AMITY UNIVERSITY
RAJASTHAN

Syllabus Revision

Amity School of Applied Sciences (ASAS)

AMITY UNIVERSITY
RAJASTHAN

AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

MATHEMATICAL PHYSICS

Course Name	Course Code	LTP	Credit	Semester
Mathematical Physics	MAP101	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	have a good grasp of the basic elements of complex analysis, including the calculation of calculus of residues. You will be able to determine the residues of a complex function and use the residue theorem to compute certain types of integrals.
CLO 2	analyze and solve standard differential equations of second order occurring in the Physical sciences
CLO 3	define Laplace transforms and its properties. The student would be able to use it to solve differential equations and mathematical problems relevant to the physical sciences.
CLO 4	expand a function in a Fourier series, and use Fourier Transform.

Course Objective:
Aim is to introduce the concept of mathematical methods and techniques which form the basis to study the post graduate level Physics Courses.

Module I: Complex Analysis
Functions of complex variable, derivative and Cauchy-Riemann differential equations, Cauchy's integral theorem and integral formula, Taylor's and Laurent's series, Singularities of an analytic function, Residues and their evaluation, Cauchy's residue theorem.

Module II: Linear Differential Equations
Introduction, Second order linear Ordinary Differential Equations with variable coefficients; Solution by series expansion; Legendre Polynomial, Bessel's Function, Hermite and Lagauerre Polynomials and their solutions; Physical applications; Generating functions; reccursion relations.

Module III: Laplace Transforms
Laplace transform (LT); First and second shifting theorems; Inverse LT by partial fractions; LT of derivative and integral of a function; Solution of differential equation using LT, Some simple applications of Laplace Transforms: Electric Circuit, Solution of Simultaneous differential equation by LT, Solution of Partial Differential Equation by LT, Laplace Transform of delta function and their uses.

Module IV: Fourier Transforms

Fourier series; Partial sums; Fourier integral and transforms; Fast Fourier Transforms, Fourier Transform of delta function and their uses., Physical Application of Fourier series Analysis :Forced Vibartion, Reimann Zeta Function and Half wave rectifier

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage%	15	10	20	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- L.A. Pipes and L.R. Harvill, Applied Mathematics for Engineers and Physicists, McGraw-Hill, New Delhi (1970).
- G. B. Arfken and H.J. Weber, Mathematical Methods for Physicists, 5th edition, Academic Press, London (2001).
- E. Kreyszig, Advanced Engineering Mathematics, 5th edition, Wiley Eastern (1991).

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CLASSICAL MECHANICS

Course Name	Course Code	LTP	Credit	Semester
Classical Mechanics	MAP102	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe mechanics of system particles and various principles.
CLO 2	Demonstrate Lagrangian and Hamiltonian equations
CLO 3	Integrate twobody central force problems
CLO 4	Integrate theprinciples to solve various motion related problems.

Course Objective:
A detailed exposition of classical mechanics for the students, opting for physics is vitally important for a clear understanding of recent intricate theories of quantum mechanics, Modern Physics and research to build a well developed and conceptualized foundation.

Module I: Symmetries and Conservation Laws
Mechanics of a system of particles, constraints, D'Alembert's principle, Variational calculus and its applications, Hamiltons variational Principle, Lagrangian equations, applications of Lagrangian formulation, conservation theorems and symmetry properties.

Module I1: Hamiltonian Formulation
Hamiltonian equation of motion, applications of hamiltonian formulation, Principle of least action, the equations of canonical transformations, cyclic coordinates, phase space and Liouville's theorem, Poisson bracket, Jacobi's Indentity .

Module III: Central Force Problem
Reduction to one body problem, equation of motion and first integral, one dimensional problem and classification of orbits, Differential equation for the orbit, Kepler problem and planetary motion, Rutherford formula, scattering in central force field, transformation to laboratory frames.

Module IV: Rigid Body and Vibrating System
Euler angles, tensor of inertia, kinetic energy of a rotating body, symmetric top and applications. Vibrating string, solution wave equation, normal vibrations, dispersion, coupled vibrating system.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	10	20	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- H. Goldstein, Classical Mechanics, 2nd edition, Narosa Publishing House (1994).
- W. Greiner, Classical Mechanics, Springer-Verlag (2003).
- Classical mechanics – S.L.Gupta, Meenakshi Prakashan, 1970, New Delhi.

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ELECTRONICS

Course Name	Course Code	LTP	Credit	Semester
Electronics	MAP103	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Design and explain the basics of digital electronic circuits.
CLO 2	Explain the principle and circuitry of digital circuits.
CLO 3	Explain the principle of operation for microprocessor, architecture and programming.

Course Objective:
The main aim of the course is to give concept of Electronics which are useful for research and industrial application.

Module I: Network Analysis
Kirchoff's laws, Thevenin, Norton's theorems, superposition, reciprocity, compensation theorems, Source transformation, Delta and Star transformations.

Module II: Amplifiers and Oscillators
CE, CB, CC amplifier, RC coupled amplifier, Low frequency gain, High frequency gain, Miller Effect, Transformer coupling, Push-Pull amplifier, Wien bridge and phase shift oscillators, Crystal oscillators

Operational Amplifiers: Differential amplifier-circuit configurations, CMRR. Operational amplifier: characteristics, frequency response, slew rate. Inverting and non-inverting amplifiers, Feedback types, Applications: current to voltage and voltage to current conversion, Voltage follower, Sum and difference amplifiers, Integrating and differentiating circuits, Phase Lock Loop (PLL), Multivibrator circuits, Triangle and square wave generation, NE 555, 556 timers, Voltage controlled oscillator, Filter – types and characteristics

Module III: Modulation and Demodulation
Analog modulation systems-amplitude, frequency and angle modulation and demodulation systems, spectral analysis of these operations, super heterodyne receivers, Basic sampling theorems. Pulse code modulation (PCM), differential pulse code modulation (DPCM), delta modulation (DM). Digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK). Multiplexing - time division and frequency division. Signal- to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Applications of Modulation Techniques in Radio wave Commutation and Telecom mutation.

Module IV: Architecture and Programming
8085 Microprocessor Architecture - Programmer's model - Registers - ALU - Control units - Stacks - Complete instruction set of 8085 - State transition and timing diagrams - T States - Machine cycles - Instruction cycles - Fetch, Execute, overlap in instruction cycles - Addressing modes - Assembly language programs - use of arithmetic, logical, Data transfer, stack and I/O instructions in programming - Subroutines.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	10	20	5	50

CT – Class Test,S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
- A.P. Malvino, Electronics: Principles and Applications, Tata McGraw-Hill (1991).
- G.B. Calyton, Operation Amplifiers, ELBS (1980).
- J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
- R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003).
- R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill (2007)

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ELECTROMAGNETIC THEORY

Course Name	Course Code	LTP	Credit	Semester
Electromegnetic Theory	MAP104	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop the concepts related to EM waves.
CLO 2	Explain the principle and solution of EM waves in physical worlds.
CLO 3	Explain the applications of maxwells equation.

Course Objective:
The main aim of the course is to give concept of Electromagnetic field theory which is useful for research and industrial applications.

Module I: Electromagnetic (EM) Fields and Potentials
Electrostatics: Laplace and Poisson equations. Boundary value problems. Dirichlet and Neumann boundary conditions. Method of images. Magnetostatics: Ampere's law and Biot-Savart's law. Maxwell equations. Boundary conditions on field vectors D, E, B and H. Vector and scalar potentials. Gauge transformations: Lorentz and Coulomb gauges. Energy density of Fields and Poynting's theorem.

Module II: Maxwell's Equations & Electromagnetic Waves
Propagation of waves in free space, dielectrics, semiconductor and conducting media. Wave propagation through ionized medium. Propagation of EM waves in anisotropic medium. Reflection and refraction of electromagnetic waves. Fresnel's equations. Normal and Anomalous dispersion. Dispersion in Gases, Solids and Liquids, ClasusiusMossotti relation; Scattering and scattering parameters, scattering theory of EM waves.

Module III: Guided Waves and Radiation
Guided Waves, Surface waves, Parallel plane guiding system, Modes of Rectangular and cylindrical waveguides, Cavity Resonator. Transmission line- circuit representations.Vector Potential due to a current distribution, Short Antenna, Half-Wave dipole. Radiation from moving charges, Lienard-Wiechert potentials, retarded potentials. Cherenkov radiation.

Module IV: Relativistic Electrodynamics
Introduction, Magnetism as a relativistic phenomenon, Four vectors, Four vector Electromagnetic Potentials, Covariance of Electrodynamics, Lorentz Transformation of Fields.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	10	20	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Electromagnetics – Kraus & Carver, TMH, 1973.
- Introduction to electrodynamics, D. J. Griffith, Benjamin-Cummins (1999)

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COMPUTER PROGRAMMING USING C LANGUAGE

Course Name	Course Code	LTP	Credit	Semester
Computer Programming Using C Language	MAP105	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe Programming in C
CLO 2	Demonstrate Fundamental Features in C
CLO 3	Discuss Arrays and Functions
CLO 4	Understand Advanced Features in C

Course Objective:
The objective of this course is to acquaint the students with the fundamentals of computer system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced Features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	10	20	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

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ELECTRONICS LAB

Course Name	Course Code	LTP	Credit	Semester
Electronics Lab	MAP120	0:0:4	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe transient response of a series LCR circuit
CLO 2	Demonstrate operational amplifier as Voltage follower, Current follower and clipper
CLO 3	Understand DC gate control characteristics
CLO 4	Study TTL NAND and NOR gate

List of Experiment (Any Eight)

1. To study the transient response of a series LCR circuit and calculate its resonant frequency, damping factor, quality factor, relaxation time and logarithmic decrement.
2. To design the two stages RC Coupled CE Amplifier and plot the variation of voltage gain with change in frequency of carrier wave.
3. To study modulation and demodulation of Audio Frequency wave
4. To study the phase shift oscillator and determine the frequency of oscillation, current gain h_{fe} and input impedance of the transistor h_{ie}.
5. To study an operational amplifier circuit and use it as
6. Adder (b) Subtractor (c) differentiator and (d) Integrator
7. To study the operational amplifier as Voltage follower, Current follower and clipper.
8. To study the operational amplifier as inverting amplifier and Non-Inverting amplifier.
9. To study of DC gate control characteristics and Anode current characteristics of silicon controlled rectifier (SCR).
10. To design and calculate frequency of Astable and Monostable Multivibrator using Transistor circuit.
11. To design and calculate frequency of Bistable Multivibrator using Transistor circuit.
12. To design and calculate frequency of Astable and Monostable Multivibrator using 555 Timer for different duty cycles.
13. To design and calculate frequency of Bistable Multivibrator using 555 Timer for different duty cycles.
14. To design and study the Study TTL NAND and NOR gate.

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	15	10	20	5	50

TA : Teacher Assessment,V: Viva, LR: Lab Record EE: External Examination

Text & References:

- J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
- A.P. Malvino, Electronics: Principles and Applications, Tata McGraw-Hill (1991).
- G.B. Calyton, Operation Amplifiers, ELBS (1980).
- J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
- R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003).
- R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill (2007)

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COMPUTER PROGRAMMING LAB USING C LANGUAGE

Course Name	Course Code	LTP	Credit	Semester
Computer Programming Lab using C Language	MAP121	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe C program to print the result of the quadratic equation
CLO 2	Demonstrate C program to arrange a list of numbers using any sorting method
CLO 3	Practice C program to create, display, modify and append a file
CLO 4	Practice C program to perform arithmetic operations on an array

List of Experiments: Any 10 programs are compulsory

1 C program to print Fibonacci series.
2 C program to swap two numbers
(a) By using third variable
(b) Without using third variable
3 C program to determine largest of given three numbers
4 C program to print the result of the quadratic equation
(a) Without using if statement
(b) By using if statement
5 C program to print factorial of a number
6 C program to check whether a string is palindrome or not
7 C program to read ten values to an array variable
8 C program to perform arithmetic operations on an array
9 C program to calculate length of string using pointers
10 C program to arrange a list of numbers using any sorting method
11 C program to copy contents of a file to another file
12 C program to create, display, modify and append a file

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	15	10	20	5	50

TA: Teacher Assessment, V: Viva, LR: Lab Record EE: External Examination

Text & Reference:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

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COMMUNICATION SKILLS – I

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel offormal communication.
CLO 4	Develop and empower self with the power ofWords.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)
Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Selfintroduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - I
(SELF-DEVELOPMENT AND INTERPERSONAL SKILLS)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-I	BSS11	1:0:0	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO2	Manage your emotions and feelings more effectively to have the impact that you need
CLO3	Develop the way that you regulate and control your emotions
CLO4	Learn about your behavioral preferences to become more self-awareness

Course Objective:

This course aims at imparting an understanding of:
Self and the process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and their effect on work behavior
Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes

Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behavior
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Examination Scheme:

Components	**SAP**	**JOS**	**FC/MA/CS/HA**	**P/V/Q**	**A**
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

AMITY UNIVERSITY
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FRENCH - I

Course Name	Course Code	LTP	Credit	Semester
French-I	FLT111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts.
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To tell ones name and to spell it

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. **Les mots transparent (en sciences)**
2. **Quelquesprénomsfrançais**
3. **La prise de contact**
4. **La politesse**
5. **Les salutations**
6. **La famille**
7. **Les présentations**
8. **Quelquesspécialitésscientifiques**
9. **Les Chiffres de 0 à 20**
10. **Les ordinaux**
11. **L'adressepostale**
12. **L'adresse mail**
13. **Le numéro de téléphone**

Contenu Grammatical:

1. **Les accents**
2. **Etre au présent**
3. **Les articles indéfinis**
4. **Les pronomspersonnels**
5. **Le feminin et le masculin**
6. **Les prépositions de lieu**
7. **Les articles définis**
8. **Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent**
9. **Les adjectifspossessifs au singulier**
10. **Les pronomstoniques**
11. **L'interrogation**

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - I

Course Name	Course Code	LTP	Credit	Semester
German-I	FLG111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:

Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to**<
- talk about gender, numbers and articles.
- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Prescribed Text-Book:

- First 10 Lessons from Deutschals Fremdsprache -1A, IBH & Oxford, New Delhi, 1977
- References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
- Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
- Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
- Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

AMITY UNIVERSITY
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SPANISH – I

Course Name	Course Code	LTP	Credit	Semester
Spanish-I	FLS111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:

Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:
Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:

Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Text &References:

- Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
- Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
- Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – I

Course Name	Course Code	LTP	Credit	Semester
Chinese-I	FLC111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字， 年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

- Learn Chinese with me book-I (Major Text book), People's Education Press
- Chinese Reader (HSK Based) book-I (suggested reading)
- Elementary Chinese Reader Book-I (suggested reading)

AMITY UNIVERSITY
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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND001	0:0:2	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	literacy programs
CLO 2	activities on arts and culture
CLO 3	Innovations and Startups
CLO 4	Synopsis: writing

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

- literacy programs, in today's digital age many organizations/individuals might also need help with email and websites
- livelihood projects,
- time giving activities to adopted communities(awareness regarding Govt. programmes)sports like yoga, meditation, drills, and physical exercises in adopted areas
- activities on arts and culture such as restoration of traditional art and culture and monuments.
- understand their responsibility in taking care of environment and appreciating cultural diversity
- While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers
- A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.
- Another group may be formed for attending to old people(who have money but need assistance for market and groceries) [Time Bank]
- Another group may be formed for civic activities, awareness programmes.
- Local social problems to be taken up and solutions devised
- Innovations and Startups to be encouraged
- help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

- Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society(the object should be to empower the community and make them self-reliant)

- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- Students should also submit their certificates from the government bodies and or non government bodies they collaborate with, if any
- Photographs of Display charts or ppt/video prepared while presentation on the group community service in the Aanandam Day must be submitted along with the report
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

- Project Assessment Committee will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome result

PROCEDURE FOR EVALUATION

- Project Assessment Committee will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome results

Format for evaluation by Project Assessment Committee (Total max marks 50)

- Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
- Report contains presentation /video (max.10 marks)
- Photographs of Students' participation and involvement of community (max.10 marks)
- Problem solving and challenging issues addressed/innovation (max. 30 marks)

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted willassess the projects
For 4 months Group Community Service Projectthe grade equivalence is as follows:

Total: 64 Hrs

Grading Marks
C grade =32 hrs
B grade>32hrs to <=44hrs
A grade >44hrs to<=54hrs
O grade >54hrs to<=64hrs

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SOLID STATE PHYSICS

Course Name	Course Code	LTP	Credit	Semester
Solid State Physics	MAP201	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Have a basic knowledge of Crystal Structure and Lattice Vibrations.
CLO 2	have an understanding of the Conductors and Semiconductors
CLO 3	have an understanding thermal, electrical and optical properties of solids
CLO 4	have an understanding of the magnetic properties of condensed matter;
CLO 5	have an understanding of the recent trends in Nanoscience

Course Objective:
The aim of this course is to introduce the concept of different solids, their structure and properties which form the basis to study the post graduate level Physics Course on Solids.

Module I: Crystal Structure and Lattice Vibrations
Bravais lattices, crystal systems, point groups, space groups and typical structures, Reciprocal Lattice, Vander Waals binding: rare gas crystals and binding energies, Covalent and metallic binding: characteristic features and examples, Diffraction techniques: X-rays, neutrons, electrons, Bragg's law in direct and reciprocal lattice, Structure factor, Lattice dynamics: monoatomic and diatomic lattices, Phonon frequencies and density of states, Dispersion curves, inelastic neutron scattering.

Module II: Conductors and Semiconductors
Free electron theory of metals, Thermal and transport properties, Bloch functions, Nearly free electron approximation, Formation of energy bands. Kronig Penny Model, Brillouin zone, Effective mass, concept of holes, Fermi surface, *Semiconductors:* carrier statistics in intrinsic and extrinsic crystals, electrical conductivity, Hall Effect Electronic specific heat.

Module III: Super conducting Optical and Dielectric materials
Superconductors:Properties, BCS theory, Flux quantization, Applications, *Optical Materials:* Optical absorption, colourcentres, Trap, recombination, excitons, Photoconductivity, luminescence, *Dielectrics:* Macroscopic electric field, Local electric field in an atom, dielectric constant and polarizability, Clausius-Mossotti equation, measurement of dielectric constant, Ferroelectrics, 1^{st} order, 2^{nd} order phase transitions, Curie-Weiss Behaviour.

Module IV: Magnetic Materials
Magnetic materials:Types, Quantum theories of dia and para magnetism, *Susceptibility measurement:* Quincke's method, Ferromagnetic order, Hysterisis, Curie point and exchange intergral, Langevin's theory of paramagnetism, Quantum Theory of paramagnetism, Magnons, domain theory, Ferri and antiferrimagnetic order, Curie temperature, susceptibility and Neel Temperature.

Module V: Thin Films and Nanostructures

Difference of behaviour of thin film from bulk, preparation techniques: Thermal evaporation, sputtering, sol-gel and spin coating. Spinning and ion-implantation techniques for amorphous films. Boltzmann transport equation for a thin film, expression for electrical conductivity, optical properties of thin films. Nano materials, Nano Clusters, Nano Particles, Nano Onions and Nano Tubes.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**Attendance**	**EE**
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition.
- A.J. Dekker, SolidState Physics, Prentice Hall of India (1971).
- N.W. Ashcroft and N.D. Mermin, SolidState Physics, SaundersCollege Publishing (1976).
- Ali Omar, Elementary SolidState Physics, Narosa Publishing House.
- J.S. Blakemore, Solid State Physics, 2nd edition, Cambridge University Press (1974).

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STATISTICAL MECHANICS

Course Name	Course Code	LTP	Credit	Semester
Statistical Mechanics	MAP202	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop the concepts related to entropy.
CLO 2	Explain the Fermi-Dirac and Bose-Einstein statistics.
CLO 3	Explain the Kinetic theory of a gas, black body radiation.

Course Objective:
The aim of the course is to introduce the concept of statistical mechanics and applications to various problems in applied Physics.

Module I
Review of phase space, Liouville's theorem, basic postulates of statistical mechanics, ensembles: microcanonical, canonical, grand canonical, and isobaric, connection to thermodynamics, fluctuations, applications of various ensembles, equation of state for a non-ideal gas, Van der Waals' equation of state, Meyer cluster expansion, virial coefficients.

Module II
Relation between entropy and probability, Boltzmann's equation, Maxwell & Boltzmann statistics, Equipartition theorem and its Simple applications. i) Mean kinetic energy of a molecule in a gas ii) Brownian motion iii) Harmonic Oscillator iv) Specific heat of solid. Maxwell velocity distribution, Related distributions and mean values.

Module III
Fermi-Dirac and Bose-Einstein statistics. Applications of the formalism to: (a) Ideal Bose gas, Debye theory of specific heat, properties of black-body radiation, Bose- Einstein condensation, experiments on atomic BEC, BEC in a harmonic potential.(b) Ideal Fermi gas, properties of simple metals, Pauli paramagnetism, electronic specific heat, Compressibility of Fermi gas, A relativistic degenerate electron gas.

Module IV
Kinetic theory of a gas, black body radiation, Rayleigh Jeans' formula, Wien's law, Planck radiation law, master equation and irreversibility, Fokker-Planck equation, ergodic theorem. Langevin equation, fluctuation-dissipation theorem, Einstein model of lattice vibrations, Phonons, Debye's theory of specific heat of solids, Random Walk Problem.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- F. Reif, Fundamentals of Statistical and Thermal Physics, International Students Edition, Tata McGraw-Hill (1988).

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QUANTUM MECHANICS

Course Name	Course Code	LTP	Credit	Semester
Quantum Mechanics	MAP203	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain perturbation theory and apply them to problems such as Zeeman effect etc.
CLO 2	Identify and examine the process of scattering process and apply the theory to real physical examples.
CLO 3	Solve and explain Klein Gordon and Dirac equation.
CLO 4	The student will also recognise symmetry principles and can apply the basics of the concept of field.

Course Objective:
The course is intended to introduce the concept of quantum mechanics to students at the advanced level so that they can solve problem of various branches of Physical Sciences.

Module I: Approxmation Methods:
Time-independent Perturbation theory (non-degenerate and degenerate) and applications to fine structure splitting, Zeeman effect (Normal and anomalous), Stark effect, Variational method – Ground state of helium atom, W.K.B approximation, Application to bound states.

Module II: Time Evolution:
Time dependent perturbation theory, The Fermi golden rule and application, Adiabatic Approximation, Sudden Approximation, Semi classical and quantum theory of radiation, Einstein Coefficients, Charged Particle in an Electromagnetic field, Rayleigh and Raman scattering – Selection rules.

Module II: Scattering Theory:
Differential and total Scattering cross-sections laws, partial wave analysis and application to simple cases; Integral form of scattering equation, Born approximation validity and simple applications.

Module IV: Relativistic Quantum Mechanics & Field Quantization:
Klein Gordon equation, Dirac equation, Covariance of Dirac equation, negative energy solutions, Dirac hole theory, Lagrangian density and equation of motion for field, Symmetries and conservation laws, electromagnetic field and Dirac field, Problem in quantizing electromagnetic field,

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	15	15	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Quantum Mechanics: L.I. Schiff.
- Modern Quantum Mechanics: J.J. Sakurai.

AMITY UNIVERSITY
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NUMERICAL METHODS AND DATA ANALYSIS

Course Name	Course Code	LTP	Credit	Semester
Numerical Methods and Data Analysis	MAP204	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use the different methods of approximation methods to solve polynomials and simultaneous equations
CLO 2	Use various standard methods of interpolation to solve numerical problems.
CLO 3	Use numerical methods of differentiation and integration to solve the problems on integration and differentiation
CLO 4	Analyse and interpret data

Course Objective:
The objective of the present course is to introduce some advanced measurement, numerical methods and data analysis commonly used in research to the post graduate students.

Module I:Solution of Algebraic and Transcendental Equations
Bisection method, Muller's method, Newton-Raphson method, Solution of simultaneous linear equations: Gauss' Elimination Method, Jacobi iterative method, Gauss-Seidel method.

Module II: Finitedifference, Interpolation and Curve fitting
Finite differences, Newton's formula for interpolation, Gauss, Stirling, Bessel's, Everett's formulae, Divided differences, Newton's general interpolation formula, Lagrange's interpolation formula, Method of Least square curve fitting, straight line and quadratic equation fitting, curve fitting by sum of exponentials.

Module III:Numerical Differentiation, IntegrationandOrdinary Differential Equations
Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson 1/3 and 3/8 rules, Gauss quadrature formula. Numerical solution of ordinary differential equations, Euler, Picard and Runge-Kutta methods.

Module IV: Data Analysis
Data interpretation and analysis: Precision and accuracy, error analysis, propagation of errors, Gaussian distribution, determination of mean value and standard deviation of the continuous Gaussian distribution, graphical representation of functional relationship, linear and nonlinear least square curve fitting, chi-square test for goodness of fit.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage%	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text &References:

- Introductory Methods of Numerical analysis by S.S. Shastri, Pearson education
- Introduction to Numerical Analysis by C.E. Froberg, Addison –Wesley 1981.
- Numerical Analysis by E. Scheid, Mc Graw Hill 1988.
- Numerical methods for scientific & Eng. Computations by Jain, Iyengar, New Age Int., Delhi.
- Elementary Numerical Analysis, K Atkinson, Wiley 1985.

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NANOTECHNOLOGY

Course Code: MAP205 **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Nanotechnology	MAP205	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Theoretical and practical knowledge related to modern nanotechnology with quantum confinement effect.
CLO 2	Synthesis and characterization of materials.
CLO 3	Working process of electron microscopy and spectroscopy to understand properties of nanomaterials.
CLO 4	The skills needed to report and present results in a professional manner. The ability to evaluate.

Course Objective:
The objective of the present course is to introduce Nanoscience and nanotechnology. The course also provides the fundamentals of Nanoscience & nanotechnology and some of its applications. The course further provides the introduction of some of the Synthesis and characterization techniques.

Module I: Introduction to Nanostructures
Emergence of Nanoscience with special reference to Feynman and Drexler; Role of particle size; Spatial and temporal scale; Concept of confinement, strong and weak confinement with suitable example; Development of quantum structures, Basic concept of quantum well, quantum wire and quantum dot, Basic of Nanoparticles, Nanowires, Nanorods, Nanoclusters,

Module II: Applications of Nanomaterials
Details of nanostructured materials, Importance, properties and application of CNT and Fullerenes, Applications in Sensors, clothes, paints, health care, electronics, computers, and other industrial and consumer products

Module III: Synthesis of nanomaterials
Nanoscale fabrication techniques, Molecular self-assembly, wet chemical synthesis, top down and bottom up approaches

Module IV: Instrumentation and Advanced Characterization techniques for nanomaterials
Vacuum & Pumps - Basic Principles and applications

Transmission electron microscope (TEM), Scanning electron microscope (SEM), Scanning Tunneling Microscopy (STM), Atomic Force microscope (AFM), Magnetic Force Microscope (MFM), UV-VIS spectrophotometer : Single beam & double beam including diode array instruments, Infra-redspectrophotometer, Powder method of X-ray diffraction, Fourier Transform Infrared spectroscopy, Fourier transform techniques, Raman spectrometer, Photoelectron spectrometer, NMR spectrometer & ESR spectrometer,

Suggested Books:

- Edelstein A. A. and Cammarata R.C., "Nanomaterials-Synthesis Properties and Applications", Institute of Physics Publishing, London, 1998.
- Poole, Jr. CP and Owens, FJ, "Introduction to Nanotechnology", Wiley India, 2006.
- Shik, A, "Quantum Wells: Physics and Electronics of two-dimensional systems", World Scientific, 1999.
- Benedek et al G., "Nanostructured Carbon for advanced Applications", Kluwer Academic Publishers, 2001.
- Harrison, P, "Quantum Wells, Wires, and Dots: Theoretical and Computational Physics", John Wiley, 2000.
- Mitin, VV, Kochelap, VA and Stroscio, MA "Quantum Heterostructures: Microelectronics and Optoelectronics", Cambridge University Press, 1999.
- Instrumentation, Measurement and Analysis, B C Nakra and K K Chaudhary, Tata McGraw – Hill Publishing House, New Delhi.
- Modern Techniques of surface science, Woodruf&Delchar, Cambridge, UK.
- Principles of Instrumental Analysis, Skoog, Holler, Nieman, Thomson Press.

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OPTICAL FIBERS AND COMMUNICATIONS

Course Name	Course Code	LTP	Credit	Semester
Optical Fibers and Communication	MAP206	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe optical fiber
CLO 2	Explain the modal analysis of step index multimode and graded index fiber
CLO 3	Explain optical sources, detectors and amplifiers
CLO 4	Describe fiber optical communication components and system

Course Objective:
The objective of the present course is to introduce fundamentals of optical fibers, detectors and amplifiers and their applications in Physics.

Module I: Optical Fiber Fundamentals
Need for fiber Optic Communication, Optical fibers - their classification,
Light propagation in optical fiber, Acceptance angle and numerical aperture, Losses in optical fiber: absorption loss scattering loss, bending loss, and splice loss. Pulse propagation in dispersive medium, pulse broadening, Intermodal and intramodal dispersion, group velocity dispersion (material and waveguide).

Module II: Modal Analysis of step index multimode and graded index fiber
Characteristics equation of step index multimode fiber, Transverse Electric (TE), Transverse magnetic (TH) and Hybrid modes, linearly polarized modes, V parameter, mode cutoff, Mode field diameter, Modal analysis of graded index fiber.

Module III: Optical Sources, Detectors and Amplifiers
Types of Optical Sources, Light emitting diodes (LED), Edge emitting LEDs, Coupling of LEDs with fibers, Semiconductor Lasers; Detectors: Photoconductors, Photodiodes, Avalanche Photodiodes and Phototransistors, Amplifiers: Semiconductor Laser Amplifiers, characteristics, advantages and drawback, Erbium Doped Fiber Amplifier (EDFA), gain and noise in EDFA and noise figure.

Module IV: Fiber Optical Communication Components and System
Coupling Components- couplers, connectors and splices, Modulators and Modulation methods, Transmitters, Receivers, Repeaters and switches; Transmitter, Receiver and link design, Line codes for optical fiber links, wavelength division multiplexing (WDM) and Optical Division Multiplexing.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text &References:

- John. M. Senior, Optical fiber communications: principles and practice, Prentice Hall of India.
- Gerd Keiser, Optical fiber communications, McGraw Hill, 3rd edition.
- D. K. Mynbaev, L. L. Scheiner, Fiber optic communication technology, Pearson Technology.
- Introduction to fiber optics, AjoyGhatak and K. Tyagrajan.
- R. P. Khare, Fiber optic and optoelectronics, OxfordUniversity press.
- Light wave Communication Systems: A practical prospective: R Papannareddy, PenrumInternational Publishing
- Fundamental of photonics, Saleh and Teich, Wiley Interscience, 2nd Edition, 2007.

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MAT LAB

Course Code: MAP 221 **Credit Units: 02**

Course Name	Course Code	LTP	Credit	Semester
MAT Lab	MAP221	0:0:4	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding the theory and practice of .m files and Simulink libraries.
CLO 2	Demonstrate Root Finding
CLO 3	Discuss decaying and growing functions
CLO 4	Plot 3D contour lines and sine plot

List of Experiment:

List of Experiment:

Theory and practice of .m files and simulink libraries.

1. Plot the results of certain basic arithmetic operations:

a) addition, multiplication etc.

b) exponential, logarithm etc.

c) trigonometry, complex numbers.

2. Working with arrays of numbers:

a) straight line plots.

b) operation on vectors.

c) matrices, circles.

3. Graph plots:

a) sine plots

b) decaying and growing functions.

c) overlay plots.

4. Programs to understand creation,saving,execution of files.

5. Programs involving matrices,manupilation using linear algebra.

6. Basic 2D and 3D plots:

a) parametric space curve.

b) polygons with vertices.

c) 3D contour lines.

7. Simple graphics problems.

8. Bubble Sort.

9. Simulating a Random Walk.

10. Root Finding:

a) Newton’s Method.

b) Bisection Method.

11. Integration

a) Trapezoidal Method.

b) Simpson’s Method.

12. Ordinary Differential Equation:

a) Euler Method.

b) Runge-Kutta Method.

Examination Scheme:

	Internal Exam				**End Sem**	
Components	**Attendance**	**PR**	**LR**	**V**	**PR**	**V**
Marks	**5**	**20**	**20**	**5**	**25**	**25**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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SOLID STATE PHYSICS LAB

Course Code: MAP 220 **Credit Units: 02**

Course Name	Course Code	LTP	Credit	Semester
Solid State Physics Lab	MAP220	0:0:4	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Study Hall Effect and to determine the Hall coefficient
CLO 2	Determine the magnetic susceptibility
CLO 3	Determine the e/m by Thomson method
CLO 4	Draw B-H Curve of a specimen

List of Experiment:

1. To study Hall Effect and to determine the Hall coefficient for doped Ge crystal.
2. To determine the energy band gap of Ge crystal using four probe method.
3. To draw B-H Curve of a specimen and determine Hysteresis loss.
4. To determine the magnetic susceptibility of the solution of paramagnetic Substance by Quincke's tube method.
5. To determine the magnetic susceptibility of the solution of diamagnetic substance by Quincke's tube method and compare its susceptibility with paramagnetic substance.
6. To find the speed of ultrasonic waves in liquids by optical diffraction method.
7. To determine the e/m by Thomson method.
8. To plot the variation of magnetic field along the axis of a circular coil using Helmholtz Tangent Galvanometer and find the reduction factor.

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	15	15	15	5	50

TA: Teacher Assessment V: Viva LR: Lab Record EE: External Examination

Text & References:

- Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition.
- A.J. Dekker, SolidState Physics, Prentice Hall of India (1971).
- N.W. Ashcroft and N.D. Mermin, SolidState Physics, SaundersCollege Publishing (1976).
- Ali Omar, Elementary SolidState Physics, Narosa Publishing House.
- J.S. Blakemore, Solid State Physics, 2nd edition, Cambridge University Press (1974).

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COMMUNICATION SKILLS - II

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS211	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE – II

(BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-II	BSS211	1:0:0	1	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:
Process of Behavioral communication
Aspects of interpersonal communication and relationship
Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication
Scope of Behavioral Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships
Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Examination Scheme:

Components	**SAP**	**JOS**	**FC/MA/CS/HA**	**P/V/Q**	**A**
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA-** Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America
  Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

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FRENCH - II

Course Name	Course Code	LTP	Credit	Semester
French-II	FLT211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. **Les loisirs**
2. **Les saisons**
3. **Les nombres**
4. **Le logement et la ville**
5. **Les prépositions de lieu**
6. **Les verbes de direction**
7. **Les lieux de l'université**
8. **Les documents administratifs**
9. **Les expressions utiliseés en classe par le professeur**
10. **Quelquesraccourcis: diminutis et sigles**

Contenu Grammatical:

1. **Aimer, faire et savoir au present**
2. **La negation**
3. **Les adjectifs possessives au pluriel**
4. **Le partitifs**
5. **Aller au présent**
6. **<<il y a>>**
7. **L'usage des prepositions de lieu**
8. **Vouloir et pouvoir au présent**
9. **L'impératif**
10. **Le conditionnel de politesse**

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

AMITY UNIVERSITY
RAJASTHAN

GERMAN – II

Course Name	Course Code	LTP	Credit	Semester
German-II	FLG211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

Prescribed Text-Book:

- **Lesson 11 onwards from Deutschals Fremdsprache -1A, IBH & Oxford, New Delhi, 1977**
- **References**: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
- **Tangram A1**by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
- **Sprachtraining**A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
- Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

AMITY UNIVERSITY
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SPANISH – II

Course Name	Course Code	LTP	Credit	Semester
Spanish-II	FLS211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:

Vocabulary:
Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:
Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:

Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary

Text &References:

- Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
- Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
- Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – II

Course Name	Course Code	LTP	Credit	Semester
Chinese-II	FLC211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:

12. Words of location

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References

- Learn Chinese with me book-I (Major Text book), People's Education Press
- Elementary Chinese Reader Book-I (suggested reading)
- Chinese Reader (HSK Based) book-I (suggested reading)
- Practical Chinese Grammar for foreigners (suggested reading)

AMITY UNIVERSITY
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ANANDAM

Course Code: AND002 **CreditUnits: 02**

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND002	0:0:2	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	literacy programs
CLO 2	activities on arts and culture
CLO 3	Innovations and Startups
CLO 4	Synopsis: writing

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

- literacy programs, in today's digital age many organizations/individuals might also need help with email and websites
- livelihood projects,
- time giving activities to adopted communities(awareness regarding Govt. programmes)sports like yoga, meditation, drills, and physical exercises in adopted areas
- activities on arts and culture such as restoration of traditional art and culture and monuments.
- understand their responsibility in taking care of environment and appreciating cultural diversity
- While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers
- A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.
- Another group may be formed for attending to old people(who have money but need assistance for market and groceries) [Time Bank]
- Another group may be formed for civic activities, awareness programmes.
- Local social problems to be taken up and solutions devised
- Innovations and Startups to be encouraged
- help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

- Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society(the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted

- Media coverage of the projects should be attached if any
- Students should also submit their certificates from the government bodies and or non government bodies they collaborate with, if any
- Photographs of Display charts or ppt/video prepared while presentation on the group community service in the Aanandam Day must be submitted along with the report
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

- Project Assessment Committee will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome result

PROCEDURE FOR EVALUATION

- Project Assessment Committee will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome results

Format for evaluation by Project Assessment Committee (Total max marks 50)

- Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
- Report contains presentation /video (max.10 marks)
- Photographs of Students' participation and involvement of community (max.10 marks)
- Problem solving and challenging issues addressed/innovation (max. 30 marks)

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted willassess the projects
For 4 months Group Community Service Projectthe grade equivalence is as follows:

Total: 64 Hrs

Grading Marks
C grade =32 hrs
B grade>32hrs to <=44hrs
A grade >44hrs to<=54hrs
O grade >54hrs to<=64hr

AMITY UNIVERSITY
RAJASTHAN

ATOMIC AND MOLECULAR PHYSICS

Course Code: MAP301 **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Atomic and Molecular Physics	MAP301	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the atomic spectra of one and two valance electron atoms.
CLO 2	Explain the change in behavior of atoms in external applied electric and magnetic field.
CLO 3	Explainrotational, vibrational, electronic and Raman spectra of molecules.
CLO 4	Describe electron spin and nuclear magnetic resonance spectroscopy and their applications.

Course Objective:
The aim of this course is to give the basic ideas about the structure of atoms and molecules, electronic structure, interaction of radiation and external fields with atoms and molecules.

Module I
Quantum states of one electron atoms, Hydrogen spectrum, Larmor's theorem, Magnetic moment and Bohr magnetron, Spin orbit interaction, hydrogen fine structure, Vector atom model , two electron systems, LS and jj Coupling schemes, spectroscopic terms, equivalent and non equivalent atoms, Helium atom spectrum, spectra of alkali atoms, Nuclear spin, magnetic moment, isotopic effect and Hyperfine structure, Normal and anomalous Zeeman effect, Paschen Back effect, Stark effect.

Module II
Rotational spectra of diatomic molecules as a rigid rotor and non rigid rotor, intensity of rotational lines, Diatomic molecule as a simple harmonic oscillator, vibrational energy of diatomic molecule, Anharmonicity, Vibrational-rotational spectra, Raman effect,quantum theory of Raman effect, rotational Raman spectra, vibrational Raman spectra .

Module III
Electronic band spectra, electronic energy and total energy, vibrational structure of electronic transitions, rotational structure of electronic bands, The branches(P,Q,R) of band, Band head formation. Intensities in electronic bands, Frank-Condon principle, Fortrat diagram.

Module IV
Interaction of atoms in the formation of molecules, covalent, ionic bonding and vander Waal's interactions, concept of molecular potential, Born-oppenheimer approximation, Electronic states of diatomic molecules, Electronic angular momenta, The LCAO approach, states for hydrogen molecular ion, Coulomb, exchange, overlap integral, symmetries of electronic wavefunctions .Term symbols for simple molecules.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Arthur Beiser, Concepts of Modern Physics, 6th edition, Tata McGraw-Hill, New Delhi (2003).
- G. Aruldhas, Molecular Structure and Spectroscopy, Prientice Hall of India, NewDelhi (2002). I, Chapmen
- B.P. Straughan, Spectro& S. Walker scopy: Vol. and Hall (1976).
- G.M Barrow, Introduction to Molecular Spectroscopy, McGraw Hill Ltd., Singapore (1986).
- Introduction to Atomic Spectra, H. E. White, McGraw-Hill

AMITY UNIVERSITY
RAJASTHAN

NUCLEAR PHYSICS

Course Name	Course Code	LTP	Credit	Semester
Nuclear Physics	MAP302	3:1:0	4	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Comprehension knowledge of the Properties of deuteron. .
CLO 2	Comprehension knowledge of Nucleon-nucleon scattering.
CLO 3	Nuclear fusion and fission.
CLO 4	Liquid drop model, Shell model
CLO 5	Enormous learning of Elementary particles.

Course Objective:
The aim of the course is to introduce the concept of nuclear structure, nuclear forces and nuclear reactions for a clear understanding of recent intricate theories of nuclear physics.

Module I: Two-Body Problems and Nuclear Forces
Properties of deuteron, Schrödinger equation for the deuteron and the ground state; rms radius, spin dependence of nuclear forces, electromagnetic moment of deuteron and the necessity of tensor forces. Nucleon-nucleon scattering, experimental n-p scattering data, partial wave analysis of n-p scattering, phase shifts, singlet and triplet potentials, effective range theory, low energy p-p scattering, meson theory of nuclear forces, Charge independence and charge symmetry; spin dependence, S-wave effective range theory; central and tensor forces, dipole and quadruple moments of deuteron.

Module II:Nuclear Reactions
Compound nucleus and Direct reactions (elastic, inelastic, transfer, break-up), Nuclear fusion, Laser induced fusion, Quantum mechanical theory, Resonance scattering and reactions, Dispersion relation, Nuclear fission: experimental features, spontaneous fission, barrier penetration, statistical model.

Module III: Nuclear Structure
Liquid drop model, Shell model (extreme single particle), magnetic moment, quadruple moment; Collective models; concept of unified model (vibrational states, deformed nuclei, rotational states).

Module IV: Elementary Particle Physics Elementary particles (quarks, baryons, mesons, leptons), spin and parity assignments, Isospin strangeness, GellmannNishijima formula, C, P and T invariance and applications of symmetry arguments to particle reactions.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- J. M Blatt and V.E. Weisskipf: Theoretical Nuclear Physics
- B.K. Agrawal : Nuclear Physics, Lokbharti Pub, Allahabad. 1989
- RR Roy and B.P.Nigam, Nuclear Physics, Willey-Easter, 1979
- M.A. Preston & RK Bhaduri-Structure of the Nucleus, Addision Wesley, 1975
- RD. Evans-The Atomic Nucleus(McGraw-Hills, 1955)
- B.L. Cohen - Concept of Nuclear Physics Tata Mc-Graw Hills, 1988
- Kenneth S. Krane, Introductory Nuclear Physics, Willey-Easter

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LASERS AND THEIR APPLICATIONS

Course Name	Course Code	LTP	Credit	Semester
Laser and Their Applications	MAP303	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain processes like absorption and emission.
CLO 2	Appreciate and understand the various types of Lasers.
CLO 3	Explain and compare various line broadening mechanism.
CLO 4	Knowledge of Spectroscopy and various applications and properties of LASER

Course Objective:

The aim of the present course is to acknowledge the students with different types of lasers and its applications.

Module I Stimulated Absorption, Stimulated Emission and spontaneous Emission :Absorption and Gain Coefficient. Radiative Lifetime and Spontaneous Transition Probabilities. Saturation: Saturation of Absorption. Gain Saturation. Widths and Profiles of Spectral Lines: Homogeneous and Inhomogeneous Broadening. Natural Linewidth. Doppler Width. Collision Broadening of Spectral Lines.

Module II

Basic principles of LASERS Laser Amplification. Laser Oscillation.Optical and Electrical Pumping. Optical Resonators. Optimization of Favourable Losses in Resonators. Resonance Frequencies of Optical Resonators. Laser Modes. Rate Equations for Three-Level and Four-Level Lasers. Steady State Output. CW and Transient Laser Behaviour. Single-Mode Operation. Q-Switching. Mode Locking.

Module III

Types of Lasers. Solis State lasers (Ruby laser, Semiconductor laser, Nd: YAG laser), Gas lasers (He-Ne laser, Excimer laser), Liquid (organic dye) lasers.

Module IV

Doppler limited Absorption and Fluorescence Spectroscopy with lasers, Fluorescence Excitation Spectroscopy and LIF. Non- linear Spectroscopy. Doppler- Free Techniques in Spectroscopy. Laser Raman Spectroscopy, Time-Resolved Laser Spectroscopy. Properties of Lasers, Applications of Lasers.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- K.Shimoda : Introduction to Laser Physics; (Springer-Verlag)
- O. Svelto : Principles of Lasers (plenum Press)
- 3. D.C. OShea, W.R. Callen & W.T. Rhodes. Introduction to Lasers and their Applications (Addison-Wesley)
- W Demtrder. Laser Spectroscopy A Basic Concepts and Instrumentation (SpringerVerlag)
- A. Corney : Atomic and Laser Spectroscopy (Clarendon Press)
- Thyagarajan and Ghatak : Lasers- Theory and Applications

AMITY UNIVERSITY
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MATERIAL SCIENCE

Course Name	Course Code	LTP	Credit	Semester
Material Science	MAP304	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Comprehension knowledge of Defects, Diffusion and Phase Equilibrium.
CLO 2	Immense understanding of Electrical and Optical properties of solids
CLO 3	Knowledge of Nanomaterials.
CLO 4	Describe applications of Materials in Devices

Course Objective:
The aim of the present course is to acknowledge the students with various types of material fabrication and their characterizations.

Module I: Defects, Diffusion and Phase Equilibrium
Crystal defects, Laws of Diffusion, Diffusion coefficient: Temperature dependence, Phase Diagram, Eutectic Point, Gibb's Phase rule, Phase Transformations, Martensitic Phase Transformation, Phase Equilibrium, Homogeneous and Heterogeneous nucleation.

Module II: Electrical and Optical properties of solids
Electrical resistivity of metal, alloys and polycrystalline metal films. Boltzmann transport equation for a thin film Electrical conductivity of ionic crystals and glasses, Concept of dangling bonds, localized and extended states, mobility edge, Complex susceptibility, Time dependent electric polarization, Thermally activated process, Activation energy, Refraction and Absorption, Complex refractive index, Kramers-Kronig Relations, Reflection: Total internal reflection and magneto-optical effect.

Module III: Nanomaterials
Introduction to nanoparticles and nanostructures, Carbon nano particles, Carbon nanotubes, Synthesis techniques, Physical vapour deposition, Chemical vapour deposition, laser ablation. Langmuir Blodgett films, Fabrication of ordered nanostructures: Self assembled monolayer (SAM). Basic characterization techniques for nanomaterials: Secondary ion mass spectrometryApplications of nanotechnology.

Module IV: Applications of Materials in Devices Semiconductor devices: Transferred electron devices, Thyrestors. Semiconductor thermal sensors, Piezoelectricity: Electromechanical devices, Piezoelectric strain gauge, Ultrasonic cleaner, Ultrasonic Imaging, Ferroelectricity, Ferroelectric devices: bimorphs and multilayer actuators, Ceramic capacitors, chip capacitors, Optoelectronic devices: LED, Solar cell. Chemical sensors: Gas sensor, Ferroelectric Liquid Crystals, Liquid crystal display devices.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text &References:

- Materials Science, M S Vijaya and G Rangrajan, Tata McGrawhill, 2011.
- Materials Science and Engineering: An Introduction, W.D. Callister, Wiley India, (2010).
- SolidState Physics: Essential Concepts, D W Snoke, Pearson Education (2009).
- Ferroelectric Devices, K Uchino, Marcel Dekker Inc. (2000).
- Physics of Semiconductor Devices, S M Sze, Wiley (2007).
- Liquid Crystal, Laptops and Life, Michael R. Fisch, Word Scientific (1991).
- Liquid Crystals – Applications and Uses, Volume I, II, III, B. Bahadur (1990).
- Synthesis, Characterization and Application of Smart Materials, R. Rai, Nova Publishers USA (2012).

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LASER AND FIBRE OPTICS LAB

Course Name	Course Code	LTP	Credit	Semester
Laser and Fibre Optics Lab	MAP320	0:0:4	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Determine wavelength of a given laser source
CLO 2	Study Propagation loss & bending loss using Optical Fiber
CLO 3	Study the frequency modulation & demodulation by using Fiber Optic Lin
CLO 4	Determine the band width of an optical receiver

List of Experiments

1. To determine wavelength of a given laser source.
2. To determine the Diameter, Divergence and Focus Spot Size of a Laser Beam.
3. To measure the degree of polarization using laser.
4. To study Propagation loss & bending loss using Optical Fiber.
5. To study the characteristics of LED & Detector using Fiber Optic.
6. To determine the numerical aperture of a given optical fiber.
7. To study the frequency modulation & demodulation by using Fiber Optic Link.
8. To study the modulation & demodulation of light source by Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) techniques.
9. To determine the band width of an optical receiver and to calculate the signal to noise ratio (SNR) using Fiber Optic.

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	15	15	15	5	50

TA: Teacher Assessment, V: Viva, LR: Lab Record EE: External Examination

Text & Reference:

- John. M. Senior, Optical fiber communications: principles and practice, Prentice Hall of India.
- Gerd Keiser, Optical fiber communications, McGraw Hill, 3rd edition.
- D. K. Mynbaev, L. L. Scheiner, Fiber optic communication technology, Pearson Technology.
- Introduction to fiber optics, AjoyGhatak and K. Tyagrajan..

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OPTICS LAB

Course Name	Course Code	LTP	Credit	Semester
Optics Lab	MAP321	0:0:4	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Determine the mean wavelength of sodium light
CLO 2	Measure the grating element of grating
CLO 3	Verify the Fresnel's formula for reflection and refraction
CLO 4	Thickness of a thin transparent sheet using Michelson Interferometer

List of Experiment:

1. To determine the mean wavelength of sodium light and to measure the wavelength difference ($\Delta\lambda$) using Michelson interferometer.
2. To study the spectral characteristics of the incident beam using Fabry Perot Interferometer.
3. To find the intensity distribution of single, double and multiple slit by using Fraunhofer diffraction pattern.
4. To measure the grating element of grating by Fraunhofer diffraction pattern.
5. To determine the thickness of a thin transparent sheet using Michelson Interferometer.
6. To verify the Fresnel's formula for reflection and refraction by using a plane refracting surface using Spectrometer.
7. To determine the effect of magnetic field on the polarization state in dispersive medium (Faraday Experiment).
8. To determine the Planck's constant using photocell

Examination Scheme:

CoMSPonents	TA	V	LR	Attendance	EE
Weightage (%)	15	15	15	5	50

TA: Teacher Assessment V: Viva LR: Lab Record EE: External Examination

Text & References:

- Optics, A. Ghatak, Tata Mc Graw Hill.
- Jenkins and White, Fundamentals of optics, Mc Graw Hill.
- S.P. Singh, Advanced practical physics Volume I,II, Pragati Prakashan.

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DIGITAL ELECTRONICS AND MICROPROCESSORS

Course Name	Course Code	LTP	Credit	Semester
Digital Electronics and Microprocessors	MAP306	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Comprehension knowledge of Boolean Algebra
CLO 2	Immense understanding of Shift Registers and Counters
CLO 3	Knowledge of Introduction to Microprocessor
CLO 4	Describe Programming and Interfacing

Course Objective:
The main aim of the course is to give concept of Digital Electronics and Microprocessor which is useful for research and industrial application.

Module I: Boolean Algebra
Truth tables Logic gates: OR, AND, Inverter gates, The Universal NOR and NAND gates, XOR and XNOR gates, De-Morgan's Theorem, Reduction Technique Karnaugh MP simplification. Parity check. The half adder, the Full adder, Parallel binary adder, half and full subtractors.

Sequential Logic: Latches, R.S. Flip/Flop, The D.Flip/Flop, T.Flip/Flop, J.K. Flip/flop, Master/ slave flip/flop, Race Problem, Binary Ripple counter, modified counters using Negative feedback.

Module II: Shift Registers and Counters
Universal Shift Register, shift counter, Ring Counter, D/A converter and A/D converter. Simultaneous and Counter method of A/D converter, Successive Approximation method, Seven segment LED display, BCD to seven segment decoder.

Logic Families: Transistor as a Switch, TTL integrated circuits, CMOS integrated circuit. Logic families and their characteristics, comparing Logic families, Interfacing. Introduction to VHDL and Programming techniques.

Module III: **Introduction to Microprocessor**
Microprocessor 8085: PIN Out and Signals, Internal architecture, Flags, Program counter. Introduction to 8085 Instruction Set: Data Transfer, Arithmetic & Logical Instruction, Branch and machine Code, OP-Code Format, Addressing Mode Timing Diagram. M **(10)**achine Cycle.

Module IV: Microprocessor: - **Programming and Interfacing**
Subroutine and Sub programming, CALL and RETURN, STACK, PUSH & POP, 8085 Interrupts, RST Code; SID, SOD, RIM and SIM; Delay Program Calculation, Memory Organization. (RAM, EPROM, ROM, PROM, DRAM.) Introduction to 8086 and registers. Addressing and Interfacing, Basic Interfacing Concept, Introduction to I/O and Memory MPped Techniques, Handshaking, Interfacing I/O devices, Display, Keyboard, Generating Control Signals, De Multiplexing of address Bus, Programming Technique, Interfacing 8155, Programmable I/O Ports and Timer IC,

Programmable Peripheral Interface 8255 with 8085. Interfacing of A/D and D/A converters, Study of 8279, 8253.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text &References:

- D. V. Hall, Microprocessors and Interfacing- Programming and Hardware, Tata McGraw Hill (1999)
- 3.Microprocessor Architecture Programming and applicationsa by R.S Gaonkar
- Digital Electronics by Malvino and Leach.
- 5.Digital Electronics by V.K.Jain.
- B. Brey, The Intel Microprocessors- Architecture, Programming and Interfacing, Pearson Education (2003)

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NON–CONVENTIONAL ENERGY SOURCES

Course Code: MAP307 **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Non-Coventional Energy Sources	MAP307	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe Solar Energy
CLO 2	Demonstrate Bio-Gas
CLO 3	Discuss Geothermal and Wind Energy
CLO 4	Understand Ocean and Hydrogen Energy

Course Objective:
A detailed exposition of the course for the student, opting for physics is so vitally important for a clear understanding of recent intricate theories of non-conventional sources of energy.

Course Contents:

Module I: Solar Energy
Heat Transfer in Renewable Energy Systems - conduction, convection and radiation, Heat transfer and engineering concepts to the renewable energy systems Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, Spectral distribution, the solar constant, radiation on titled surface / earth, instruments for measuring solar radiation. Application of solar energy and solar photovoltaic system

Module II: Bio-Gas
Raw materials, Properties/ characteristics of bio gas, Principles of Bio-Conversion; Photosynthesis, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion, Transportation of bio gas, bio gas plant technology & status, Biomass cogeneration Energy recovery from urban waste, Power generation from liquid waste, Bio gas applications,

Module III: Geothermal and Wind Energy
Structure of earth's interior, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Applications.
Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals; types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Recent development and applications

Module IV: Ocean and Hydrogen Energy

Principle of ocean thermal energy conversion (OTEC), setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Fundamentals of tidal power, Potential and conversion techniques, mini-hydel power plants. Use of tidal energy, Limitations of tidal energy conversion systems. Properties of hydrogen in respect of it's use as source of renewable energy, Sources of hydrogen, Production of hydrogen; electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. Applications of hydrogen energy.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**Attendance**	**EE**
Weightage (%)	15	15	15	5	50

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text &References:

- Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
- Kothari D.P., "Renewable energy resources and emerging technologies", Prentice Hall of India Pvt. Ltd.
- Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
- .Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
- Tiwari and Ghosal, "Renewable energy resources" Narosa Publication.
- Twidell& Weir, "Renewable Energy Sources"
- K Mittal "Non-Conventional Energy Systems" , Wheeler Publication
- Ramesh & Kumar, "Renewable Energy Technologies", Narosa Publications.

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ASTROPHYSICS

Course Name	Course Code	LTP	Credit	Semester
Astrophysics	MAP312	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Discuss ooverview and Basics of Astronomy
CLO 2	Demonstrate Stellar Structure and Evolution
CLO 3	Discuss Galactic and Extragalactic Astronomy
CLO 4	Describe Cosmology

Course Objective:
A quantitative approach to astronomy and astrophysics. Treatment of stars, the interstellar medium, galaxies, and cosmology. At the end students should be able to handle research problems in Astronomy.

Course Contents:

Module I: Overview and Basics of Astronomy
Coordinate systems, precession, time, heliocentric corrections, methods of observation, spectrum of EM radiation, and observation in different wavelength bands.
Overview of major contents of universe, Black body radiation, specific intensity, flux density, luminosity, Basics of radiative transfer (Emission/absorption coefficients, source functions). Magnitudes, distance modulus, various distance scales in Astronomy, various methods of distance measurement.

Module II: Stellar Structure and Evolution
Introduction to stars: HR diagram, a discussion on the variety of stellar phenomena, Stellar structure, stellar polytropes, Energy Generation in Stars, Thermonuclear reactions, pp and CNO cycle. Various stages of evolution: Main Sequence stars, various phases of evolution eg. He-burning, C-burning, Si-burning, photo-dissociation.
Stellar degeneracy and Equations of State: Stellar degeneracy, Chandrasekhar mass, EoS of matter at near-nuclear and nuclear densities. Final stages of stellar evolution: Supernovae (a basic understanding of the core-collapse process and the structure of the progenitor) and neutron stars - a basic knowledge of NS structure.

Module III: Galactic and Extragalactic Astronomy
Galactic structure: Local and large scale distribution of stars and interstellar matter, the spiral structure, the Galactic centre, Galactic dynamics, stellar relaxation, dynamical friction, star clusters, density wave theory of galactic spiral structure (qualitative), chemical evolution in the galaxy, stellar populations, galaxies, morphological classification of galaxies, clusters of galaxies, interactions of galaxies, dark matter, evolution of galaxies.

Module IV: Cosmology

Introduction, assumptions and early scientific cosmologies.Observing the Universe:Large scale structure of the Universe, isotropy and homogeneity, darkness at night, expansion of the Universe, redshift, particles in the Universe. Dynamics of the Universe:Curved space, general relativity concepts, horizon, Friedmann equation of state, fluid and acceleration equations, cosmological constant. Expansion rate, cosmological distance ladder, density and deceleration parameters, age of the Universe. Radiation, visible matter, dark matter, gravitational lensing. The early Universe: Big Bang, baryogenesis, inflation, nucleosynthesis, recombination, last scattering surface, Cosmic Microwave Background.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	15	15	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- The Physical Universe: An introduction to Astronomy by Frank H. Shu
- Astrophysical concepts by Harwit Martin
- Astrophysics for Physicists by Arnab Rai Choudhuri
- An Introduction to modern Astrophysics by Bradley W. Carroll and Dale Ostile, Pearson Addison-Wesley
- http://www.iucaa.ernet.in/~dipankar/ph217/
- http://nptel.iitm.ac.in/courses/115105046/

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COMMUNICATION SKILLS - III

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS311	1:0:0	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an idea of professional work place
CLO 2	**Learn about the importance of interviews, etiquette.**
CLO 3	Learn the basic steps and techniques for preparing and for having a successful interview
CLO 4	Demonstrate Workplace Speaking Skills.

B. SYLLABUS

Topic
Group Discussion-2
PI-2 (Mock Sessions)
CV-3 + Profile Mapping
Video Resume
Social Media Profiling

EXAMINATION SCHEME:

Components	Group Discussion	Video Resume	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - III
(LEADING THROUGH TEAMS)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Sciences-III	BSS311	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe team design features and the difference between team and group, and components of the concept
CLO 2	Identify the patterns of interaction in a team, method of studying attractions and repulsions in groupssociometry and construction of socio-gram for studying interpersonal relations in a Team.
CLO 3	Analyze various stages of team growth, team performance curve profiling a team: Role of leadership in managing team.
CLO 4	Differentiate between management values, pragmatic spirituality in life and organization building global teams through universal human values.
CLO5	Demonstrate the leaning of teams, leadership and values, pragmatic spirituality in life and organization building global teams.

Course Objective:

This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team &Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III:TeamBuilding
Types and Development of TeamBuilding
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies

Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, HarcourtCollege Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, HarperCollinsCollege Publishers

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FRENCH – III

Course Name	Course Code	LTP	Credit	Semester
French-III	FLT311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To understand and present the time schedule and to tell the time

Course Contents:

Unité 3 La science au quotidien Page : 40-61 Leçons 7, 8 & 9

Contenu Lexical:

1. **L'heure**
2. **Les jours de la semaine**
3. **Les mois de l'année**
4. **Les matières et types de cours**
5. **Les spécialitésscientifiques.**
6. **L'annéeuniversitaire**
7. **Les nationalités**
8. **Les noms de pays**
9. **Les métiers scientifiques**
10. **Les chiffres de 69 à l'infini**
11. **Quelquesunités de mesure**
12. **Quelquestermesscientifques**
13. **Les termes de l'exposition**
14. **Les expression familières pour accepter une invitation.**

Contenu Grammatical:

1. **Finir, commencer au présent**
2. **Les prepositions de temps**
3. **Féminins et masculine des noms de métiers scientifiques**
4. **Les adjectifs de nationalité.**
5. **Le future proche**
6. **Les adjectifs demonstratives**
7. **Le but: pour + infinitive**
8. **Le register familier**

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - III

Course Name	Course Code	LTP	Credit	Semester
German-III	FLG311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents

Vocabulary:

- Furniture
- Days and months name
- Time vocabulary like 15 min, quarter, minute, seconds.
- Adjectives use to describe furniture.

Grammar:

- Past participle of verb had
- Usage of negation like **not = nicht; kein= not a single.**
- Preposition of time.
- Use of adjective in sentences.
- Introduction and use of separable verbs

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

Prescribed Text-Book:

- **First 10 LessonsfromDeutschalsFremdsprache -1B, INBH & Oxford, New Delhi, 1977**
- **References**: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013]
- **Tangram A1**by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
- **Sprachtraining**A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
- Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

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SPANISH – III

Course Name	Course Code	LTP	Credit	Semester
Spanish-III	FLS311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enable the students to talk about a place like, class room, market, neighborhood and location of thing with the use of prepositions.

Course Content

Vocabulary:
Vocabulary pertaining to describe people/ place /objects, Illness, Currency, Market etc. preferences, opinions , body parts etc.

Grammar:
Introduction of stem changing irregular verbs
Introductionofprepositions (Cerca de/ lejos de/ encima de etc.)
Present continuous tense **(Estar+ gerundio)**
Introduction of third person verbs Gustar/Parecer/Encantar/ Doleretc
Interrogatives – How much/ How many
Introduction of irregular verbs.
Immediate uture plans (Ir a + verbo)

ExaminationScheme:

Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary

Text &References:

- Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
- Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
- Dictionaries for reference: Collins, www.wordreferences.com.

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CHINESE – III

Course Name	Course Code	LTP	Credit	Semester
Chinese-III	FLC311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

COURSE CONTENTS

1. Description of size
2. Description of quantity
3. Asking and replying questions on shopping
4. Asking and replying questions on Communication
5. Conversation Related to Study
6. Conversation Related to Work
7. Expression of Simple Feelings
8. Listening of dialogues
9. Conversation based on dialogues
10. Programme Specific Vocabulary & Expressions
11. Chinese CBT Package
12. Chinese Festivals (In English)

VOCABULARY CONTENTS

1. Vocabulary will include approx 100 Characters including 50 Characters of HSK-I level.

2. Vocab related to size, quantity, shopping, communication, study, work and simple feelings and Programme Specific Vocabulary will be covered during this semester.

3. By the end of third semester the students will be able to master all 150 characters set for the HSK level-I.

GRAMMATICAL CONTENTS

1. Antonyms
2. Prepositional phrases
3. The object of 在, 从
4. Complement of degree
5. Preposed object
6. Verb 在

7. 有 and 是 indicating existence
8. Question of type (4)
9. The 是 sentence type (2).
10. Sentence with a verb taking two objects

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

Text & References

- Learn Chinese with me book-I (Major Text book), People's Education Press
- Elementary Chinese Reader Book-I
- Chinese reader (HSK Based) book-I
- Module on Programme specific vocab.

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Course Title: Anandam

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND003	0:0:2	2	3

Course Learning Outcomes:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any

- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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SUMMER INTERNSHIP

Course Name	Course Code	LTP	Credit	Semester
Summer Internship	MAP355	0:0:0	6	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Practical training is based on the theoretical subjects
CLO 2	Learn various industrial, technical and administrative processes
CLO 3	Complete specific tasks of synthesizing / testing / analysis / characterization

Methodology:
Practical training is based on the theoretical subjects studied by subjects. It can be arranged within the college or any in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on campus training the students will be given specific tasks of synthesizing / testing / analysis / characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same.

Examination Scheme

Feedback from Industry:	20
Training Report:	40
Viva:	15
Presentation:	25
Total	**100**

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RESEARCH WORK PROJECT BASED

Course Name	Course Code	LTP	Credit	Semester
Research Work Based Project	MAP460	0:0:0	21	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Perform the research work on given topic
CLO 2	Prepare the project file
CLO 3	Demonstrate the performance of work

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.
Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department
The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgement(s)**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data

interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.
Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

- **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:
For research article:
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* , **8** (suppl 1): 116–117.
For book:
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

AMITY UNIVERSITY
RAJASTHAN

AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

Programme Structure-2021

M.Sc. (Applied Chemistry)
Duration – 2 Years Full Time

Summary Sheet

M.Sc (Applied Chemistry)

Semester	CC	DE	VA	OE	Total
I	26	0	6	0	32
II	18	4	6	3	31
III	26	4	4	3	37
IV	21	0	0	0	21
Total	**91**	**8**	**12**	**6**	**121**

Core Courses: CC, **Domain Electives:** DE, **Open Electives:** OE

FIRST SEMESTER

Course Code	Course Title	Category	(L)	(T)	(P)	Credits
Core Courses						
MAC101	Physical Chemistry	CC	3	1	–	4
MAC102	Organic Chemistry	CC	3	1	–	4
MAC103	Computer programming using "c" Language	CC	3	1	–	4
MAC104/MAC105	Applied Mathematics/Applied Biology	CC	2	1	–	3
MAC155	Seminar	CC	–	–		6
MAC120	Physical Chemistry lab	CC	–	–	4	2
MAC121	Organic Chemistry Lab	CC	–	–	4	2
MAC122	Computer programming using "c" Language lab	CC	–	–	2	1
Value Added Courses						
BCS111	Basics of Communication	VA	1	-	-	1
BSS111	Self Development and interpersonal skill	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language – I French-1 German-1 Spanish-1 Chinese-1	VA	2	-	-	2
AND001	Anandam	VA	-	-	2	2
	TOTAL					**32**

SECOND SEMESTER

Course Code	Course Title	Category	(L)	(T)	(P)	Credits

Core Courses						
MAC 201	Analytical Chemistry	CC	3	1		4
MAC 202	Industrial and Applied Chemistry	CC	3	1		4
MAC 203	Inorganic Chemistry	CC	3	1		4
MAC-220	Analytical chemistry-Lab	CC			4	2
MAC-221	Industrial Chemistry-Lab	CC			4	2
MAC-223	Inorganic chemistry-Lab	CC			4	2
Domain Elective –I(Select any one of following)						
MAC-204	Drugs and Dyes	DE	3	1		4
MAC-205	Natural Products Chemistry	DE	3	1		4
MAC-206	Bioinorganic and Organomatallic Chemistry	DE	3	1		4
MAC-207	Industrial Management and Safety Processes	DE	3	1		4
MAC-208	Environmental Chemistry	DE	3	1		4
MAC-209	Chemistry of cosmetics	DE	3	1		4
MAC-210	Nano Chemistry	DE	3	1	–	4
Value Added Courses						
BCS 211	Corporate Communication	VA	1	-	-	1
BSS 211	Behavioral Communication and Relationship Management	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language – II French German Spanish Chinese	VA	2	-	-	2
AND002	Anandam		**-**	**-**	**2**	2
OPEN ELECTIVE-II						
	OE-I	OE				3
	Total					**31**

SUMMER INTERNSHIP

Note: Students must submit their summer internship report immediately on return from summer vacation in July /August and the same would be evaluated for 6 credit units, which would be included in the Third Semester marks.

Course Code	Course Title	Category	(L)	(T)	(P)	Credits
Core Courses						
MAC 301	Instrumental Method of Analysis I	CC	3	1	-	4
MAC 302	Synthetic Organic Chemistry	CC	3	1	-	4
MAC 303	Introduction to Polymeric Materials	CC	3	1	-	4
MAC-304	Chemistry of Materials and Nano Materials	CC	3	1		4
MAC 355	Summer Internship(Evaluation)	CC	-	-	-	6
MAC320	Applied Chemistry Lab	CC			4	2
MAC321	Instrumental Lab	CC			4	2
Domain Elective –II(Select any one of following)						
MAC305	Medicinal Chemistry	DE	3	1		4
MAC306	Polymer Technology	DE	3	1		4
MAC307	Green Chemistry	DE	3	1		4
MAC308	Industrial Waste and Water Treatment	DE	3	1		4
MAC309	Nuclear Chemistry	DE	3	1		4
Value Added Course						
BCS 311	Communication Skills – III	VA	1	-	-	1
BSS 311	Behavioural Science – III	VA	1	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language – III French German Spanish Chinese	VA	2	-	-	2
	Open Elective- II		3			3
	TOTAL					37

FOURTH SEMESTER

Core Courses

Course Code	Course Title	Category	(L)	(T)	(P)	Credits
MAC460	Research Work Based Project*	CC				30

*Student will be sent to laboratories at universities, national

institute and industries for their project based research work during 4th semester. At the end of 4th semester student will be evaluated on the basis of dissertation followed by presentation of their research work.

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

PHYSICAL CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
PHYSICAL CHEMISTRY	MAC-101	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Distinguish the maximum performance of a reaction from its rate of advancement to receive the product.
CLO 2	Be able to distinguish the usefulness of mathematics in physical chemistry and be inspired by the charm of their application.
CLO 3	Be able to quality the idea about the behavior of molecules and system in order to be able to cope with experiment.

Course Objective:

Aim is to introduce the concept of physical chemistry and techniques which form the basis to study the post graduate level Chemistry Courses.

MODULE I: CHEMICAL THEROMODYNAMICS

Concepts of laws of thermodynamics, free energy, work function, concept of entropy and entropies of chemical reactions, third law of thermodynamics, Maxwell‟s relation, partial molar properties, chemical potential, Vant Hoff‟s equation, Gibbs-Duhem equation, Concept and determination of fugacity, Non ideal systems: excess functions for non- ideal solutions, activity, activity coefficient, Debye-Huckel theory for activity coefficient of electrolytic solutions, ionic strength .

MODULE- II: PHASE EQUILIBRIA

Gibb‟s Phase rule-two component systems – classification – liquid-liquid and liquid vapour equilibria (fractional distillation) solid – gas (dehydration and rehydration of $CuSO_4$. $5H_2O$), solid-liquid systems(Bi-Cd, Al-Mg and – benzene – picric acid systems),– three component systems involving liquid–liquid equilibria.

MODULE-III: APPLIED ELECTROCHEMISTRY

Electrochemistry of solutions, ion-solvent and ion-ion interaction, ion transport in solution – electrochemical cells, Nernst equation, electrode kinetics, electrical double layer, Debuy Huckel

theory, electrical double layer, Polarography Theory, Ilkovic Equation, Half Wave Potential an dits significance. Introduction to corrosion, Homogenous Theory, Forms of Corrosion, Corrosion Monitoring & Prevention methods.

MODULE IV: QUANTUM CHEMISTRY

a)Introduction to Exact Quantum Mechanical Results: Introduction to Schrodinger Equation and the postulates of Quantum Mechanics. Discussion of solutions of the Schrodinger Equation to some model systems viz. particle in a box , the harmonic oscillator, The rigid rotor, the hydrogen atom.

b) Approximate Methods: The Variation Theorem, Linear vibration Principle, Perturbation Theory (First order and non-degenerate). Application of variation method and perturbation,theory of helium atom.

c) MOT: Huckels Theory of conjugated system, bond order and charge densitycalculation, Application to ethylene, Butadiene, Cyclopropenyl radical, cyclobutadiene etc. Introduction to extended Huckel Theory

MODULE V: SURFACE CHEMISTRY AND CATALYSIS

Adsorption: Gibbs adsorption isotherm, BET equation and estimation of surface area

Micelles:Surface Active agents, classification of surface agents, micellization, critical Micellar Concentration (CMC) factors affecting The CMC of surfactants, thermodynamics of micellization. Concepts of catalysis: Homogenous catalysis, kinetics of enzyme reactions, Surface chemistry and catalysis.

MODULE VI: SOLID STATE CHEMISTRY

General Principals, experimental procedures and kinetics of Solid state reactions. Crystal Defects including thermodynamics of Schottky and Frenkel defects, colour centres, nonstoichiometric defects. Electronic Properties- band theory, insulators, intrinsic, extrinsic and doping semiconductors, p-n junction, super conductors. Magnetic properties- Classification of materials, quantum theory of paramagnetics, cooperative phenomena, magnetic domains, hysteresis. Optical properties – Optical reflectance, photoconduction, photoelectric effect.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books Suggested:

1. J. P. Lowe and K.Peterson, Quantum Chemistry Academic Press.

2. D. A. McQuarrie, Quantum Chemistry Viva Books Pvt. Ltd.: New Delhi.

3.
4. R. G. Mortimer, Mathematics for Physical Chemistry Elsevier.
5. F. L. Pilar, Elementary Quantum Chemistry, Dover Publication Inc.: NewYork.
6. P. W. Atkins and J. de Paula, Atkin‟s Physical Chemistry, Oxford University Press.
7. I. L. Levine, Quantum Chemistry, Prentice-Hall Inc., New Jersey.
8. T. Engel and P. Reid, Physical Chemistry, Benjamin-Cummings.
9. D. A. McQuarrie and J. D. Simon, Physical Chemistry: A Molecular Approach, Univ. Science Books.
10. R. J. Silbey, R. A. Alberty and M. G. Bawendi, Physical Chemistry, Wiley.

ORGANIC CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
ORGANIC CHEMISTRY	MAC-102	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Recognize many functional groups and their reactivity
CLO 2	Interpret data from a range of physical techniques to characterise organic compounds.
CLO 3	Recognise many fundamental bond forming reactions and how to apply them in synthesis
CLO 4	Describe bonding models and appreciate how these impact on the properties of a simple molecule
CLO 5	Apply curly arrow nomenclature to depict the mechanistic course of a reaction
CLO 6	Appreciate when different reactions are likely to compete and ways to bias reactions towards a single outcome
CLO 7	Understand how spectroscopic techniques can be used to delineate a molecule's structure
CLO 8	Understand the influence of bond polarisation on a molecule's structure and reactivity

Course Objective:
Aim is to introduce the concept of organic chemistry and techniques which form the basis to study the post graduate level Chemistry Courses.

MODULE I: STEREOCHEMISTRY
Conformational analysis of cycloalkanes, decalines, effect of conformation on reactivity, conformation of sugars, steric strain due to unavoidable crowding. Elements of symmetry, chirality, threo and erythro isomers, R,S-nomenclature, E,Z-nomenclature, methods of resolution, optical purity, sterospecific and steroselective synthesis, asymmetric synthesis-Cram‟s rule-Prelog‟s rule. Optical activity in the absence of chiral carbon (biphenyls, allenes and spiranes).

MODULE II: REACTION MECHANISM

Types of mechanism, types of reactions, thermodynamic and kinetic requirements, kinetic and thermo control. Hammond‟s postulate, Curtin-Hammett principle. Potential energy diagrams, transitions sta intermediates, methods of determining mechanism, isotope effects.

MODULE III: SUBSTITUTION REACTION

Aliphatic neucleophilic substitution reaction, SN1 and SN2 and SET mechanism, neighboring group participation, non -classical carbocation, ambident nucleophile, regioselectivity. Aliphatic electrophilic substitution, SE_2 and SE_1. Aromatic nucleophilic substitution. S_NAr, S_N1, benzyne and $S_{RN}1$ mechanism.

MODULE IV: ELIMINATION AND ADDITION REACTION

E_2, E_1, $E1_{cB}$ mechanisms, Hoffmann and Saytzeff‟s rule – competition between and elimination and substitution reactions. Mechanistic and stereochemical aspects of addition

reactions involving elctrophiles, nucleophiles and free radicals, region and chemo selectivity, orientation and reactivity.

MODULE V: PERICYCLIC REACTIONS

Conservation of molecular orbital symmetry, classification of pericyclic reactions – electrocyclic reactions, cyclo addition and sigmatropic rearrangements, ene reactions, woodward – Hoffmann correlation diagram.

MODULE VI: NAMED REACTIONS

Clemmensen, Wolff Kishner, Meerwein – Ponndorrf- Verley, Claisen, Dieckmann, Benzoin, Michael addition, Mannich reaction, Wittig reaction, Chichibabin reactions, Hundsdiecker reactions, Robinson reaction, Reformatsky reaction, Gattermann Koch reaction, Wagner – Meerwein rearrangement, Benzil – benzylic reaction, Favorskii reaction, Pinacol- pinacolone rearrangement.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References:

1. A guide book to mechanism in Organic chemistry (Orient-Longmens)- Peter Sykes
2. Organic reaction mechanism (Benjamin) R. Breslow
3. Mechanism and structure in Organic chemistry (Holt Reinh.)B. S. Gould.
4. Organic chemistry (McGraw-Hill)Hendrikson, Cram and Hammond.
5. Basic principles of Organic chemistry (Benjamin) J. D.Roberts and M. C. Caserio.
6. Reactive Intermediates in Organic chemistry (John Wiley)N. S. Issacs.
7. Stereochemistry of Carbon compounds. (McGraw-Hill)E.L.Eliel
8. Organic Stereochemistry (McGraw-Hill) by Hallas.
9. Organic reaction mechanism (McGraw-Hill) R. K. Bansal
10. Organic chemistry- R. T. Morrison and R. N. Boyd,(Prentice Hall.)
11. Modern organic reactions(Benjumin) H. O. House.
12. Principle of organic synthesis- R.O.C. Norman and J. M. Coxon.(ELBS)
13. Reaction mechanism in organic chemistry- S. M. Mukharji and S. P. Singh.
14. Stereochemistry of organic compoundsc) D. Nasipuri.
15. Advanced organic chemistry (McGraw-Hill) J. March.
16. Introduction to stereochemistry (Benjumin) K. Mislow.
17. Stereochemistry by P. S. Kalsi (New Age International)
18. Reaction, Reagents and Rearrangements, S.N.Sanjal (Bharti Bhavan)

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

COMPUTER MATHEMATICS and 'C' LANGUAGE

Course Name	Course Code	LTP	Credit	Semester
Computer Mathematics and C' Language	MAM103	3:1:0	4	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Attempting algorithmic solutions to problems
CLO2	Designing and coding moderate sized programs to understand the

	concepts of programming.
CLO3	Reading, understanding and modifying code written by others.

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their inter conversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.

Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.

File Handling.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	20	5	20	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References*:*

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

AMITY UNIVERSITY
RAJASTHAN

COMPUTER Programming and 'C' LANGUAGE LAB

Course Name	Course Code	LTP	Credit	Semester
Computer Mathematics and C' Language Lab	MAM122	0:0:2	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Attempting algorithmic solutions to problems
CLO2	Designing and coding moderate sized programs to understand the concepts of programming.
CLO3	Reading, understanding and modifying code written by others.

Software Required: Turbo C

Course Contents:

- C programs involving loops: Problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls.
- C programs involving arrays and matrices
- C programs involving pointers, and solving various problems with the help of those.
- File handling
- C programs involving strings
- C programs involving structures

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	20	15	10	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

AMITY UNIVERSITY
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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

APPLIED MATHEMATICS

Course Name	Course Code	LTP	Credit	Semester
APPLIED MATHEMATICS	MAC-104	2:1:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Development of mathematics theorem for reactions
CLO 2	Theorem for chemical kinetics of reactions and order of reactions
CLO 3	Statistics models for chemical reactions

Course Objective:

This course is to develop mathematical techniques required for industrial applications. The course gives the students a basic understanding of Fourier and Laplace transforms, Probability and statistics. It also equips the students with basic knowledge of differential and integral calculus of real variable.

Course Contents

MODULE I: Differential & Integral Calculus

Definition of limit, continuity & Derivative of a real valued function of real variable at a point, Rolle‟s Theorem, Mean Value Theorem, Taylor‟s Theorem, Maxima and Minima of one Variable, partial differentiation Indefinite and definite integral, properties of definite integral, reduction formulae, Double Integration

MODULE II: Ordinary Differential Equations:
Formation of a differential equation, variable separable method, Homogeneous differential equation, Linear Differential equation of first order, second order Linear Differential equation with constant coefficients, cauchy‟s Linear Differential Equations,

MODULE III: Fourier Transforms
Fourier series expansion, Euler‟s formula, functions having point of discontinuity, fourier series of function having arbitary period, even and odd functions, half range series, Fourier Transforms, Inverse Fourier Transforms, Properties of Fourier Transforms and their

applications to boundary value problems.

MODULE IV: Probability & Statistics

Probability: definitions, addition and multiplication laws, Baye‟s Theorem, random variables, discrete and continuous probability functions, Mean, Variance, Binomial, Possion, normal and exponential distributions, moment generating function, characteristicfunction of a probability distribution, joint probability distribution of two random variables.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References:

1. Mathematical Calculus by Thomson & Finley.
2. Advanced Engineering Mathematics by Kreyszig.

APPLIED BIOLOGY

Course Name	Course Code	LTP	Credit	Semester
APPLIED BIOLOGY	MAC-105	2:1:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Distinguish the maximum performance of a reaction from its rate of advancement to receive the product.
CLO 2	Be able to distinguish the usefulness of mathematics in physical chemistry and be inspired by the charm of their application.
CLO 3	Be able to quality the idea about the behavior of molecules and system in order to be able to cope with experiment.

Course Objective:

This course is to develop biological concept required for industrial applications mainly in drugs. The course gives the students a basic understanding of Biological concepts mainly for mathematical background students. It also equips the students with basic knowledge of cell structure, protein, carbohydrates etc.

Course Contents

Unit I Cell Structure and Functions.

Structure prokaryotic and eukaryotic cells, intracellular organelles and their functions, comparison of plant and animal cells. Overview and their functions, comparison of plant and animal cells. Overview of metabolic processes-catabolism and anabolism. ATP – the biological energy currency. Origin of life-unique properties of carbon chemical evolution and rise of living systems. Introduction to bio-molecules, building blocks of biomacromolecules.

Unit II Carbohydrates. Conformation of monosaccharides, structure and functions of important derivatives of mono-saccharides like glycosides, deoxy sugars, myoinositol, amino sugars. Nacetylmuramic acid, sialic acid disaccharides and polysaccharides. Structural polysaccharides cellulose and chitin. Storage polysaccharides-starch and glycogen. Structure and biological function of glucosaminoglycans of mucopolysaccharides.

Carbohydrates of glycoporteins and glycolipids. Role of sugars in biological recognition. Blood group substances. Ascorbic acid.

Unit III Lipid. Fatty acids, essential fatty acids, structure and function of triacylglycerols, glycerophospholipids, sphingolipids, cholesterol, bile acids, prostaglandins. Liproproteins-compositiion and function, role in atherosclerosis. Properties of lipid aggregates-micelles, bilayers, liposomes and their possible biological functions. Biological membranes. Fluid mosaic model of membrane structure. Lipid metabolism-boxidation of fatty acids.

Unit IV Amino-acids, Peptides and Proteins. Chemical and enzymatic hydrolysis of proteins to peptides, amino acid sequencing. Secondary structure of proteins. force responsible for holding of secondary structures. ahelix, -b-sheets, super secondary structure, triple helix structure of collagen. Tertiary structure of protein-folding and domina structure. Quaternary structure. Amino acid metabolism-degradation and biosynthesis of amino acids, sequence determination, chemical/enzymatic/mass spectral, racemization/detection. Chemistry of oxytocin and tryptophan releasing hormone (TRH).

Unit V Nucleic Acids. Purine and pyrimidine bases of nucleic acids, base pairing via Hbounding. Structure of ribonucleic acids (RNA) and deoxyribonucleic acid (DNA), double helix model of DNA and forces responsible for holding it. Chemical and enzymatic hydrolysis of nucleic acids. The chemical basis for heredity, an overview of replication of DNA, transcription, translation and genetic code. Chemical synthesis of mono and trinucleoside.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References:

1. Principles of Biochemistry, A.L. Lehninger, Worth Publishers.
2. Biochemistry, L. Stryer, W.H. Freeman.
3. Biochemistry, J. David Rawan, Neil Patterson.
4. Biochemistry, Voet and Voet, John Wiley.
5. Outlines of Biochemistry E.E. Conn and P.K. Stumpf, John Wiley.

PHYSICAL CHEMISTRY LAB

Course code: MAC-120 **Credit units 02**

Course Name	Course Code	LTP	Credit	Semester
Physical Chemistry Lab	MAC-120	0:0:4	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Distinguish the maximum performance of a reaction from its rate of advancement to receive the product.
CLO 2	Be able to distinguish the usefulness of mathematics in physical chemistry and be inspired by the charm of their application.

CLO 3	Be able to quality the idea about the behavior of molecules and system in order to be able to cope with experiment.

List of Experiments (Any 10 Experiments are to be performed)

1. Phase Equilibria:

i. Determination of congruent composition and temperature of a binary system (e.g.,diphenylamine – benzophenone system)
ii. Determination of mutual solubility curve of Phenol and water and hence the consolute point.
iii. To determine the distribution coefficient of I_2 between two immiscible solvents (CCl_4 and H_2O).

2. Chemical Kinetics:

(i) To study kinetically the alkaline hydrolysis of ethyl acetate.

(ii) To study the kinetics of reaction between $K_2S_2O_8$ and KI.

a. Determination of the rate constant and order of reaction.
b. To study the influence of ionic strength on the rate constant.

(iii) Determination of the effects of change of temperature, change of concentration of reactant and catalyst and ionic strength of the media on the velocity constant of hydrolysis of an ester or ionic reaction.

(iv) Determination of the rate constant for the oxidation of iodide ions by hydrogen peroxide studying the kinetics as an iodine clock reaction.

3. Electrochemistry:

(i) Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductomertically.

(ii) Determination of solubility and solubility product of sparingly soluble salts (e.g., $PbSO_4$, $BaSO_4$) conductometricaliy.

(iii) Determination of the strength of strong and weak acids in a given mixture conductomerically.

4. Potentiometry:

(i) Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.

(ii) Acid base titration in a non-aqueous media using a pH meter.

5. Colligative Properties

(i) Determination of depression in Freezing point of solutions.
(ii) Determination of elevation in boiling point of solutions.

6. Adsorption

I. Determine the adsorption isotherms of acetic acid from aqueous solutions by charcoal and verify Freundlich adsorbtion isotherm.

Examination Scheme:

A				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

References:

1. A.Finlay and J.A.Kitchener, "Practical Physical Chemistry, Longman
2. F.Daniels and J.H.Mathews, "Experimental Physical Chemistry", Longman
3. H.H.Willard, L.L.Merritt and J.A.Dean, "Instrumental Methods of Analysis", Affiliated East-West Press
4. D.P.Shoemaker and C.W.Garland, "Experimental Physical Chemistry", McGraw-Hill
5. A.I.Vogel, "A Textbook of Quantitative Inorganic Chemistry", Longman
6. J.B.Yadav, "Advanced Practical Chemistry", Goel Publishing House
7. J.J.Lingane, "Electroanalytical Chemistry", Interscience
8. L.Meites, H.C.Thomas and R.P.Bauman, "Advanced Analytical Chemistry McGraw Hill.

ORGANIC CHEMISTRY LAB

Course Code: MAC-121 **Credit Units: 2**

Course Name	Course Code	LTP	Credit	Semester
Organic Chemistry Lab	MAC-121	0:0:4	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Distinguish the maximum performance of a reaction from its rate of advancement to receive the product.
CLO 2	Be able to distinguish the usefulness of mathematics in physical chemistry and be inspired by the charm of their application.
CLO 3	Be able to quality the idea about the behavior of molecules and system in order to be able to cope with experiment.

1. Qualitative Analysis: Separation, purification and identification of compounds of binary mixture, derivative preparation and confirmatory tests.

2. Organic Synthesis:

1. Oxidation: Adipic acid by chromic acid oxidation of cyclohexanol.
2. Aldol condensation: Dibenzal acetone from benzaldehyde.
3. Sandameyer reaction: Chloro toluene from para toluidine
4. Friedel Craft‟s reaction
5. p – amino azobenzene from aniline via diazoaminobenzene.
6. m- phenylene diamine from Nitrobenzene via m-dinitrobenzene and m- nitroaniline.
7. Preparation of benzidine from benzene involving benzidine rearrangement.

3. Quantitative Analysis:

1. Determination of the percentage of sulphur in the given organic compounds by Messenger‟s method.
2. Estimation of Glucose using Fehling‟s solution.
3. Determination of equivalent weight of the given carboxylic acid using Silver-salt method.
4. Determine percentage purity of the given carbonyl compound using hydroxylamine hydrochloride.
5. Determination of strength of known aniline solution by bromination using KBr-$KBrO_3$ mixture.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

References:

1. A.I.Vogel, "A Textbook of Practical Organic Chemistry", Longman
2. Analysis, "Elementary Practical Organic Chemistry – Part 3: Quantitative Organic Longman
3. F.G.Mann and B.C.Saunders, "Practical Organic Chemistry", Longman
4. B.B.Dey and M.V.Sitaraman, "Laboratory Manual of Organic Chemistry",
5. B.L.Oser (Ed), "Hawk‟s Physiological Chemistry", Tata McGraw-Hill
6. British Pharmacopoeia and Indian Pharmacopoeia,
7. A.C.Agarwala and R.M.Sharma (Eds), "A Laboratory Manual of Milk Inspection", Asia Publishing House

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COMMUNICATION SKILLS – I

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel offormal communication.
CLO 4	Develop and empower self with the power ofWords.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)
Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Selfintroduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - I
(SELF-DEVELOPMENT AND INTERPERSONAL SKILLS)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-I	BSS11	1:0:0	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO2	Manage your emotions and feelings more effectively to have the impact that you need
CLO3	Develop the way that you regulate and control your emotions
CLO4	Learn about your behavioral preferences to become more self-awareness

Course Objective:

This course aims at imparting an understanding of:

Self and the process of self exploration

Learning strategies for development of a healthy self esteem

Importance of attitudes and their effect on work behavior

Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self

Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power

Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude

Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behavior
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.

- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

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FRENCH - I

Course Name	Course Code	LTP	Credit	Semester
French-I	FLT111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts.
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To tell ones name and to spell it

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - I

Course Name	Course Code	LTP	Credit	Semester
German-I	FLG111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:
Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to**<
- talk about gender, numbers and articles.
- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam

10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book:First 10 LessonsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

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SPANISH – I

Course Name	Course Code	LTP	Credit	Semester
Spanish-I	FLS111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:
Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.
Grammar:
Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – I

Course Name	Course Code	LTP	Credit	Semester
Chinese-I	FLC111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Elementary Chinese Reader Book-I (suggested reading)

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Anandam

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND001	0:0:2	2	1

Course Learning Outcomes:

CLO1		Awareness and empathy regarding community issues
CLO2		Interaction with the community and impact on society
CLO3		Interaction with mentor and development of Student teacher relationship
CLO4		Interaction among students, enlarge social network
CLO5		Cooperative and Communication skills and leadership qualities
CLO6		Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

ANALYTICAL CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
ANALYTICAL CHEMISTRY	MAC-201	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of spectroscopy and understand the sense of job responsibilities, while maintaining social and environment awareness.
CLO 2	Understand the manufacture of TLC and importance of these material in daily life. Understand the build-up a progressive and successful career in industries with a biotechnological perspective.
CLO 3	Understand the manufacturing of polarography.
CLO 4	Understand the significant number and understand the gap between knowledge based conventional education and market demands and provide an alternative to those pursuing higher education.
CLO 5	Understand the electro analytical techniques and the concept of experimental design in chemistry.
CLO 6	Understand the separation techniques and also understand the area of self employment.

Course Objective:

This course is all about uses of analytical chemistry and instrumentation in research as well as in industry after post graduation. Which focus on analysis of compounds through instruments, separation of reaction mixtures by chromatography and their different types, and find out the errors during instrumental analysis of compounds. It also describes the utilization of absorption spectroscopy for detection of functional groups.

MODULE I: STASTICAL TESTS AND ERROR ANALYSIS:

Accuracy, precision, classification of errors, significant figures and computation, mean deviation and standard deviation, Least square methods, regression coefficient , F-test, t-test and Chi-test.

MODULE II: WET CHEMICAL METHODS OF ANALYSIS

Volumetric analysis –neutralization, precipitation, complexometric and redox titrations-theoretical titrations curves - theory of indicators; Gravimetric analysis, volatilization and precipitation methods-homogeneous precipitation; Colorimetric analysis - principles and

applications- estimation of iron and nickel.

MODULE III: SPECTRAL METHODS

Molecular and atomic spectroscopy - interaction of electromagnetic radiation with matter – Beer-Lambert law - UV / Visible absorption spectroscopy, IR absorption spectroscopy; Fluorescence, phosphorescence and chemiluminescence methods; NMR Spectroscopy, Mass Spectroscopy, Principles, instrumentation and analytical applications of spectral methods.

MODULE IV: ELECTROANALYTICAL TECHNIQUES

Conductometry, and high frequency titrations; Potentiometry, pH-metry, Ion selective electrodes; Electrogravimetry and coulometry; Voltammetry –polarography, amperometric titrations and anodic stripping voltammetry; principles, practice and applications.

MODULE V: SEPARATION TECHNIQUES

Solvent extraction and Ion exchange techniques – principles and applications; Chromatographic techniques – adsorption chromatography, thin layer chromatography, Chromatographic techniques in combination with Mass Spectrometer (GC-MS, LC-MS etc) and their applications in various fields such as chemistry, biology, medicine, nanotechnology etc,, high performance chromatography, size exclusion chromatography; Supercritical fluid chromatography.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	20	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Book Suggested:

1. D.A.Skoog, D.M.West, F.J. Holler and S.R.Crouch, " Fundamentals of Analytical Chemistry", 8th Edn., - Thomson Brooks/Cole Pub. (2005).
2. J.Mendham, R.C.Denney, J.D. Barnes and M.J.K.Thomas, " Vogel"s Text book of quantitative chemical analysis", 6th Edn., Pearson Education (2008).
3. F.W. Fifield and D.Kealey, " Principles and Practice of Analytical Chemistry, 1st Indian Reprint, Blackwell Pub. (2004).
4. H.H Willard, L.L Merritt, J.A Dean, and F.A Settle, " Instrumental Methods of Analysis", 7th Edn., - CBS Pub (2004).
5. G. D.Christian, "Analytical Chemistry", 6th Edn., John Wiley Press (2006).
6. K.A. Rubison and J,F. Rubison, " Contemporary Instrumental Analysis, Printice Hall, Inc. (2000). 7.A.K.Srivastva& P.C. Jain," Instrument approach to chemical analysis" 4th edition,S.Chand & Company(2012)
8.C.L.Wilson and D.W.Wilson, "Comprehensive Analytical Chemistry", Dan van Nostrand
9. J.G.Dick, "Analytical Chemistry, McGraw Hill

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

INDUSTRIAL AND APPLIED CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
INDUSTRIAL AND APPLIED CHEMISTRY	MAC-202	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Glass in Industry and understand the sense of job responsibilities, while maintaining social and environment awareness. Understand the manufacturing of soap and detergents
CLO 2	Understand the manufacture of cement and importance of these material in industry and daily life. Understand the build-up a progressive and successful career in cement industries with a biotechnological perspective. Understand the catalytic processes and the concept of experimental design in chemistry.
CLO 3	Understand the industrial processes and understand the gap between knowledge based conventional education and market demands and provide an alternative to those pursuing higher education. Understand the process of reactor and also understand the area of self employment.

Course Objective:

chemistry and understand important issues in industrial chemistry and pertinent environmental legislations.

MODULE I: GLASS INDUSTRY

Introduction, classification of glass, basic raw materials of glass, manufacturing processes including chemical reactions, some special glasses: optical glass, coloured glass, fibre glass, laminate glass, safety glass, photosensitive glass, photochromatic glass, lead glass, borosilicate glass and glass wool.

MODULE II: CEMENT INDUSTRY

Types of cement, manufacture of Portland cement, composition, setting and hardening of cement, Mortars and concrete, gypsum, plaster of paris, estimation of silica, alumina, calcium oxide and sulphates in Portland cement.

MODULE III: SOAPS AND SYNTHETIC DETERGENTS

Manufacture of detergent, types of detergents, anionic, cationic, nonionic and amphoteric detergents, manufacture of soap, Liquid soap.

MODULE III: HOMOGENEOUS AND HETEROGENEOUS CATALYSIS

Conversion, selectivity, contact time, time on stream, Kinetics of heterogeneous catalysis, adsoprtion, phase transfer catalysis, super acid catalysis, intramolecular catalysis, enzyme

catalysis, semi-conductor catalysis and photocatalysis. Promoters, stabilizers, catalyst deactivation by poisoning, fouling and sintering

MODULE IV: OPERATING CATALYTIC PROCESS

Mechanism of performing mass and heat balance, reactors – batch reactor, flow reactor and fluidised bed reactor - plug-flow and back - mixed reactors, isothermal and adiabatic reactors, Applications of Boilers and Reactors in Industry

MODULE V: INDUSTRIAL CATALYTIC PROCESSES

Cracking, reforming, alkylation, isomerization, hydrogenation/dehydrogenation, dehydrocyclisation, dehydrosulphurization, hydrocracking, oxidation, metathesis, carbonylation, polymerization, synthetic fuels, hydrogen generation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	20	5	20	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS SUGGESTED:

1. Jens Hagen,Industrial catalysis, 2nd Edition, Wiley-VCH Verlay Gambh & Co,.(2006).
2. Herman Pines, The chemistry of catalytic hydrocarbon conversions, Academic Press, New York (1981).
3. R. Pearce and W.R.Patterson, Catalysis and chemical processes, Leonard Hill, London (1981).
4. Charles, N. Satterfield, Heterogeneous catalysis in industrial practice, 2nd Edn. Mc.Graw Hill, International Edition, Singapore (1993).
5. Catalytic Chemistry, Bruce-gates, John Wiley & Sons
6. Organic Chemistry Vol.2 IL Finar 5th Edn. Longmans 1975
7. Dryden‟s outlines of Chemical Technlolgy 2nd Edn., edited and revised by M.Gopala Rao, Marshel sitting – EastWest Press, 1973.
8. Chemical Process Industries 3 Edn., R Norries Shreve, Mc Graw Hill 1967.
9. Chemistry of Engg Materials by CV Agarwal.
10. Applied Chemsitry for Engineer‟s by Diamont
11. Industrial Chemistry by BK Sharma, Goel Publishing house Meerut.

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

INORGANIC CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
INORGANIC CHEMISTRY	MAC-203	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify the bonding fundamentals for metal ligand complexes, including their bonding, structure, reactivity, stability, magnetic properties, electronic spectra, chemical reactions and their applications
CLO 2	Learn the fundamentals of the chemistry of the transition metal complexes and

	metal-π complexes and their importance in real world applications
CLO 3	Basic and advanced laboratory procedures used in inorganic synthesis
CLO 4	Select and Implement the laboratory safety rules
CLO 5	Demonstrate awareness of the solutions of problems encountered in an experiment which can be further utilized for work or education
CLO 6	Analyse how to maintain standards of professional and scientific ethics

Course Objective:

The course is designed to make it learn about the general principles and methodologies which are used in inorganic chemistry which further can be utilized in many industries based on inorganic chemistry. Students will be able to develop the ability to apply critical reasoning, in particular regarding the ability to apply the concepts of basic inorganic Chemistry to simple practical problems or simple phenomena as well as be able to understand important issues in industrial chemistry and pertinent environmental legislations.

MODULE-I: METAL-LIGAND EQUILIBRIUM IN SOLUTION

Stepwise and overall formation constants and their interaction, trends in stepwise constant, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand. Chelate effect and its thermodynamic origin, determination of binary formation constants by potentiometry and spectrophotometry.

MODULE-II: REACTION MECHANISM OF TRANSITION METAL COMPLEXES

Energy profile of a reaction, reactivity of metal complex, inert and labile complexes, kinetic application of valence bond and crystal field theories, kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, anation reactions, Substitution reactions in square planar complexes, the trans

effect, mechanism of the substitution reaction. Redox reaction, electron transfer reactions, mechanism of one electron transfer reactions, outer sphere type reactions, inner sphere type reactions.

MODULE-III: METAL-LIGAND BONDING

Crystal field theory, molecular orbital theory, octahedral, tetrahedral and square planar complexes, p-bonding and molecular orbital theory.

MODULE-IV: ELECTRONIC SPECTRA AND MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Spectroscopic ground states, correlation. Orgel and Tanabe-Sugano diagrams for transition metal complexes (d1-d9 states), calculations of 10Dq, B and β parameters, charge transfer spectra, anomalous magnetic moments, Orbital contribution to magnetic moment, spin crossover.

MODULE- V: METAL π-COMPLEXES

Metal carbonyl, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding structure and important reaction of transition metal nitrosyl.

MODULE-VI:

Metal Clusters, Chains and Fullerenes
Compounds with metal-metal multiple bonds.Isopoly and heteropoly acids and their salts. Fullerenes

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	20	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS SUGGESTED:

1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harpes & Row.
3. Chemistry of the Elements. N.N. Greenwood and A. Earnshow, Pergamon.
4. Inorganic Electronic Spectroscopy, A.B.P. Lever, Elsevier.
5. Magnetio chemistry, R.1. Carlin, Springer Verlag.
6. Comprehensive Coordiantion Chemistry eds., G. Wilkinson, R.D. Gillars and J.A. Mc Cleverty,Pergamon.
7.Advanced Inorganic Chemistry, Malik, Tuli, Madan,S.Chand & Company

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ANALYTICAL CHEMISTRY LAB

Course Name	Course Code	LTP	Credit	Semester
Mathematical Physics	MAC-220	0:0:4	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the manufacturing of polarography.
CLO 2	Understand the manufacture of TLC and importance of these material in daily life. Understand the build-up a progressive and successful career in industries with a biotechnological perspective
CLO 3	Understand the manufacturing of polarography.
CLO 4	Understand the significant number and understand the gap between knowledge based conventional education and market demands and provide an alternative to those pursuing higher education.
CLO 5	Understand the electro analytical techniques and the concept of experimental design in chemistry.

CLO 6	Understand the separation techniques and also understand the area of self employment.

Course Objective:

Aim is to introduce the concept of mathematical methods and techniques which form the basis to study the post graduate level Physics Courses.

Chromatography

Separation of cations and anions by Column Chromatography: Ion exchange,

a. Cadium and zinc

b. Zinc and magnesium.

c. Thin-layer chromatography-separation of nickel, manganeses, cobalt and zinc.

d. Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of Rf values.

Physical Analytical Chemistry Section

1) To verify Beer-Lambert‟s Law for potassium permanganate solution and hence to determine the molar extinction coefficient and unknown concentration of given sample colorimetrically
2) To determine the solubility of calcium oxalate in presence of KCl (Ionic Strength Effect)
3) To determine the solubility of calcium oxalate in presence of HCl (H+ ion Effect)

Organic Analytical Chemistry

I. To verify the Beer-Lamberts Law and determine the concentration of given dye solution colorimetrically.
II. To estimate the amount of D-glucose in given solution colorimetrically.

Quantitative Analysis

I. Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method.
II. Estimation of amines/phenols using bromate bromide solution/or acetylation method.
III. Determination of lodine and Saponification values of an oil sample.
IV. To determine the acid value of given oil

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Reference Books

1. C.L.Wilson and D.W.Wilson, “Comprehensive Analytical Chemistry”, Dan van Nostrand
2. J.G.Dick, “Analytical Chemistry, McGraw Hill
3. D.A.Skoog and D.M.West, “Analytical Chemistry – An Introduction”, Reinholdt. (

practical Book)
4. I.M.Kolthoff, V.J.Elving and Sandell, "Treatise on Analytical Chemistry", Interscience.(practical
Book)

INDUSTRIAL CHEMISTRY LAB

Course Code: MAC-221 **Credit Units:02**

Course Name	Course Code	LTP	Credit	Semester
Industrial Chemistry Lab	MAC-221	0:0:4	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the manufacturing of polarography.
CLO 2	Understand the manufacture of TLC and importance of these material in daily life. Understand the build-up a progressive and successful career in industries with a biotechnological perspective
CLO 3	Understand the manufacturing of polarography.
CLO 4	Understand the significant number and understand the gap between knowledge based conventional education and market demands and provide an alternative to those pursuing higher education.

A. Analysis of cement
B. Analysis of polymers
1. Determination of Acid Values of plastic material.
2. Determination of Saponification value of plastic material.
3. Determination Iodine value of a plastic material.
4. Determination of hydroxyl Value of plastic material.
5. Determination of Carbonyl Value of plastic material.
6. Determination of Molecular Weight of a polymer.
7. Determination of Capacity of cation exchange resin.
8. Determination Capacity of an anion exchange resin.

C. Preparation of polymers
1. Preparation of Urea Formaldehyde resin.
2. Preparation of Phenol Formaldehyde resin.
3. To synthesize and hydrolyse Nylon 6:6 in the laboratory

D. Water Analysis
(i) Total dissolved solids
(ii) Carbonate and non-carbonate hardness by EDTA

(iii) Dissolved oxygen, BOD, COD
(iv) Alkalinity
(v) Turbidity

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INORGANIC CHEMISTRY LAB

Course Code: MAC-223 **Credit Units:02**

Course Name	Course Code	LTP	Credit	Semester
Inorganic Chemistry Lab	MAC-223	0:0:4	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the manufacturing of polarography.
CLO 2	Understand the manufacture of TLC and importance of these material in daily life. Understand the build-up a progressive and successful career in industries with a biotechnological perspective
CLO 3	Understand the manufacturing of polarography.
CLO 4	Understand the significant number and understand the gap between knowledge based conventional education and market demands and provide an alternative to those pursuing higher education.

MODULE I QUANTITATIVE INORGANIC ANALYSIS & SPECTROPHOTOMETRIC DETERMINATION

(i) Ores analysis (oxides and carbonate ores or any other)
(ii) Nickel/molybdenum/tungston/vanadium/uranium by extractive spectrophotometric

method. (Any other experiments may be added) (Dry Lab)

MODULE II ESTIMATION OF INDUSTRIAL PRODUCTS

(i) Active CaO in lime
(ii) Chlorine in bleaching powder
(iii) Lead content in red lead

MODULE IV PREPARATION OF TYPICAL INORGANIC COMPLEXES

Preparation of selected inorganic compounds and their study by IR, electronic spectra, Mossbauer. ESR and magnetic susceptibility measurements.Handling of air and moisture sensitive compounds involving vacuum lines. Selection can be made from the following:

1. Sodium amide[1].
2. Trialkoxyboanes- IR and NMR spectra.
3. Preparation of Tin (IV) iodide, Tin (IV) chloride and Tin (II) iodide[2]
4. Sodium tetrathionate $Na_2S_4O_6$.
5. Determination of Cr (III) complexes. $[Cr(H_2O)_6]NO_3.3HO$,$[Cr(H_2O)_4Cl_2]Cl.2H_2O$,$[Cr(en)_3]Cl_3$, $Cr(acac)_3$. Inorg.synths., 1972, 13, 184.
6. Preparation of Fe(II) chloride (use it as Friedel-Craft chlorination source) J. Org. Chem.,1978, 43, 2423; J. Chem. Edu., 1984, 61, 645; 1986, 63, 361.
7. Reaction of Cr(III) with a multidentate ligand; a kinetics experiment (visible spectra Cr-EDTA complex) J.A.C.S., 1953, 75, 6570.
8. Preparation and use of Ferrocene. J. Chem. Edu. 1966, 43, 73; 1976, 53, 730.

(Any five preparations)

MODULE V QUALITATIVE INORGANIC SEMI-MICRO ANALYSIS

Detection of atleast four cations (2 common and 2 uncommon) in a mixture of salts.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

REFERENCES (Inorganic Chemistry Lab)

1. G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney Vogel‟s Text book of quantitatives chemical analysis, ELBS 5th Edn. Longman, Singapoor Publishers,Singapore, 1996.
2. R. Mukhopodhyay, P.Chatterjee, “ Advanced practical Chemistry”
3. Dinesh Sharma, “ A hand book of Analytical Inorganic chemistry”, First Published(2004)
4. I.M.Kolthoff, E.B.Sandell et.al. Quantitative chemical analysis, CHYmillan, Madras 1980.
5. A Text book of quantitative Inorganic Analysis – A. I. Vogel
6. Standardsmethodsof ChemicalAnalysiF.J.Welcher
7. Experimental Inorganic Chemistry – W. G. Palmer.

8. Manual on Water and Waste Water Analysis, NEERI- Nagpur D.S. Ramteke and C. A. Moghe
9. Inorganic synthesis- King.
10. Synthetic Inorganic Chemistry-W .L. Jolly
11. EDTA Titrations –F Laschka

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DRUGS AND DYES

Course Name	Course Code	LTP	Credit	Semester
DRUGS AND DYES	MAC-204	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identification of drugs and their characterization tool
CLO 2	Working of drugs in living organism
CLO 3	Dyes and their working mechanism
CLO 4	Preparation of dyes and their structure

Course Objective: At the end of this course students must acquire a good knowledge about the various drugs their active constituents, their pharmacological actions and therapeutic uses. Beside drugs they will learn about various dyes used in day to day life, their properties and applications.

Course Content:

MODULE I: INTRODUCTION TO DRUGS

Definition of drug (WHO), classification of drugs, nomenclature of drugs, stereochemical aspects of drugs, definitions of terms commonly used in the chemistry of drugs, routes of drug administration and different dosage forms and applications

MODULE II: MECHANISM OF ACTION, STRUCTURE AND SYNTHESIS OF DRUGS

Sulphonamides : Sulphathiazole, Sulphadiazine(any two)

Antiseptics : Iodoform, Dettol
Antileprotic drugs : Dapsone (DDS), Acedapsone (DADDS)

Anticancer agents : Alkylating agents

CardiovascularDrugs : Amyl nitrate, Methyldopa

Antipyretics&Analgesics: Novalgin, Paracetamol

Antimalarials :Chloroquine ,Primaquine,Mepacrine

Anti diabetic : Tolbutamide

Antitubercular: p-amino salicylic acid, Ethambutol

MODULE III: INTRODUCTION TO DYES

Historical development of synthetic Dyes - Introduction, Nomenclature, classification based on structure & mode of applications of fibres.Structural features of a dye (chromophores and auxochromes), bathochromic and hypsochromic effects, diazotisation and coupling, colour and chemical constitution

(Witt"s theory, Armstrong theory and Modern theory). Dye intermediates- unit, batch & continuous process in the preparation of dye intermediates,

MODULE IV: STRUCTURE AND PREPARATION OF DYES

Nitro	Picric acid, Martius yellow, Naphthol y
Nitros	Fast green O, Naphthol green Y
Azo D	Methyl orange, Methyl red, Congo Red
Phthal	Phenolphthalein
Phthalocyar	Copper phthalocyanine
Xanth	Fluorescein, Eosin, Mercurochrome
Rhoda	Rhodamine
Thiazi	Methylene
Cyanir	Quinoline l
Antraquinon	Alizarin
Indigo	Indigo (Ind
Thioin	Thioindigo
Azine	Safranine T

Action of light on dyes and dyed fibres, Factors affecting fastness of dyed fibres General consideration, fluorescence, phototropy, mechanism of fading.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	5	20	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. The Organic Chemistry of Drug Synthesis, Vol. 1,2,3,4 by Lednicer Daniel, 1st edition, John Wiley & Sons INC.
2. Exploring QSAR Vol; I Fundamentals and Applications in Chemistry and Biology by CHansh and A Leo Vol. II: hydrophobic, Electronic and Steric Constants by C Hansh, A Leoand D Hockman ACS Book Catalog.
3. Foye" s Principles of Medicinal Chemistry by Foye, 6th edition, Lippincott William Wilkins.
4. Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
5. Quantitative Drug Design- A Critical Introduction by Martin YC, Marcel Dekker Inc. NewYork.
6. Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press NewYork, Oxford.
7. Computer Aided Drug Design, by Pops and Perruns, Academic Press, NY

8. Burger‟ s Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York.
9. Introduction to Medicinal Chemistry‟ – How Drugs Act and Why by Alex Gringauz, Willey-VCH Publication 1997.
10. Drug Design by Bothara KG &Kulkarni VM, 3rd edition, NiraliPrakashan.
11. An Introduction to Drug Design by SN Pandeya& IR Dimmock, 1st edition, New AgeInternational Publishers.
12. Structure based Drug Design by Veerapandian, 1st edition, Taylor & Francis New York,London.
13. Holtje. Sippl.,Rognan and Folkers, Molecular Modeling.
14. P.K. Larsen, Tommy and U.Madsen, textbook of Drug Design and Discovery.

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NATURAL PRODUCTS CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
NATURAL PRODUCTS CHEMISTRY	MAC-205	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify the natural products and their mechanism
CLO 2	Vitamins and their actions
CLO 3	Designing of drugs from alkaloids.
CLO 4	Steroids and their applications

Course Objective: The main idea of this course is the give the students a brief idea of natural product chemistry, which includes the study of Vitamins, alkaloids, terpenes and steroids etc. These plays a key role in our day to day life. The course covers the importance of these naturally occurring materials and their applications in chemistry, biology and medicine. The course will alos includes the invited lectures on recent advances in natural product chemistry and it gives a reasonable good overview of the naturally occurring chemicals and their important reactions, their applications etc.

Course Content:

MODULE I: NATURAL PRODUCTS AND THEIR BIOSYNTHETIC PATHWAYS

General classification of natural products, their isolation and characterisation and biosynthesis of common plant products; Biosynthesis pathways for natural products using co-enzymes and enzymes; Synthesis of selected natural products based on genetic classification – fatty acid derivatives and related compounds, general biogenesis and synthesis of cis jasmone, methyl jasmonate, prostaglandins, exaltone and muscone.

MODULE II: VITAMINS

Vitamins: Classification, occurrence, chemistry of Vitamins A, C and E, structure elucidation and synthesis, deficiency syndromes,

MODULE III :ALKALOIDS

Drugs (cocaine, opiates, quinine, vincristine, curare, mescaline, etc.) and toxins (nicotine, lupinines, strychnine, tetrodotoxin, etc. Introduction 2. Simple Alkaloids I: Pyrrole Derivatives

3. Simple Alkaloids II: Piperidine Derivatives 4. Aromatic Alkaloids I: Simple Derivatives 5. Aromatic Alkaloids II: More Complex Derivatives 6. The Indole Alkaloids 7.Miscellaneous Alkaloids with Interesting Bioactivities.

MODULE IV:TERPENES AND STEROIDS

Classification and biosynthesis of mono- sesqui-, di- and triterpenoids and steroids.Acetyl CoA, Mevalonic acid, acetoacetyl CoA, squalene to lanosterol, Cholesterol to estradiol, diosgenin and its utility in hormone synthesis.

MODULE V: GENERAL CHEMISTRY OF THE FOLLOWING COMPOUNDS

Cholesterol, Artemisinin, Gibbereline A3, Azadirachtin.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTI	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text and References:

1. K. Nakanashi. Natural Products Chemistry, Vols. I and II, Academic Press, New York andLondon (1974).
2. M. Harmata. Strategies and Tactics in Organic Synthesis 4 & 5, Academic Press (2004)
3. T. L. Gilchrist. Heterocyclic Chemistry (2nd edn.), Longman Scientific & Technical Publicns.(1992).
4. R. K. Bansal. Heterocyclic Chemistry: Synthesis, Reactions and Mechanisms, Wiley Eastern (1991).

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BIOINORGANIC AND ORGANOMETALLIC CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
BIOINORGANIC AND ORGANOMETALLIC CHEMISTRY	**MAC-206**	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Metal ions and their biological functions
CLO 2	Metal enzymes and their mechanism in biological cycles
CLO 3	Metallocenes and biochemical reactions

Course Objective: The main idea of this course is to give students a brief idea about Bioinorganic chemistry that examines the role of metals in biology. It includes the study of both natural phenomena such as the behaviour of metalloproteins as well artificially introduced metals, including those that are non-essential, in medicine and toxicology. Many biological processes such as respiration depend upon molecules that fall within the realm of inorganic chemistry. The discipline also includes the study of inorganic models or mimics that imitate the behaviour of metalloproteins. It also covers organometallic chemistrywhich is the study of chemical compounds containing bonds between carbon and a metal. Since many compounds without such bonds are chemically similar, an alternative may be compounds containing metal-element bonds of a largely covalent character. Organometallic chemistry combines aspects of inorganic chemistry and organic chemistry.

Course Content:

MODULE I: ROLE OF METAL IONS IN BIOLOGICAL SYSTEM

Elements of life: essential major, trace and ultratrace elements. Basic chemical reactions in the biological systems and the role of metal ions (specially Na+, K+, Mg2+, Ca2+, Fe3+/2+, Cu2+/+, and Zn2+).Metal ion transport across biological membrane Na+-ion pump, ionophores. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases.

MODULE II: METALLOPROTEINS AND METALLOENZYMES

Biological functions of hemoglobin and myoglobin, cytochromes and ferredoxins, carbonate bicarbonate buffering system and carbonicanhydrase. Biological nitrogen fixation, Photosynthesis: Photosystem-I and Photosystem-II.

MODULE III: METALLOCENE

Metallocenes, Structure and synthesis of cyclopentadienyl complexes, Covalent vs Ionic bonding in metallocenes, Arene complexes

MODULE IV: REACTIONS IN ORGANOMETALLIC CHEMISTRY

Substitution reactions in carbonyl complexes, Oxidative addition and reductive elimination, Insertion and elimination, Nucleophilic and electrophillic attack of coordinated ligands, Synthesis of ferrocenes derivatives, carbonylate anion as nucleophile

MODULE IV: APPLICATIONS OF ORGANOMETALLICS IN CATALYSIS

(b) In Catalysis: Asymmetric hydrogenation; synthesis of acetic acid and glycol (Monsanto acetic acid process) Cativa process ; Arylation/vinylation of olefins (Heck reaction); Wacker process (olefin oxidation); Asymmetric epoxidation.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Texts & References

1. C. Elschenbroich. Organometallics (3rd edn.), Wiley-VCH Publication (2006).
2. C. Elschenbroich & A. Salzer.Organometallics – A Concise Introduction (2nd edn.),VCHPublication (1992).
3. F. Mathey & A. Sevin.Molecular Chemistry of the Transition Elements, John Wiley (1996).
4. F. A. Cotton & G. Wilkinson.Advanced Inorganic Chemistry (5th edn.), John Wiley (1988).
5. R. C. Mehrotra & A. Singh. Organometallic Chemistry: A Unified Approach (2nd edn.), New Age International (2000).
6. Yamamoto, Organo Transition Metal Chemistry,

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INDUSTRIAL MANAGEMENT AND SAFETY PROCESSES

Course Name	Course Code	LTP	Credit	Semester
INDUSTRIAL MANAGEMENT AND SAFETY PROCESSES	**MAC-207**	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use of management study in chemical industries
CLO 2	Application of manufacture management
CLO 3	Safety process and chemical industries

Course Objective: The curriculum is developed to help the students understand the basic functions & responsibilities of a manager, provide him tools and techniques of managing different activities of the business concerned and to understand & interpret the provisions of some of the important provisions related to patent, trademark etc. It also aims at minimizing the chances of risks, injuries and accidents by implementing risk management techniques and safety management operations, monitoring the operating systems and bolstering the safety measures of an industry in general. With the rise of natural disasters in and around our world, the importance of the safety of human capital, protection of the environment and conservation of existing assets of an industry is increasing, leading to growing relevance of these skills.

Course Contents:

MODULE I: BASIC CONCEPTS OF MANAGEMENT FUNCTION OF MANAGEMENT

Planning, Organizing, Directing, Control, Decision-making, Budgeting, Inventory Management (IM) & Quality Control (QC), Meaning & Importance of Inventory management, Inventory models, Cost consideration, Economic order quantity model.

MODULE II :QUALITY MANAGEMENT

Meaning & definition of Quality-Quality control systems-quality assurance-planning for quality- total quality management (TQM) philosophy-implementation of TQM in service and manufacturing industries-national & international standards.

MODULE III: MANUFACTURING MANAGEMENT

Production planning & control, dynamics of material flow-inventory-bottlenecks and process variability, planning levels and time scales, forecasting-aggregate planning, synchronized manufacturing and theory of constraints-just in time production-shop floor performance monitoring.

MODULE IV:SAFETY IN CHEMICAL PROCESS INDUSTRIES

Safety in industries; need for development; importance safety consciousness in Indian chemical industry; safety programmes, elements of safety programme; effective realization, economic and social benefits. Industrial safety- Chemical process industries; potential hazard; chemical and physical job safety analysis; high presssure; high temperature operation; dangerous and toxic chemicals; highly radioactive materials; safe handling and operation of materials and machineries; planning and layout.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. William Handley, “Industrial Safety ", Hand Book McGraw-Hill Book Company 2nd Edition, 1969.
2. Fawatt, H.H. and Wood, W.S., “Safety and Accident Prevention in Chemical Operation", Interscience, 1965.
3. Heinrich, H.W. Dan Peterson, P.E. and Nester Rood, “Industrial Accident Prevention ", McGraw-Hill Book Co., 1980.
4. Blake, R.P., “Industrial Safety ", Prentice Hall Inc., New Jersy - III Edition, 1963.
5. Subbaram N.R. “Handbook of Indian Patent Law and Practice", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.
6. Eli Whitney, Moduleed States Patent Number: 72X, Cotton Gin, March 14, 1794.
7. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].

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ENVIRONMENTAL CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
ENVIRONMENTAL CHEMISTRY	MAC-208	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand environment problems and their solutions through scientific methods.
CLO 2	Able the control the water pollution and also able to improve water quality parameters.
CLO 3	Industrial parameters of various industries.
CLO 4	Develop the methods for biodegradation of waste materials.
CLO 5	Develop the methods for removal of heavy metal ions.

Course Objectives: The overall aim of this course is to share knowledge of chemistry to students with practical skill of chemistry. Base of this course is implementation of scientific methods to solve problems, which enable student to gain better understanding of chemistry. Student can use practical knowledge of chemistry in specific area at industrial level as their career option.

MODULE I: CHEMISTRY AND THE ENVIRONMENT

Chemistry and the environment - environmental pollution - causes - pollutants – air pollution -

effects of air pollution: Environmental fate of pollutants – transformation process - bioConcentration - fate of air, water and soil pollutants

MODULE II: WATER POLLUTION

Water pollution - water quality parameters - turbidity, colour, pH, acidity, alkalinity, solids, hardness, chlorides, residual chlorine, sulphates, fluorides, phosphates, iron and manganese, DO, BOD, COD, nitrogen, grease, volatile acids, gas analysis.

MODULE III: INDUSTRIAL POLLUTION

Cement, sugar, distillery, drug, paper and pulp, thermal power plants, nuclear power plants, metallurgy.Polymers, drugs etc.

Environmental disasters – Cherbonyl, Three mile island, Seveso and minamata disasters, Japan tsunami

MODULE IV: BIOLOGICAL ACTIVITY

Biological activity - biodegradation of carbohydrates, proteins, fats and oil, detergents, pesticides; Metabolic fate of pollutants - adsorption – distribution -metabolism - excretion.

MODULE V: ENVIRONMENTAL TOXICOLOGY

Toxic heavy metals **:**Mercury, lead, arsenic and cadmium. Causes of toxicity. Bioaccumulation, sources of heavy metals. Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects. Toxic Organic Compound **:**Pesticides, classification, properties and uses of organochlorine and ionospheres pesticides detection and damaging effects.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	20	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS SUGGESTED:

1. Environmental Chemistry, S.E. Mahan, Lewis Publishers.
2. Environmental Chemistry, Sharma & Kaur, Krishna Publishers.
3. Environmental Chemistry, A.K. De, Wiley Eastern
4. Environmental Pollution Analysis, S.M. Khopkar, Wiley Eastern
5. Standard Method of Chemical Analysis, F.J. Welcher Vol. III, Van Nostrand Reinhold Co.
6. Environmental Toxicology, Ed. S. Landsberger and M. Creatchman, Gordon and Breach Science Publication.
7. Enviromental Chemistry, C. Baird, W.H. Freeman.

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CHEMISTRY OF COSMETICS

Course Name	Course Code	LTP	Credit	Semester
CHEMISTRY OF COSMETICS	**MAC-209**	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use of chemistry in preparation of cosmetics
CLO 2	Analysis of cosmetics and their characterisations
CLO 3	Handling of synthesis of cosmetics

Course Objective: This course is intended to provide a comprehensive survey of ingredients fundamental to the cosmetic industry. The course will emphasize current trends in the selection of cosmetic ingredients. The chemistry and technology of cosmetic raw materials will be related to their behavioral properties as utilized in the construction of stable functional systems. In this way, it is intended to generate a better understanding of the contributions of ingredients to the performance of finished product formulations. Emphasis will be placed on recognizing and dealing with problem areas associated with the use of various ingredients. Safety considerations and other pertinent matters which can influence ingredient selection will be included in these discussions.

Course Content:

MODULE I: INTRODUCTION

Classification of raw materials and raw materials used in the cosmetic industry for the manufacture of finished products. Method of sampling, Indian Standard specification laid down for sampling and testing of various cosmetics in finished form by the bureau of Indian standards. Factors affecting stability of a formulation, ICH guidelines, Methods of stabilizations and Methods of stability testing.Concept of development of stability indicating analytical

methods.

MODULE II: PHYSICAL AND CHEMICAL PROPERTIES OF COSMETICS

Determination of Physical and chemical constants such as extractive values, moisture content, alcohol content, volatile oil content, ash values, bitterness values, foreign matters, and physical constants applicable to the lipid containing drugs. Microbial counts, bioburden and Pharmacopoeial microbial assays.

MODULE III: PREPARATION OF COSMETICS

Brief introduction of the following cosmetic preparation and a detailed study on their quality control: Shampoo, Tooth paste, skin powder, skin creams, hair creams, nail polish, after shave lotion, bath and toiletries, lipstick and hair dyes, perfumes, depilatories.

MODULE IV: PACKAGING OF COSMETICS

Packaging of cosmetics –Filling of solids, semisolids & liquids. Materials used for cosmetic packaging Rules & regulations and legal provisions for packaging & labeling.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. Comprehensive Pharmacy Review 5th Edition by Leon Shargel, Alan H. Mutnick, Paul F. Souney, Larry N. Sawnson – 2004.

2. Applied Biopharmaceutics and Pharmacokinetics, 4th Edition by Leon Shargel / Andrew B.C., Yu
– 1999.

3. A. H. Beckett and J. B. Stenlake Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition.

4. G. H. Jeffery, J. Basset, J. Mendham, R. C. Denny (Rev. by) Vogels Text Book of Quantitative Chemical Analysis, 5th Edition 1989, ELBS.

5. The Controller of Publications; New Delhi, Govt. of India, Indian Pharmacopoeia, Vol. I and Vol. II - 1996.

6. J. B. Wilkinson and R. J. Moore :Herry‟sCosmeticology; Longman Scientific and Technical Publishers, Singapore.

7. P.D. Sethi; Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition - 1997,

8. ICH guideline for impurity determination and stability studies.

9. Practical HPLC method development by Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, John Wiley and Sons 2nd Edition – 1997

AMITY UNIVERSITY
RAJASTHAN

AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

NANO CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
NANO CHEMISTRY	**MAC-210**	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Praparation of nanoparticles
CLO 2	Metal nanoparticles and their prepartions
CLO 3	Growth of materials on nanoscales

Course Objective: To provide an adequate knowledge on various nanochemistry aspects.

Course Content:

MODULEI :SIZE EFFECTS ON STRUCTURE AND MORPHOLOGY OF NANOPARTICLES

Fundamental Properties - Size Effects on Structure and Morphology of Free or Supported Nanoparticles - Size and Confinement Effects - Fraction of Surface Atoms - Specific Surface Energy and Surface Stress - Effect on the Lattice Parameter - Effect on the Phonon Density of States - Nanoparticle Morphology - Equilibrium Shape of a Macroscopic Crystal - Equilibrium Shape of Nanometric Crystals - Morphology of Supported Particles.

MODULE II:SUPERPLASITICITY AND REACTIVITY OF METAL NANOPARTICLE

Superplasticity – Introduction – Mechanism - Superplastic Nanostructured Materials - Industrial Applications . Reactivity of Metal Nanoparticles - Size Effects-Structural Properties - Electronic Properties - Reactivity in Chemisorption and Catalysis of Monometallic Nanoparticles - Support Effects - Alloying Effects - Effect of Surface Segregation - Geometric Effects -Electronic Effects - Preparation and Implementation in the Laboratory and in Industry.

MODULEIII: SUPERCRITICAL FLUIDS

Supercritical Fluids –Introduction – Physicochemical Properties - Solubility - Viscosity - Diffusion - Thermal Conductivity - Applications - Purification and Extraction - Synthesis.

MODULEIV: FEATURES OF NANOSCALE GROWTH

Specific Features of Nanoscale Growth – Introduction - Thermodynamics of Phase Transitions - Dynamics of Phase Transitions - Thermodynamics of Spinodal Decomposition - Thermodynamics of Nucleation – Growth - Size Control - Triggering the Phase Transition- Application to Solid Nanoparticles - Controlling Nucleation - Controlling Growth - Controlling Aggregation. Stability of Colloidal Dispersions - Breaking Matter into Pieces.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References:

1. C. Brechignac, P. Houdy, M. Lahmani, ―*Nanomaterials and Nanochemistry*‖, Springer publication (2007).
2. Kenneth J. Klabunde, ―*Nanscale materials in chemistry*‖, Wiley Interscience Publications (2001).
3. C. N. Rao, A. Muller, A. K. Cheetham ,―*Nanomaterials chemistry*‖, Wiley-VCH (2007).

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COMMUNICATION SKILLS - II

Course Name	Course Code	LTP	Credit	Semester
Corporate Communication Skills	BCS211	1:0:0	1	2

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage	30	30	35	5

(%)				

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGMENT

(BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Communication And Relationship Managment	BSS211	1:0:0	1	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:

Process of Behavioral communication

Aspects of interpersonal communication and relationship

Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication

Scope of Behavioral Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR

Escalating, maintaining and terminating IPR

Direct and indirect strategies of terminating relationship

Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America

Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

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FRENCH - II

Course Name	Course Code	LTP	Credit	Semester
French-II	FLT211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. Les loisirs
2. Les saisons
3. Les nombres
4. Le logement et la ville
5. Les prépositions de lieu
6. Les verbes de direction
7. Les lieux de l'université
8. Les documents administratifs
9. Les expressions utiliseés en classe par le professeur
10. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

1. Aimer, faire et savoir au present
2. La negation
3. Les adjectifs possessives au pluriel
4. Le partitifs
5. Aller au présent
6. <<il y a>>
7. L'usage des prepositions de lieu
8. Vouloir et pouvoir au présent
9. L'impératif
10. Le conditionnel de politesse

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN – II

Course Name	Course Code	LTP	Credit	Semester
German-II	FLG211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

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SPANISH – II

Course Name	Course Code	LTP	Credit	Semester
Spanish-II	FLS211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:
Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

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CHINESE – II

Course Name	Course Code	LTP	Credit	Semester
Chinese-II	FLC211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.
1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix

5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND002	0:0:2	2	2

COURSE LEARNING OUTCOMES (CLO)

The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

INSTRUMENTAL METHODS OF ANALYSIS

Course Code: MAC 301 **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Instrumental Methods Of Analysis	MAC-301	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Study of Advanced Analytical Techniques
CLO 2	Able the find out Synthons and synthetic equivalents of functional groups.
CLO 3	Able the protection of various functional groups during reaction.
CLO 4	**Atomic structure and spectroscopy**.

Course Objective: The curriculum is developed to help the students to understand the basic theory & applications of various sophisticated instruments. The instrumental analysis course aims to provide students with an understanding of the functioning and applications of these instruments in our day to day life. It covers the basic principles of theory, its operation and their applications in chemistry, physics, biology, nanotechnology, material science and materials chemistry. Recent advances in the characterization of nano materials will also include in the course. The course is further enhanced with invited lectures on recent developments and applications in characterization of nano materials.

Course Contents:

MODULE I: ADVANCED ANALYTICAL TECHNIQUES

Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance

MODULE II: SPECTROSCOPIC TECHNIQUES

(UV- Vis- NIR Spectrophotometer), FTIR Spectrometer, Thermal Analysis (DSC, TGA, DTA etc).Applications of XRD measurements, Calculation of particle size from XRD measurements using Debye Scherer formula. Applications of spectroscopic techniques in chemistry, biology, nanotechnology, nanomedicine etc.

MODULE III: MOSSBAUER SPECTROSCOPY

Magnetic property of materials using Vibrating Sample Magnetometer, Mossbauer Spectrophotometer. Hysteresis loop, Remnant magnetization, Coercivity, Saturation Magnetization etc. Principle and Applications of CHNS analyzer. Applications of VSM, Mossbauer spectrometer and CHNS analyzer

MODULE IV: Atomic structure and spectroscopy:
Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle,

Chemical applications of group theory: symmetry elements; point groups; character tables; selection rules. Symmetry elements and symmetry, operations, groups, classes, multiplication and character tables, applications of group theory in hybridisation and molecular vibrations.

MODULE V: Nuclear Magnetic Spectroscopy: Nuclear moments, nuclear spin states in a magnetic field and the resonance phenomenon, relaxation processes, Bloch equations outline of NMR detection methods; chemical shifts and spin-spin coupling, spectra of a two-spin system (A2, AB and AX cases); interpretation of simple first order spectra of organic molecules. NMR lineshapes and molecular dynamics. FT-NMR spectroscopy, measurement of relaxation times, introduction to 13C NMR spectroscopy**.**

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	20	5	20	5	50

Text and References

1. Fundamentals of Analytical Chemistry (with CD-ROM and InfoTrac) by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, Hardcover: 992 pages, Publisher: Brooks Cole
2. Dean‟s Analytical Chemistry Handbook by Pradyot Patnaik, Hardcover: 1280 pages, Publisher: McGraw-Hill Professional
3. Quantitative Chemical Analysis, Sixth Edition by Daniel C. Harris, Hardcover: 928 pages, Publisher: W. H. Freeman
4. Analytical Chemistry by Gary D. Christian, Hardcover: 848 pages Publisher: Wiley; 6th edition
5. Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
6. Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press New York, Oxford.

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

SYNTHETIC ORGANIC CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
SYNTHETIC ORGANIC CHEMISTRY	MAC-302	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Disconnection approach in various chemical reactions.
CLO 2	Able the find out Synthons and synthetic equivalents of functional groups.
CLO 3	Able the protection of various functional groups during reaction.
CLO 4	Develop the industrial application of various functional groups and reactions.

Course Objective: The main objective of this organic chemistry course is to give a good idea of different important chemical reactions. Synthetic organic chemistry plays an important role in our daily life due to the importance of synthesis of various organic compounds for the prevention of various diseases.It couse includes the disconnection approach, synthons and umpolung reactions and applications of complex metal hydrides. This course also covers the various important reagent such as LDA, PPA, diazomethane, ozone phase transfer catalyst etc. It also includes invited lectures on the recent development of synthetic organic chemistry recations.

Course Content:

MODULE I : DISCONNECTION APPROACH

Introduction to disconnection approach,functional group interconversions.Introduction to Retro-synthesis of aromatic Heterocyclesand 3, 4, 5 and 6 membered carbocyclic and heterocyclic rings. One group C-X and two group disconnections in1,2,1,3 -,1,4-& 1,5- difunctional compounds.

MODULE II: SYNTHONS AND UMPOLUNG

An introduction to Synthons and synthetic equivalents, importance of the order of events in organic synthesis, chemoselectivity, regioselectivity. Diels Alder reaction,Michael addition and Robinson annulation.Reversal of polarity (Umpolung).

MODULE III : INTRODUCTION TO PROTECTING GROUPS AND APPLICATIONS.

a) Protecting Groups: Principle of protection of alcohol, amine, carbonyl and carboxyl groups**b) Application of the following in synthesis** Merrifield resin, polymeric reagents. Solid phase synthesis of polypeptide &oligonucleotides, electro organic synthesis, enzyme catalyzed reaction in synthesis &resolution of racemic mixtures.

MODULE IV: APPLICATION OF FOLLOWING REAGENTS &REACTION IN SYNTHESIS.

Complex metal hydrides, lithium dialkyl cuprate, lithium diisopropylamide (LDA) Dicyclohexylcarbodiimide(DCC), Trimethyl silyl iodide, tributyltin hydride, peracids, lead tetra acetate, PPA, Diazomethane , ozone phase transfer catalyst, woodward-prevost hydroxylation, Barton and Shapiro reaction Hoffmann – Loffler- Fretag, Peterson synthesis.
Selenium dioxide, crown ethers, DDQ

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text and References

1. S.Warren: Designing of organic synthesis
2. J. Fuhrhop & G. Penzlin. : Organic synthesis (2nd ed.)
3. Carruthres: some modern methods of organic synthesis.
4. Fieser & Fieser : Reagent in organic synthesis
5. R.O.C.Norman: principle of organic synthesis
6. CAREY & sundberg: Advanced organic Chemistry
7. Bartan and Ollis : comprehensive organic Chemistry
8. R.Admas: - organic reactions
9. Stone & west: Advances in organometallic Chemistry
10. C.W.Bird: Transition metal intermediate in organic synthesis
11. Swan &black :organometallic in organic synthesis.
12. A. Mitra : synthesis of prostaglandins
13. John Apsimon: Total synthesis of natural products
14. M. K. Mathur, C. K. Narang & R.E.Williams: polymers as aid in organic Synthesis
15. P. HODGE & D.C.SHERRINGTON: Polymer supported reaction in organic synthesis.
16. C.J.Gray: Enzyme catalysed reactions
17. T.W. Green & P.G.M.Wats : Protecting groups in organic Chemistry
18. Weber &Gokel : phase transfer catalyst in organic synthesis.
19. Protecting group chemistry J. Roberton (OX)

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

INTRODUCTION TO POLYMERIC MATERIALS

Course Name	Course Code	LTP	Credit	Semester
INTRODUCTION TO POLYMERIC MATERIALS	MAC-303	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Given a polymer structure the student should be able to specify a general synthesis scheme and predict molecular weight averages as a function of reactant concentration and monomer conversion.
CLO 2	A student should be able to calculate number and weight average molecular weight from a given distribution.
CLO 3	Given a polymer, student should be able to specify methods for the measurement of number and weight average molecular weight and also the entire molecular weight distribution.
CLO 4	A student should be able to describe basic chain conformations and calculate the average chain end-to-end distance.
CLO 5	Given micrographs of polymer materials the student should be able to identify the morphology and how it depends upon crystallization conditions.
CLO 6	A student should be able to describe basic aspects of the phase behaviour of polymer solutions and blends and how this behaviour depends
CLO 7	The student should be able to predict the basic stress/strain and viscoelastic behaviour of polymer materials based on a knowledge of structure and thermal properties
CLO 8	Given simple material requirements (optical transparency for bottles, flexibility and toughness for buckets, etc), a student should be able to select the most suitable polymer material for a given application.

Course Objective: The curriculum is developed to help the students to understand the importance of polymeric materials and their usefulness in day to day life. The Polymeric materials course aims to provide students with an understanding of the different kinds of polymers, their preparation, polymerization and chemical bonding between them. It also covers the applications of these polymeric materials in plastics, elastomers

Course Content:

MODULE I: INTRODUCTION TO POLYMER

History and Concept of macromolecules, monomers with specific example viz. acrylonitrile,

vinyl, chloride, methyl methacrylate, isobutylene, isoprene, styrene, hexamethylene diamine and adipic acid, caprolactum, ethylene oxide and sebacic acid, ethylene glycol and terephthalic acid, functionality, Degree of polymerization, Classification of polymers depending on – a) The origin (natural, Semisynthetic, synthetic etc. b) The structure (linear, branched, network, hyperbranched, dendrimer.c) The formation (condensation, addition). d) Homopolymers, copolymers. e) The behaviour on application of heat and pressure
(thermoplastic and Thermosetting). f) The form and application (plastics, fiber. elastomers and resin. g) Stereisomers: Isotactic, Syndiotactic, Atactic, Organic and Inorganic polymers. Concept of molecular mass, polydispersity, number average and weight average, molecular weight distribution in linear polymers.

MODULE II- METHODS OF POLYMERISATION

Methods of polymerization. Bulk polymerization, Solution polymerization, Emulsion polymerization, Suspension polymerization, Melt polycondensation. Controlled polymerization methods, viz, Nitroxide mediated polymerization (NMP), Atom Transfer Radical Polymerization (ATRP), Reversible Addition Fragmentation Termination (RAFT).

MODULE III- CHEMISTRY OF POLYMERIZATION (MECHANISM)

chain polymerization- Free radical, Ionic and coordination mechanism, Common features of two types of Mechanism of cationic polymerization and anionic polymerization, Mechanism of coordination polymerization – Ziegler-Natta catalysts, Ring opening polymerization-mechanism of polymerization of cyclic ethers, cyclic amides and cyclosiloxanes.

MODULE IV-SPECIAL POLYMERS AND THEIR APPLICATIONS

polyethylene, rubber and rubbers derived from butadiene – acrylic acid copolymers, stereoregular polybutadienes, polychloroprene (neoprene), styrene- butadiene – acrylonitrile copolymers, polystyrene, polymethyl methacrylate(PMMA), polyvinyl acetate (PVA), polyvinyl alcohol, poly vinychloride, fluoro carbon polymers.

polyamides (Nylon 6, Nylon 6,6, Nylon 6,10), polyesters (poly ethylene terephthalate (PET), polybutylene, terphthalate (PBT), aromatic polyesters), polycarbonate, polyurethanes – Flexible and rigid polyurethane, polyurethane elastomers, coatings, adhesives, sulphur, containing polymers, polimdes, polyethersulphones, polyetherketones. Thermosetting resins – phenolic resins, amino resins, epoxy resins, silicone polymers, and cyanate ester resins.

MODULE V- POLYMER DEGRADATION

Introduction, Types of degradation-Thermal, mechanical, Photodegradation, oxidative degradation, Hydrolytic degradation, Degradation by ultrasonic waves and high energy radiation.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1) F.W. Billmeyer, Jr. Textbook of polymer science, Wiley- Interscience, N.Y.(1971)
2) Introduction to polymer chemistry, R. Seymour, Wiley –Interscience (1981)
3) Physical chemistry of CHYromolecules, by D.D. Deshpande, Vishal publications, (1985)
4) principles of polymerization, G.Odian, Wiley – Interscience (1981)

5) Organic polymer chemistry, K. J. Saunders, Chapman and Hall, London (1973).
6) Principles of polymer chemistry by P.J. Flory.
7) Polymer Science –V R Gowarikar.

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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

CHEMISTRY OF MATERIAL & NANOMATERIAL

Course Name	Course Code	LTP	Credit	Semester

CHEMISTRY OF MATERIAL & NANOMATERIAL	MAC-304	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand how effect may emerge due to nano- dimension of particle and bulk material.
CLO 2	To understand chemical change in synthesis of nanomaterial.
CLO 3	To understand characterization, properties, functionalization and uses of solid material and nanomaterial.
CLO 4	Identify nano- structure of nano-material.

Course objective: Material science plays a vital role in this modern age of science and technology. The rapid development in the field of nanomaterials and composite science have opened vast opportunities for better understanding and utilization of various materials. The course curriculum is designed to give students an idea of the detailed aspects of important topics of material science like composites, nano materials and their synthesis and characterization.

Course Contents:

MODULE I: INTRODUCTION TO CHEMISTRY OF MATERIALS & NANOMATERIALS

Materials & their classification, Role of chemistry in material design, Nanoscale Science and Technology-Implications for Physics, Chemistry, Biology and Engineering; Classifications of nanostructured materials, nano particles; quantum dots, nanowires, ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties.

MODULE II: SYNTHESIS OF MATERIALS & NANOMATERIALS

Materials: Preparative techniques: Ceramic methods; chemical strategies, chemical vapour deposition; preparation of nanomaterials, Langmuir- Blodgett Films. Fabrication of ordered nanostructures

.Composition and purity of materials. Nanomaterial Synthesis: Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, general method of preparation, properties, detection, and characterization of organic nanoparticles: hydrophobic drugs, protein, peptide, lipid, cyclodextrine, polysaccharides. Nanocochleates, Prospects and Future Challenges.

MODULE III: CHARACTERIZATION TECHNIQUES OF MATERIALS AND NANOMATERIALS:

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques-AFM, SPM, STM, SNOM, ESCA, SIMSNanoindentation, Small-angle X-ray and neutron scattering, DLS, Ellipsometer, Confocal microscopy

MODULE IV: APPLICATION OF MATERIAL CHEMISTRY & NANOCHEMISTRY

Application of Organic Nanoparticles: Application of Lipids, CNTs, Proteins, peptides,

Dendrimer, cyclodextrin, Polysaccharide based organic nanoparticles in nanomedicineand drug delivery through nanoscopic structure and nanoformulation; Applications of zero-dimensional Nanoparticles: Quantum dots for solar cells, Quantum dots for lightemitting diode, Molecular electronics, Nanoparticles as catalysts; Applications of one dimensional nanotubes and nanowires: Nanotube/nanowire-based field effect transistors for biosensing, gas sensing, Piezoelectric nanowires as nanogenerator, Thermoelectric Nanowires, Quantum dots for bio-sensing; Application of Nanoporous materials: A Single Nanopore for DNA sequencing, Nanoporous anodized aluminum oxide, Nanoporous metal-organic framework for gas absorption, Nanoporous materials for Li/Cd-ion battery applications;Application of Nano ceramics: Dielectrics, ferroelectrics, magnetoceramics, and multiferroics Magnetism; Dia-, Para-, Ferro-, Antiferro-, Ferri-magnetism, Magnetic properties; Gaintmagnetoresistance, Tunneling magnetoresistance, Colossal magnetoresistance, Superparamagnetism High-temperature superconducting (High-Tc) materials: Yttrium barium copper oxide (YBCO) and Bi-systems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	20	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books suggested:

1.Introduction to Nanoscience by Gabor L. Hornyak, Joydeep Dutta, Harry F. Tibbals, Anil K. Rao.CRC Press, 2008.

2. Nanotechnology: Importance and Application by M.H. Fulekar, IK International, 2010.

3. Environanotechnology by Mao Hong fan, Chin-pao Huang, Alan E Bland, Z Honglin Wang, RachidSliman, Ian Wright. Elsevier, 2010.

4. Nanotechnologies, Hazards and Resource efficiency by M. Steinfeldt, Avon Gleich, U. Petschow, R. Haum. Springer, 2007.

5. Nanotechnlogy: Health and Environmental risk by Jo Anne Shatkin. CRC press, 2008.

6. Nanotechnology in Biology and Medicine: Methods, Devices and Application by Tuan Vo-Dinh .CRC press, 2007.

7. Nanomaterials for Biosensors by Challa Kumar. Wiley-VCH, 2007.

8. Nanosystem characterization tools in the life sciences by Challa Kumar. Wiley-VCH, 2006.

APPLIED CHEMISTRY LAB

Course Code: MAC-320 **Credit Units: 02**

APPLIED CHEMISTRY LAB

Course Name	Course Code	LTP	Credit	Semester
Applied Chemistry Lab	MAC-320	0:0:4	2	3

List of Experiments (Any 15 Experiments are to be performed)

Polymers

1. Caprolactum from cyclcohexanone .

2. Synthesis of Nylon-6,10

3. Preparation of Polystyrene.

4. Study the morphology of polymers through optical microscopy.

5. Preparation of Epoxy resin using Bisphenol-A and Epichlorohydrin.

6. Determination of molecular weight of high polymer using viscosity method.

7. Determination of melt flow index of polymers and Compare their Melt Flow Characteristics

Dyes

8. Preparation of Methyl Orange- An azodye.

9. Preparation of Indigo

Food Industry

10. Separation of artificial colorants in confectionary using TLC.

11. Determination of protein content of wheat flour.

Cosmetic Products

12. Shampoo

13. Detergent

14. Talc

15. Lipstick

16. Perfumes

Drugs Analysis

17. Preparation of Paracetamol and Aspirin

18. Analysis of Drugs:

a. Novalgin

b. Sulfa-drugs

c. Paracetamol

Inorganic preparation

19. Acetylation of ferrocene
20. Preparation of Tetraamminecarbonatocobalt(III)nitrate.
21. Preparation of Pentaamminechlorocobalt(III)chloride.
22. Synthesis of meso-tetraphenylporphyrin
23. Synthesis of p-substituted tetraphenylporphyrins

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

1. A Textbook of quantitative chemical analysis, VIth Edition Vogel, Pearson Education Limited.

2. Practical Organic Chemistry, Mann and Saunders, IV Edition, ELBS and Longman Publication

3. Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi

4. Practical Manual of Organic Chemistry, R. K. Bansal

5. A Textbook of quantitative inorganic analysis including elementary instrumental analysis, IVth Edition Vogel, ELBS and Longman Publication

6. Advanced Practical Inorganic Chemistry, Gurdeep Raj, Goel Publishing House, Meerut

INSTRUMENTAL LAB

Course Code: MAC-321 **Credit Units: 02**

INSTRUMENTAL LAB

Course Name	Course Code	LTP	Credit	Semester
Instrumental Lab	MAC-321	0:0:4	2	3

Course Contents:

1. Determination of R_f value of the materials using Paper Chromatography

2. Conductometric titrations

3. Colorimetric measurements

4. Separation of metal ions using chromatographic techniques

5. Spectral analysis of organic compounds

6. Measurement of molecular weight using intrinsic viscosity measurements

7. pH measurements
(a) Measurement of pH of different solutions using pH-meter.
(b) Preparation of buffer solutions
(i) Sodium acetate-acetic acid
(ii) Ammonium chloride-ammonium hydroxide
(c)Measurement of the pH of buffer solutions and comparison of the values

8. Determine the crystallinity and phase identification of metal oxides using X-Ray diffractometer

9. Determine the thermal stability of materials using Thermo gravimetric analysis

10. Determine the Oxidation state of materials using XPS

11. Determine the Phase change of materials (Endothermic or exothermic) using Differential Scanning Calorimetry (DSC)

12. Determine the Magnetic behavior of the Materials Using Vibrating Sample magnetometer

13. Determine the molecular mass of the materials using ESI- Mass Spectrometer

14. Determine the percentage of Carbon, Hydrogen, Nitrogen and Sulphur Using CHNS Analyzer.

15. Determine the λ_{Max} of the materials using UV-Visible Spectrophotometer

16. Determine the Functional Group of the Materials using IR Spectrometer.

17. Separation of Mixtures of organic compounds using HPLC

18. separation and identification of molecular mass of the materials using GC-MS

19. Identification of particle size measurement of the materials using Photon Correlation Spectroscopy

20. Determination of Morphology of the materials using SEM analysis

21. Determination of the particle size, shape, SAED pattern of the Materials Using HRTEM

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**

5	20	20	5	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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MEDICINAL CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
MEDICINAL CHEMISTRY	**MAC-305**	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Development of drugs through chemical process
CLO 2	Kinetics of drug development reactions
CLO 3	Use of drugs as antibiotics

Course objective: To introduce awareness among the students about the basic ideas of medicines & their working mechanism.

Course Contents:

MODULE I: DRUG DEVELOPMENT

Drug development: Lead modification. a) Identification of active part -Pharmacophore b) Fundamental group modification c) Structure-activity relationship d) Structure modification to increase potency and therapeutic index. i) Homologation ii) Chain branching iii) Ring chain transformations iv) Bioisosterism. Drug development process: a) Pre-formulation, product development. b) Preclinical studies; Acute toxicity, sub acute toxicity, chronic toxicity, LD_{50}, ED_{50}, pharmacodynamicsutagenecity and reproductive studies.

MODULE II: PHARMACOKINETICS

Basic principles of pharmacokinetics including absorption, distribution, metabolism and excretion of drugs and metabolites in the human body, important pharmacokinetic parameters in defining drug therapeutics, mathematical approach to pharmacokinetic modeling.

MODULE III: PHARMACODYNAMICS

Introduction, elementary treatment of enzyme stimulation, enzyme inhibition, sulphonamides, membrane active drugs, drug metabolism, biotransformation, significance of drug metabolism in

medicinal chemistry. Therapeutic index, explanation of quantal dose, graded dose, dose-effect curves, efficacy, potency, margin of safety

MODULE V: ANTIBIOTICS

Definition, characteristics, classification, synthesis and therapeutic uses of Penicillin, Ampicillin, Amoxicillin, Chloramphenicol, Cephalosporin, Tetracycline and Streptomycin

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Books suggested:

1. Principles of Medicinal Chemistry, W. C. Foye, Philadelphia, USA
2. An introduction to Medicinal chemistry, G. L. Patrick, Oxford University Press
3. Burger‟s Medicinal Chemistry and Drug Discovery, Vol. 1-5, John Wiley
4. The Organic Chemistry of Drug Design and Drug Action, Richard B. Silvermann, Academic Press
5. Medicinal Chemistry, Ashutosh kar, New Age International Ltd
6. Essentials of Medical Pharmacology, K. D. Tripathi, Jaypee Brothers
7. A textbook of medicinal chemistry, P. Primo, CBS Publishers & Distributors
8. Text book of pharmaceutical organic chemistry, Md. Ali, CBS Publishers

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POLYMER TECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
POLYMER TECHNOLOGY	**MAC-306**	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Development of polymer process.
CLO 2	Polymeric compounds and their development
CLO 3	Synthesis of specially type polymers

Course objective: This course is designed to familiarize students with the various polymer characterization and manufacturing techniques for converting polymer feed stocks into plastic end products. It involves a study of various plastics processing techniques. Students will become familiar with specialty polymers and their industrial uses, and design factors to create materials with desirable end-use properties

Course Contents:

MODULE I: POLYMER PROCESSING

Plastic Technology: Extrusion, injection molding, blow molding, compression molding, thermoforming, rotational molding, casting.*Fiber Tec* Textile and fabric properties, spinning, fi after-treatments.*Elastomer Technology*- Vulcan reinforcement, elastomer prope compounding. Recycling of polymers Classification of polymer recycling processes. Waste polymer recovery, sortation, microsortation, polymer reprocessing. Polymer incineration

MODULE II: POLYMER BLENDS AND ALLOYS

Definition, Polymer Blends, compatibilisation, Industrial Blends , Industrial applications of polymer blends.

MODULE III: SPECIALTY POLYMERS

Liquid Crystal Polymers (LCP): Smectic, nematic, cholestric crystals, thermotropic main chain LCP, side chain LCP, chiral nematic LCP, properties of commercial LCP"s. *Electroactive polymers*: Filled polymers, conducting polymers- doping, conducting mechanism, EMI shielding, applications-rechargeable batteries, sensors, photoconductive polymers. *Ionic*

Polymers: Ionic crosslinking, ion exchange, hydrophilicity, ionomers, polyelectrolytes, applications, *Synthetic Polymeric membranes*-membrane preparation, membrane modules, applications *Others:* High temperature and fire resistant polymers, Hydrogels, smart polymers, . Dendritic polymers- their applications. *Biomedical polymers*: Contact Lens, Dental Polymers, Artificial heart, Kidney and skin cells *Biobased polymers:* PLA, PCL

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Books suggested:

1. Principles of Polymerization by G. Odian, (Wiley Interscience, New Delhi)
2. Polymer Science by Gowarikar
3. Thermal Characterization of Polymeric Materials- E. Turi (Academic Press)
4. Polymer Characterization- Physical Techniques by D. Campbell and J.R.White (Chapman and Hall)
5. Text Book of Polymer Science, F.W.Billmeyer (Willey Eastern)
6. Applied Rheology in Polymer Processing by B. R. Gupta, (Asian Books, Pvt. Ltd. New Delhi)
7. Polymer Blends and Alloys by R.P. Singh, C.K. Das and S. K. Mustafi, (Asian Books Pvt. Ltd.)
8. Principles of Polymer Science by Bahadur and Shastry
9. Plastics Technology Handbook by Manas Chanda and S.K.Roy (4th Edition, CRC Press, New York)
10. Analysis of polymers- an introduction, by Crompton T.R., pergaman press 1989.
11. Thermal characterization of polymeric materials, by Turi E.A., Academic press Inc.

GREEN CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
GREEN CHEMISTRY	**MAC-307**	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Recognise the connection between environment and chemical reaction
CLO 2	Interpret data on the basis of energy consumption and identify the green behaviour of reaction
CLO 3	Define and calculate basic Green Chemistry metrics such as reaction yield, atom economy, e-factor and reaction mass efficiency and interpret molecular structure in terms of expected relative chemical behavior
CLO 4	Define and calculate basic Green Chemistry metrics such as reaction yield, atom economy, e-factor and reaction mass efficiency and interpret molecular structure in terms of expected relative chemical behavior
CLO 5	Identify how the future can be different: identify reagents, reactions and technologies that should be and realistically could be replaced by green alternatives
CLO 6	Introduce leaders of the field of green chemistry, related sectors of public health, or sustainability science, and reflect on the motives and forces that underlie our adoption and commitment to technologies that are clearly or potentially harmful to the environment.
CLO 7	Develop an understanding of the importance of pollution and wastefulness in modern cultures by reflecting on the big chemistry, big technology issues such as energy use and the protection of the atmosphere, waterways and land
CLO 8	Reflect and articulate the need for a new ethical paradigm in a world where powerful technologies, including chemical technologies, can have dangerous, long term effects, as well as positive and uplifting ones

Course Objective: A detailed exposition of the course for the student, opting for Applied Chemistry is so vitally important for a clear understanding of recent intricate theories of non-conventional sources of energy.

Course Contents:

MODULE I: SOLAR ENERGY

Heat Transfer in Renewable Energy Systems - conduction, convection and radiation, Heat transfer and engineering concepts to the renewable energy systems Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, Spectral distribution, the solar constant, radiation on titled surface / earth, instruments for measuring solar radiation. Application of solar energy and solar photovoltaic system

MODULE II: BIO-GAS

Raw materials, Properties/ characteristics of bio gas, Principles of Bio-Conversion;

Photosynthesis, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion, Transportation of bio gas, bio gas plant technology & status, Biomass cogeneration Energy recovery from urban waste, Power generation from liquid waste, Bio gas applications.

MODULE III: GEOTHERMAL AND WIND ENERGY

Structure of earth‟s interior, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Applications. Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals; types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Recent development and applications.

MODULE IV: OCEAN AND HYDROGEN ENERGY

Principle of ocean thermal energy conversion (OTEC), setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Fundamentals of tidal power, Potential and conversion techniques, mini-hydel power plants. Use of tidal energy, Limitations of tidal energy conversion systems. Properties of hydrogen in respect of it‟s use as source of renewable energy, Sources of hydrogen, Production of hydrogen; electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. Applications of hydrogen energy.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Books suggested:

1. Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
2. Kothari D.P., “Renewable energy resources and emerging technologies”, Prentice Hall of India Pvt. Ltd.
3. Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
4. Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
5. Tiwari and Ghosal, “Renewable energy resources” Narosa Publication.
6. Twidell & Weir, “Renewable Energy Sources”
7. K Mittal “Non-Conventional Energy Systems” , Wheeler Publication
8. Ramesh & Kumar, “Renewable Energy Technologies”, Narosa Publications.

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INDUSTRIAL WASTE AND WATER TREATMENT

Course Name	Course Code	LTP	Credit	Semester
INDUSTRIAL WASTE AND WATER TREATMENT	**MAC-308**	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Treatment and utilization of industrial waste
CLO 2	Water treatment through chemical process

CLO 3	Recovery and reuse of waste water

Course Objectives: This course will give the basic understanding of the chemical principles involved in water and wastewater treatment. It presents the basic chemistry and treatment methodologies used in drinking water and wastewater operations. The students would be able to characteristics and treatment of industrial waste, advanced methods of treatment waste and disposal, reuse and recovery of waster from various industries. A brief introduction to environmental Impact assessment has also been added to create general awareness.

Course Contents:

MODULE I: **AN INTRODUCTION TO SOURCE, CHARACTERISTICS AND TREATMENT OF INDUSTRIAL WASTE**

Undesirable waste characteristics, sources and characteristics of waste water, industrial waste survey, waste characteristics - estimation of organic content, water reuse and in-plant waste control, idea of different technologies for the treatment of industrial waste water and the basis for the selection of treatment technology.

MODULE II: **TREATMENT OF INDUSTRIAL WASTES**

Different steps in the treatment of industrial waste (equalization, neutralization, sedimentation, oil separation, flotation, coagulation), sources and removal of heavy metals e.g. As, Ba, Cd, Cu, F, Fe, Rb, Mn, Hg, Ni, Se, Ag & Zn)

MODULE III: **ADVANCE WATER TREATMENT OF INDUSTRIAL WASTE**

Aeration, air stripping of volatile organics (VOC), biological oxidation - removal of organics (sorption, stripping, biodegradation), nitrification and de-nitrification. Lagoons and stabilization basins, membrane processes, trickling filtration, adsorption, ion exchange, chemical oxidation, sludge dewatering and disposal.

MODULE IV: **WASTE WATER REUSE AND RECOVERY**

Treatment, disposal, reuse and recovery of trade waste from (1) Textile Manufacture (2) Distilleries (3) Sugar (4) Paper and Pulp mills (4) Tanneries (5) Food Processing industries (6) Fertilizer Industry.

MODULE V: **ENVIRONMENTAL IMPACT ASSESSMENT**

Introduction to EIA, impact assessment methodologies, environmental inventory, environmental impact assessment (planning and management), environmental indices and indicators for describing the affected environment, EIA guidelines, introduction to environmental impact statement.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Books suggested:

1. Thomous S. Spiro and William M. Stiglicini, Chemistry of The Environment, Prentice Hall of India Pvt. Ltd. (2002)
2. Nicholas P. Cherimisinoff, Biotechnology for Waste and Waste Water Treatment, Prentice Hall of India Pvt. Ltd. (2001).
3. Jarry A. Nathanson, Basic Environmental Technology, 4th ed ,Prentice Hall of India Pvt. Ltd. (2003).
4. W.Wesley Eckenfelder, Indusrtrial Water Pollution Control, 2nd ed., Tata Mc-Graw Hill Book Company (1989).
5. Larry W. Canter. , Environmental Impact Assessment, 2nd ed, Tata Mc Graw Hill (1996).

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NUCLEAR CHEMISTRY

Course Name	Course Code	LTP	Credit	Semester
NUCLEAR CHEMISTRY	**MAC-309**	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Radioactivity and their application in general life
CLO 2	Understand the handling and utility of radioactive materials
CLO 3	To identify the nuclear model

Course objective: To provide an essence of basic fundamental knowledge of nuclear science and radioactivity to the students.

Course Contents:

MODULE I: INTRODUCTION TO RADIOACTIVITY

Discovery of radioactivity, α, β and γ radiations, the radioactive series, radioactive decay,

modes of decay, the n/p ratio, odd even rule, artificial radioactivity, transmutation of elements, the G.M counter

MODULE II: CHEMISTRY OF RADIOACTIVE ELEMENTS

Positions of radioactive elements in periodic table, trans-uranides and trans-actinides, super heavy elements; nomenclature & predicted chemistry, the Seaborg model, radiation dosimetry, radiolysis of aqueous solutions

MODULE III: USES OF NUCLEAR ISOTOPES

Introduction to nuclear medicine, positron emission tomography (PET) , radiocarbon dating and its uses, nuclear reactors, uses of heavy water in nuclear reactors, Trace analysis of elements and compounds - neutron activation analysis, isotope dilution analysis. Nuclear waste and its environmental effect

MODULE IV: NUCLEAR MODELS

Liquid-drop model, electron shell model, nuclear reactions, fission and fusion, cold fusion, idea about nuclear spin and its application in NMR, nuclear splitting, Zeeman effect and stark effect

(only definition and qualitative explanation)

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%	20	5	20	5	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Books suggested:

1. Essentials of Nuclear Chemistry, H. J. Arnikar, 4th Edition Wiley Eastern (1987).
2. Chemical Applications of Radioisotopes, H. J. M. Bowen. Buttler and Tanner (1969).
3. Introduction of Nuclear and Radiochemistry, G Friedlander, T. W. Kennedy, E. S. Macias and J. M. Miller, 3rd Edition, John Wiley (1981).

COMMUNICATION SKILLS - III

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS311	1:0:0	1	3

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an idea of professional work place
CLO 2	**Learn about the importance of interviews, etiquette.**
CLO 3	Learn the basic steps and techniques for preparing and for having a successful interview
CLO 4	Demonstrate Workplace Speaking Skills.

B. SYLLABUS

Topic
Group Discussion-2
PI-2 (Mock Sessions)
CV-3 + Profile Mapping
Video Resume
Social Media Profiling

EXAMINATION SCHEME:

Components	Group Discussion	Video Resume	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print

- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - III
(LEADING THROUGH TEAMS)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Sciences-III	BSS311	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe team design features and the difference between team and group, and components of the concept
CLO 2	Identify the patterns of interaction in a team, method of studying attractions and repulsions in groupssociometry and construction of socio-gram for studying interpersonal relations in a Team.
CLO 3	Analyze various stages of team growth, team performance curve profiling a team: Role of leadership in managing team.
CLO 4	Differentiate between management values, pragmatic spirituality in life and organization building global teams through universal human values.
CLO5	Demonstrate the leaning of teams, leadership and values, pragmatic spirituality in life and organization building global teams.

Course Objective:

This course aims to enable students to:

Understand the concept and building of teams

Manage conflict and stress within team

Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview

Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team &Sociometry

Patterns of Interaction in a Team

Sociometry: Method of studying attractions and repulsions in groups

Construction of sociogram for studying interpersonal relations in a Team

Module III:TeamBuilding

Types and Development of TeamBuilding

Stages of team growth

Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

Organizational Behaviour, Davis, K.

- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, HarcourtCollege Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, HarperCollinsCollege Publishers

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FRENCH - III

Course Name	Course Code	LTP	Credit	Semester
French-III	FLT311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To understand and present the time schedule and to tell the time

Course Contents:

Unité 3 La science au quotidien Page : 40-61 Leçons 7, 8 & 9

Contenu Lexical:

1. L'heure
2. Les jours de la semaine
3. Les mois de l'année
4. Les matières et types de cours
5. Les spécialitésscientifiques.
6. L'annéeuniversitaire
7. Les nationalités
8. Les noms de pays
9. Les métiers scientifiques
10. Les chiffres de 69 à l'infini
11. Quelquesunités de mesure
12. Quelquestermesscientifques
13. Les termes de l'exposition
14. Les expression familières pour accepter une invitation.

Contenu Grammatical:

1. Finir, commencer au présent
2. Les prepositions de temps
3. Féminins et masculine des noms de métiers scientifiques

4. Les adjectifs de nationalité.
5. Le future proche
6. Les adjectifs demonstratives
7. Le but: pour + infinitive
8. Le register familier

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - III

Course Name	Course Code	LTP	Credit	Semester
German-III	FLG311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents
Vocabulary:

- Furniture
- Days and months name
- Time vocabulary like 15 min, quarter, minute, seconds.
- Adjectives use to describe furniture.

Grammar:

- Past participle of verb had
- Usage of negation like **not = nicht; kein= not a single.**
- Preposition of time.
- Use of adjective in sentences.
- Introduction and use of separable verbs

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

PrescribedText-Book: First 10 LessonsfromDeutschalsFremdsprache -1B, INBH & Oxford, New Delhi, 1977
References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

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SPANISH – III

Course Name	Course Code	LTP	Credit	Semester
Spanish-III	FLS311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enable the students to talk about a place like, class room, market, neighborhood and location of thing with the use of prepositions.

Course Content

Vocabulary:

Vocabulary pertaining to describe people/ place /objects, Illness, Currency, Market etc. preferences, opinions , body parts etc.

Grammar:
Introduction of stem changing irregular verbs
Introductionofprepositions (Cerca de/ lejos de/ encima de etc.)
Present continuous tense **(Estar+ gerundio)**
Introduction of third person verbs Gustar/Parecer/Encantar/ Doleretc
Interrogatives – How much/ How many
Introduction of irregular verbs.
Immediate uture plans (Ir a + verbo)

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:
Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A

2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

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CHINESE – III

Course Name	Course Code	LTP	Credit	Semester
Chinese-III	FLC311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

COURSE CONTENTS

1. Description of size
2. Description of quantity
3. Asking and replying questions on shopping
4. Asking and replying questions on Communication
5. Conversation Related to Study
6. Conversation Related to Work
7. Expression of Simple Feelings
8. Listening of dialogues
9. Conversation based on dialogues
10. Programme Specific Vocabulary & Expressions
11. Chinese CBT Package
12. Chinese Festivals (In English)

VOCABULARY CONTENTS

1. Vocabulary will include approx 100 Characters including 50 Characters of HSK-I level.
2. Vocab related to size, quantity, shopping, communication, study, work and simple feelings and Programme Specific Vocabulary will be covered during this semester.

3. By the end of third semester the students will be able to master all 150 characters set for the HSK level-I.

GRAMMATICAL CONTENTS

1. Antonyms
2. Prepositional phrases
3. The object of 在，从

4. Complement of degree
5. Preposed object
6. Verb 在
7. 有 and 是 indicating existence
8. Question of type (4)
9. The 是 sentence type (2).
10. Sentence with a verb taking two objects

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I
2. Chinese reader (HSK Based) book-I
3. Module on Programme specific vocab.

Course Title: Anandam

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND003	0:0:2	2	3

Course Learning Outcomes:

The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government

d) Government policies (related to the topic), if any
e) Duty of public
f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

PROJECT (DISSERTATION)

Course Code: MAC-460 **Credit Units: 28**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**

  The title page should contain Project Title; Student‟s Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgement(s)**

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

It is incomplete without student‟s signature.

- **Abstract**

  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**

  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**

  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**

  A conclusion should be the final section in which the outcome of the work is mentioned briefly.

  Check that your work answers the following questions:

  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**

  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**

  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

  Examples:

  For research article:

  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* ,**8** (suppl 1): 116–117.

  For book:

  Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
  - Quality Control
  - Conclusions

<u>Assessment Scheme:</u>
Continuous Evaluation:

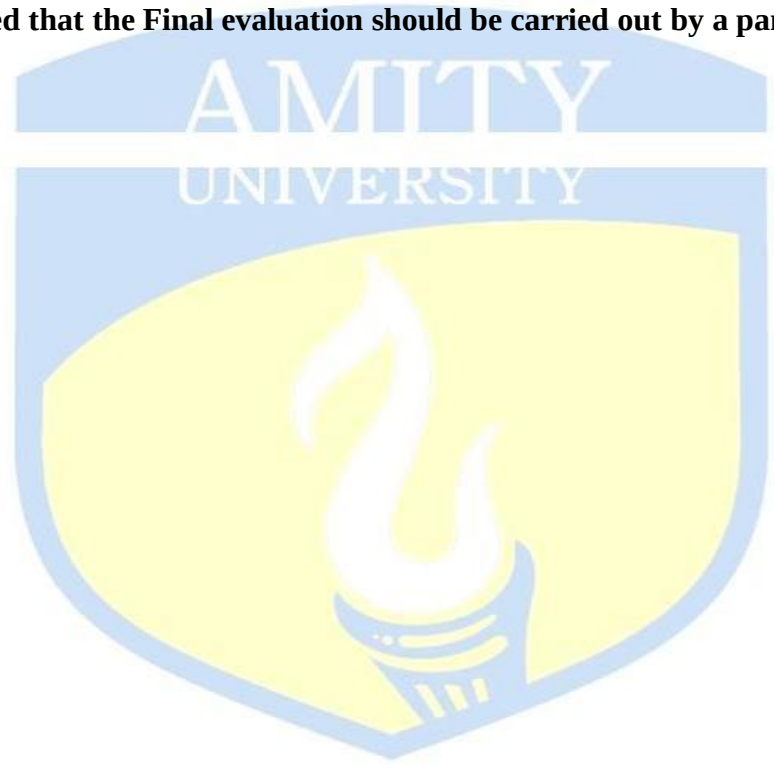
40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results,

achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.



Open Elective

GREEN AND ENVIRONMENTAL CHEMISTRY

Course Code : MAC-001 **Credit Units: 03**

MODULE I: CHEMISTRY AND THE ENVIRONMENT

Chemistry and the environment - environmental pollution - causes - pollutants – air pollution effects of air pollution: Environmental fate of pollutants – transformation process – bio Concentration - fate of air, water and soil pollutants

MODULE II: WATER POLLUTION

Water pollution - water quality parameters - turbidity, colour, pH, acidity, alkalinity, solids hardness, chlorides, residual chlorine, sulphates, fluorides, phosphates, iron and manganese, DO BOD, COD, nitrogen, grease, volatile acids, gas analysis.

MODULE III: INDUSTRIAL POLLUTION

Cement, sugar, distillery, drug, paper and pulp, thermal power plants, nuclear power plants metallurgy.Polymers, drugs etc.

Environmental disasters – Cherbonyl, Three mile island, Seveso and minamata disasters, Japan tsunami

MODULE IV: ENVIRONMENTAL TOXICOLOGY

Toxic heavy metals **:**Mercury, lead, arsenic and cadmium. Causes of toxicity. Bioaccumulation sources of heavy metals. Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects. Toxic Organic Compound **:**Pesticides, classification, properties and uses of organochlorin and ionospheres pesticides detection and damaging effects.

BOOKS SUGGESTED:

1. Environmental Chemistry, S.E. Mahan, Lewis Publishers.
2. Environmental Chemistry, Sharma & Kaur, Krishna Publishers.
3. Environmental Chemistry, A.K. De, Wiley Eastern
4. Environmental Pollution Analysis, S.M. Khopkar, Wiley Eastern
5. Standard Method of Chemical Analysis, F.J. Welcher Vol. III, Van Nostrand Reinhold Co.
6. Environmental Toxicology, Ed. S. Landsberger and M. Creatchman, Gordon and Breach Science Publication.
7. Enviromental Chemistry, C. Baird, W.H. Freeman

AMITY UNIVERSITY
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AMITY SCHOOL OF APPLIED SCIENCES

Master of Science – Applied Mathematics

Programme Structure

Credits PG (2 years/ 4 semesters)		**PG**			
Semester	**Core (CC)**	**Domain Electives (DE)**	**VA**	**Open Electives(OE)**	**Total**
1	21	0	6	0	27
2	21	4	6	3	34
3	26	4	6	3	39
4	21	0	0	0	21
Total	**89**	**8**	**18**	**6**	**121**

Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective

FIRST SEMESTER

Code	**Course**	**Category**	**L**	**T**	**P**	**Credits**
MAM 101	Complex Analysis	CC	3	1	-	4
MAM 102	Real Analysis	CC	3	1	-	4
MAM 103	Advanced Differential Equation	CC	3	1	-	4
MAM104	Probability Theory & Statistics	CC	3	1	-	4

MAM 105	Computer Mathematics and C Language	CC	3	1	-	4
MAM 120	Computer Mathematics and C Language Lab.	CC	-	-	2	1
Value Added Courses						
BCS 111	Communication Skills – I	VA	1	-	-	1
BSS 111	Behavioral Science – I	VA	1	-	-	1
	Foreign Language -I	VA	2	-	-	2
FLT 111	French- I					
FLG 111	German-I					
FLS 111	Spanish-1					
FLC 111	Chinese-I					
AND001	**Anandam**	NTCC	-	-	2	2
	Total					27

SECOND SEMESTER

Code	Course	Category	L	T	P	Credits
MAM 201	Advanced Abstract Algebra & Linear Algebra	CC	3	1	-	4
MAM 202	Numerical Methods & Data Analysis	CC	3	1	-	4
MAM 203	Optimization Techniques	CC	3	1	-	4
MAM 204	Statistical Methods	CC	3	1	-	4
MAM 205	Computer Programming Using c++	CC	3	1	-	4
MAM 220	Statistical Method Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
MAM 206	Number Theory	DE	3	1	-	4
MAM 207	Topology					
MAM 208	Fuzzy Sets and their Applications					
MAM 209	Coding Theory					
MAM 210	Special Functions and Transform					

	Calculus					
Open Elective 1						
		OE	3	-	-	3
Value Added Courses						
BCS 211	Communication Skills – II	VA	1	-	-	1
BSS 211	Behavioral Science – II	VA	1	-	-	1
	Foreign Language – II	VA	2	-	-	2
FLF 211	French- II					
FLG 211	German-II					
FLS 211	Spanish-1I					
FLC 211	Chinese-II					
AND002	**Anandam**	NTCC	-	-	2	2
	Total					34

SUMMER INTERNSHIP

Note: Students must submit their summer internship report immediately on return from summer vacation in July /August and the same would be evaluated for 6 credit units, which would be included in the Third Semester marks.

THIRD SEMESTER

Code	Course	Category	L	T	P	Credits
MAM 301	Mathematical Modeling	CC	3	1	-	4
MAM 302	Functional Analysis	CC	3	1	-	4
MAM 303	Discrete Mathematical Structures	CC	3	1	-	4
MAM 304	Mathematical Methods	CC	3	1	-	4
MAM 305	Partial Differential Equation	CC	3	1	-	4
MAM350	Summer Internship (Evaluation)	CC	-	-	-	6
DE Electives: Student has to select 1 course from the list of following DE electives						
MAM 306	Cryptography	DE	3	1	-	4
MAM 307	Biomechanics					
MAM 308	Classical Mechanics					
MAM 310	Lebesgue Measure Theory					
MAM 311	Information Theory					
Open elective 2						
		OE	3	-	-	3
Value Added Courses						
BCS 311	Communication Skills – III	VA	1			1
BSS 311	Behavioral Science – III	VA	1			1
	Foreign Language – III	VA	2	-	-	2
FLF 311	French- III					
FLG 311	German-III					
FLS 311	Spanish-III					

FLC 311	Chinese-III					
AND003	**Anandam**	NTCC	-	-	2	2
	Total					39

FOURTH SEMESTER

Code	Course	Category	L	T	P	Credits
MAM 460	Project	CC	-	-	-	21
	Total					21

AMITY UNIVERSITY
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AMITY SCHOOL OF APPLIED SCIENCES (ASAS)

COMPLEX ANALYSIS

Course Name	Course Code	LTP	Credit	Semester
Complex Analysis	MAM101	3:1:0	4	1

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain the fundamental concepts of complex analysis and their role in modernmathematics and applied contexts
CLO 2	Demonstrate accurate and efficient use of complex analysis techniques
CLO 3	Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from complex analysis
CLO 4	Apply problem-solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts

Module I
Review of complex numbers; Analytic functions, harmonic functions, elementary functions, branches of multiple-valued functions.

Module II
Conformal mappings; Complex integration, Cauchy's integral theorem, Cauchy's integral formula.

Module III
Theorems of Morera and Liouville, maximum-modulus theorem; Power series, Taylor's theorem and analytic continuation.

Module IV
Zeros of analytic functions, open mapping theorem; Singularities, Laurent's theorem, Casorati-Weierstrass theorem, argument principle, Rouche's theorem, Cauchy's residue theorem and its applications in evaluating real integrals, Mittag-Leffler's theorem.

Module V
Bilinear transformation, Riemann mapping theorem, infinite products, Beta - Gamma function and its properties, functional equation for Beta and Gamma function, integral version of Beta & Gamma functions, Jensen formula, Poisson-Jensen formula.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

Text & References:

Text:

- R.V. Churchill and J.W. Brown, Complex Variables and Applications, 5th edition, McGraw Hill, 1990.
- J. H. Mathews and R. W. Howell, Complex Analysis for Mathematics and Engineering, 3rd edition, Narosa.
- Conway, .I.B., Functions of One complex variable Narosa Publishing, 2000.
- Ahlfors, L.V., Complex Analysis. McGraw-Hill Book Company, 1979.

References:

- L. V. Ahlfors, Complex Analysis, 3rd Edn., McGraw Hill, 1979.
- J. E. Marsden and M. J. Hoffman, Basic complex analysis, 3rd Edn., W. H. Freeman, 1999.
- Priestly, HA., Introduction to Complex Analysis Claredon Press, Orford, 1990.
- Liang-shin Hann & Bernard Epstein, Classical Complex Analysis, Jones and Bartlett Publishers International, London, 1996.
- D.Sarason, Complex Function Theory, Hindustan Book Agency, Delhi, 1994.
- Mark J.Ablewitz and A.S.Fokas, Complex Variables: Introduction & Applications, Cambridge University Press, South Asian Edition, 1998.
- E.C.Titchmarsn, The Theory *of* Functions, Oxford University Press, London.
- S.Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.

AMITY UNIVERSITY
RAJASTHAN

REAL ANALYSIS

Course Name	Course Code	LTP	Credit	Semester
Real Analysis	MAM102	3:1:0	4	1

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand Sequences and series of functions
CLO 2	Understand measurable sets and their fundamental properties
CLO 3	Understand measurable functions and their equivalent formulations
CLO 4	Understand Riemann Integral, Lebesgue Integral

Module I
Sequences and series of functions, Pointwise and uniform convergence, Cauchy criterion for uniform convergence, Uniform convergence and continuity, Uniform convergence and differentiation, Weierstrass approximation theorem.

Module II
Set functions, intuitive idea of measure, Elementary properties of measure, Measurable sets and their fundamental properties. Lebesgue measure of sets of real numbers, Algebra of measurable sets; Borel sets, Equivalent formulation of measurable sets in terms of open, Closed, Fo and Gs sets, "Non measurable sets.

Module III
Measurable functions and their equivalent formulations, Properties of measurable functions. Approximation of measurable functions by sequences of simple functions, Measurable functions as nearly continuous functions, Egoroff s theorem, Lusin's theorem, Convergence in measure and F Riesz theorem for convergence in measure. Almost uniform convergence.

Module IV
Shortcomings of Riemann Integral, Lebesgue Integral of a bounded function over a set of finite measure and its properties. Lebesgue integral as a generalization of Reimann integral, Bounded - convergence theorem, Lebesgue theorem regarding points of discontinuities of Riemann integral. functions, Integral of non-negative functions, Fatou's Lemma, Monotone convergence-" Theorem, Geaeral Lebesgue Integral, Lebesgue convergence theorem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

Text & References:

***Text*:**

- J. E. Marsden and M. J. Hoffman, Elementary Classical Analysis, 2nd Edn., W. H. Freeman, 1993.
- W. Rudin, Principles of Mathematical Analysis, 3rd Edn., McGraw Hill, 1976.

References:

- P. M. Fitzpatrick, Advanced Calculus, 2nd Edn., AMS, Indian Edition, 2010.
- N. L. Carothers, Real Analysis, Cambridge University Press, Indian Edition, 2009.

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ADVANCED DIFFERENTIAL EQUATIONS

Course Name	Course Code	LTP	Credit	Semester
Advanced Differential Equations	MAM103	3:1:0	4	1

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the basic concept about Differential
CLO 2	Create an interest in finding the solution of Initial value problem
CLO 3	Apply basic concepts and find the difference between Linear homogeneous systems and Non-homogeneous systems and their applications
CLO 4	Develop the concept to solving the Higher order equations.

Module I

Review of fundamentals of Differential equations (ODEs); Existence and uniqueness theorems. Power series solutions, Systems of Linear ODEs, Stability of linear systems.

Module II: Cell Organelles

Initial value problem and equivalent integral equation, e-approximate solution, equicontinuous set of functions. Ascoli- Arzela theorem, Cauchy -Peano existence theorem and its corollary. Lipschitz condition. Differential inequalities and uniqueness - Gronwall's inequality: Successive approximations. Picard-Lindelof theorem. Continuation of solution Maximal interval of existence , Extension theorem. Kenser's theorem(statement only).

Module III

Linear differential systems: Definitions and notations. Linear homogeneous systems; Fundamental matrix, Adjoint systems, reduction to smaller homogeneous systems. Non-homogeneous linear systems; variation of constants. Linear systems with constant coefficients. Linear systems with periodic coefficients. Floquet theory.

Module IV

Higher order equations: Linear differential equation (LDE) of order 'n', Linear combinations, Linear dependence and linear independence of solutions. Wronskian theory: Definition, necessary and

sufficient condition for linear dependence and linear independence of solutions of homogeneous LDE. Abel's identity, Fundamental set, More Wronskian theory. Reduction of order. Non-homogeneous LDE. Variation of parameters. Adjoint equations, Lagrange's Identity, Green's formula. Linear equation of order n with constant coefficients.

Module V

System of differential equations, the n-th order equation, dependence of solutions on initial conditions and parameters. Maximal and Minimal solutions. Differential inequalities. A theorem of Wintner. Uniqueness theorems: Kamke's theorem, Nagumo's theorem and Osgood theorem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

Text & References:

***Text*:**

- E.A. Coddington and N. Levinson, *Theory of Ordinary Differential Equations,*Tata McGraw-Hill, 2000.
- P. Hartman, *Ordinary Differential Equations,* John Wiley & Sons NY, 1971.

References:

- S.L. Ross, Differential Equations, John Wiley & Sons,
- G. Birkhoff and G.C. Rota, Ordinary Differential Equations, .John Wiley & Sons,1978.
- G.F. Simmons, Differential Equations,, Tata McGraw-Hill , 1993.
- I.G. Petrovski, Ordinary Differential Equations, Prentice-Hal!, 1966.
- D. Somasundaram, Ordinary Differential Equations, A first Course, Narosa Pub., 2001.
- S.G. Deo, V. Lakshmikantham and V. Raghavendra, Textbook of Ordinary Differential Equations, Tata McGraw-Hill, 2006.

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PROBABILITY THEORY & STATISTICS

Course Name	Course Code	LTP	Credit	Semester
Probability & Statistics	MAM104	3:1:0	4	1

COURSE LEARNING OUTCOMES (CLO)

A. Course Content

CLO 1	Calculate the probability and probability distribution
CLO 2	Apply the probability theory and draw inferences
CLO 3	Find the correlation and regression
CLO 4	Able to apply different hypothesis testing techniques.

Module I
Axiomatic definition of probability, probability spaces, probability measures on countable and uncountable spaces, conditional probability, and independence.

Module II
Random variables, distribution functions, probability mass and density functions, functions of random variables, standard univariate discrete and continuous distributions and their properties; Mathematical expectations, moments, moment generating functions, characteristic functions, inequalities.

Module III
Random vectors, joint, marginal and conditional distributions, conditional expectations, independence, covariance, correlation, standard multivariate distributions, functions of random vectors.

Module IV
Modes of convergence of sequences of random variables, weak and strong laws of large numbers, central limit theorems; Introduction to stochastic processes, definitions and examples.

Module V
Tests of significance, Hypothesis testing, Large samples, Small samples, Chi-square test.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

Text & References:

***Text*:**

- J. Jacod and P. Protter, Probability Essentials, Springer, 2004.

- V. K. Rohatgi and A. K. Md. E. Saleh, An Introduction to Probability and Statistics, 2nd Edn., Wiley, 2001.

References:

- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2000.
- G. R. Grimmett and D. R. Stirzaker, Probability and Random Processes, 3rd Edn., Oxford University Press, 2001.
- S. Ross, A First Course in Probability, 6th Edn., Pearson, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edn., Wiley, 1968.
- J. Rosenthal, A First Look at Rigorous Probability Theory, 2nd Edn., World Scientific, 2006.

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COMPUTER MATHEMATICS and 'C' LANGUAGE

Course Name	Course Code	LTP	Credit	Semester
Computer Mathematics and C' Language	MAM105	3:1:0	4	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Attempting algorithmic solutions to problems
CLO2	Designing and coding moderate sized programs to understand the concepts of programming.
CLO3	Reading, understanding and modifying code written by others.

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their inter conversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.

Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.

File Handling.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

***References*:**

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.

- J. B Dixit, “Fundamentals of Computers and Programming in ‘C’.
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.

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COMPUTER MATHEMATICS and ‘C’ LANGUAGE LAB

Course Name	Course Code	LTP	Credit	Semester
Computer Mathematics and C’ Language Lab	MAM120	0:0:2	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Attempting algorithmic solutions to problems
CLO2	Designing and coding moderate sized programs to understand the concepts of programming.
CLO3	Reading, understanding and modifying code written by others.

Software Required: Turbo C

Course Contents:

- C programs involving loops: Problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls.
- C programs involving arrays and matrices
- C programs involving pointers, and solving various problems with the help of those.
- File handling
- C programs involving strings
- C programs involving structures

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	20	15	10	25	25

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

AMITY UNIVERSITY
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COMMUNICATION SKILLS – I

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel offormal communication.
CLO 4	Develop and empower self with the power ofWords.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)
Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Selfintroduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - I
(SELF-DEVELOPMENT AND INTERPERSONAL SKILLS)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-I	BSS11	1:0:0	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO2	Manage your emotions and feelings more effectively to have the impact that you need
CLO3	Develop the way that you regulate and control your emotions
CLO4	Learn about your behavioral preferences to become more self-awareness

Course Objective:

This course aims at imparting an understanding of:
Self and the process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and their effect on work behavior
Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ

Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behavior
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

FRENCH - I

Course Name	Course Code	LTP	Credit	Semester
French-I	FLT111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts.
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To tell ones name and to spell it

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - I

Course Name	Course Code	LTP	Credit	Semester
German-I	FLG111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:
Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to**<
- talk about gender, numbers and articles.
- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

PrescribedText-Book:First 10 LessonsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

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SPANISH – I

Course Name	Course Code	LTP	Credit	Semester
Spanish-I	FLS111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:

Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:

Subject pronouns

Use of verbs SER/ESTAR/TENER in simple present tense

Use of regular AR /ER/IR ending verbs.

Llamarse y dedicarse

Simple Negativesenteses

ExaminationScheme:

Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – I

Course Name	Course Code	LTP	Credit	Semester
Chinese-I	FLC111	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.

4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press

2. Chinese Reader (HSK Based) book-I (suggested reading)

3. Elementary Chinese Reader Book-I (suggested reading)

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Anandam

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND001	0:0:2	2	1

Course Learning Outcomes:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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ADVANCED ABSTRACT ALGEBRA

Course Name	Course Code	LTP	Credit	Semester
Advanced Abstract Algebra	MAM201	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

A. Course Content

CLO 1	Apply the basic methods of Set theory and applications.
CLO 2	Interpret and understand several important concepts in Abstract algebra, Group theory, Ring Theory, vector spaces, linear transformations.
CLO 3	Describe field theory and its application.
CLO 4	Explore and implement the principles of counting of subgroup and uses of Sylow's Theorems for abelian and non – abelian groups.
CLO 5	Analyse the linear dependencies among vector spaces.

B. Syllabus

Module I

Normal groups, quotient groups, Class equation of groups, Groups of order < 10, Cauchy's Theorems for abelian and non – abelian groups, Sylow's Theorems for abelian and non – abelian groups, solvable groups, the symmetric group S_n for $n > 4$ is not solvable, Maximal subgroups, composition Series of a group, Jordan Holder Theorem.

Module II

Overview of Rings and Fields, Integral Domains, Euclidean domains, Unique Factorization domains, Modules, Definition and examples, Direct sum, Free modules, Quotient modules, Simple modules, Modules over Principle ideal domains, Modules with chain conditions, Artenian Modules, Noetherian Modules, Hilbert's basis theorem

Module III

Overview of vector spaces, Extension of Fields, Finite Extension of a field, Algebraic and transcendental extensions of a field, roots of a polynomial, Existence of a root of an irreducible polynomial in some extension, splitting fields, Separable and inseparable extensions, Normal extension of a field.

Module IV

Linear operators and matrices Similarity of linear transformations. Invariant subspaces. Reduction to triangular forms. Nilpotent transformation.Index of nilpotency. Invariants of a nilpotent transformation. The primary decomposition theorem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- N. Herstein, Topics in Algebra, John Wiley & Sons, Singapore
- C. Musili, Introduction to Rings and Modules, Narosa Publishing House, New Delhi
- P. B. Bhattacharya, S.K. Nagpaul, Basic Abstract Algebra (2nd Ed.) , Cambridge University Press, Indian Edition, 1997.
- M. Artin, Algebra, Prentice Hall of India, New Delhi.
- N. Jacobson, Basic Algebra(Vols. I & II), W.H. Freeman. 1980
- S. Lang, ALGEBRA 3rd Edition, Pearson Education Asia, New Delhi
- S. Luther and IBS Passi, Algebra (Vols I & II), Narosa Publishing House, New Delhi
- S. Singh and Q. Zameeruddin, Modern Algebra, New Age Publishers, New Delhi.

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NUMERICAL METHODS AND DATA ANALYSIS

Course Name	Course Code	LTP	Credit	Semester
Numerical Methods and Data Analysis	MAM202	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

A. Course Content

CLO 1	Investigate the solution of a nonlinear equation.
CLO 2	Create a function which closely fits given n- points in the plane by using interpolation method.
CLO 3	Apply numerical methods to obtain approximate solutions to mathematical problems.
CLO 4	Develop appropriate numerical methods to solve a differential equation.

B. Syllabus

Module I: Solution of Algebraic and Transcendental Equations

Bisection method, Muller's method, Newton - Raphson method, Solution of simultaneous linear equations: Gauss' Elimination Method, Jacobi iterative method, Gauss-Seidel method.

Module II: Finite Difference, Interpolation and Curve Fitting

Finite differences, Newton's formula for interpolation, Gauss, Stirling, Bessel's, Everett's formulae, Divided differences, Newton's general interpolation formula, Lagrange's interpolation formula, Method of Least square curve fitting, straight line and quadratic equation fitting, curve fitting by sum of exponentials.

Module III: Numerical Differentiation, Integration and Ordinary Differential Equations

Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson 1/3 and 3/8 rules, Gauss quadrature formula. Numerical solution of ordinary differential equations using Euler, Picard and Runge-Kutta methods of 2^{nd} and 4^{th} order.

Module IV: Data Analysis

Data interpretation and analysis: Precision and accuracy, error analysis, propagation of errors, Gaussian distribution, determination of mean value and standard deviation of the continuous Gaussian distribution, graphical representation of functional relationship, linear and nonlinear least square curve fitting, chi-square test for goodness of fit.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- S.S. Shastri, Introductory Methods of Numerical analysis, Pearson education
- C.E. Froberg, Introduction to Numerical Analysis, Addison –Wesley 1981.
- E. Scheid, Numerical Analysis, Mc Graw Hill 1988.
- M.K. Jain, S.R.K. Iyengar and R. K. Jain, Numerical methods for scientific & Engineering. Computations, New Age International Publishers, New Delhi.
- K Atkinson, Elementary Numerical Analysis, Wiley 1985.

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OPTIMIZATION TECHNIQUES

Course Name	Course Code	LTP	Credit	Semester
Optimization Techniques	MAM203	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

A. Course Content

CLO 1	Investigate the solution of a nonlinear linear programming.
CLO 2	Create a research skill in the field of operation research.
CLO 3	Apply basic concepts of mathematics to formulate an optimization problem.
CLO 4	Develop linear programming (LP) models for shortest path, Assignment and transhipment problems.

B. Syllabus

Module I: Linear Programming Problems (LPP)

Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes' Big M method. Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method

Module II: Transportation Problems

Introduction to Transportation Model, Matrix Form of TP, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution.
Assignment Problems: Definition, Hungarian Method for AP.

Module III: Integer Linear Programming Problems

Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method

Module IV: Dynamic Programming
Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Hadley, G.,"Linear Programming,", Addison-Wesley, Mass.
- H.A.Taha,"Operations Research – An Introduction", Macmillian
- F.S. Hiller, , G.J. Lieberman, " Introduction to Operations Research", Holden-Day
- 4. Harvey M. Wagner, "Principles of Operations Rsearch with Applications to Managerial Decisions", Prentice Hall of India Pvt. Ltd.
- K. Swarup, P. K. Gupta and Man Mohan, "Operation Research", Sultan Chand & Sons, New Delhi

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STATISTICAL METHODS

Course Name	Course Code	LTP	Credit	Semester
Statistical Methods	MAM204	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Analyse the probability and probability distribution
CLO 2	Select and implement the probability theory, make use of sampling and draw inferences
CLO 3	Calculate the multiple correlation and regression.
CLO 4	Apply different hypothesis testing techniques.
CLO 5	Investigate data conditions used for different sampling distributions.

Module I: Probability & Probability Distributions

Classical and Modern axiomatic definition of probability, Addition and Multiplication rule of probability, Testing the independence of events, Random variables and probability Distribution, Conditional probability, Baye's Theorem, Discrete and Continuous Distribution, Moment Generating Functions, Binomial distribution, Poisson distribution, Negative Binomial distribution, Exponential distribution and Normal Distribution.

Module II: Statistical Methodology

Theory of sampling, different methods of sampling: Random sampling, stratified sampling, cluster sampling, systematic sampling etc. Distribution of sample mean and variance, Test of significance: normal, t, Chi-square, F-test and Analysis of variance – one way classification

Module III: Elementary Statistical Inference

Theory of estimation: Characteristics of estimators, concept of consistency, unbiased ness, and efficiency, Method of estimation, Cramer Rao Inequality

Module IV: Correlation and Regression

Bivariate normal distribution, types, importance, methods of measuring correlation-scatter diagram, Karl Pearson's and Spearman's rank Correlation. Regression lines, Difference between regression and correlation, uses of Regression, Standard Error of estimate. Introduction of Partial and Multiple correlations.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Biswas and Srivastava- A Textbook, Mathematical Statistics, Ist Edition, Narosa Publishing House, New Delhi.
- Feller,W.(1971): Introduction to Probability Theory and its Applications, Vol. I and II. Wiley Eastern-Ltd
- V. K.Rohatgi, (1984): An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
- Hogg, R.V. and Craig, A.T.(1971): Introduction to Mathematical Statistics, McMillan.
- Mood, A.M., Graybill,F.A. and Boes, D.C.(1974): Introduction to the Theory of Statistics, McGraw Hill.
- Des Raj & Chandak (1998): Sampling Theory, Narosa Publishing House.
- Mathematical Statistics by Gupta and Kapoor, Sultan Chand and Sons

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COMPUTER PROGRAMMING USING C^{++}

Course Name	Course Code	LTP	Credit	Semester
Computer Programming using C++	MAM205	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	**Be able to explain the difference between object-oriented programming and procedural programming.**
CLO2	**Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.**
CLO3	**Be able to build C++ classes using appropriate encapsulation and design principles.**

Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs. classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterates, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

Text & References:

Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.

- “Object Oriented Programming with C++” By E. Balaguruswamy.

References:

- Parasons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Yashwant Kanetkar, “Object Oriented Programming using C++”, BPB, 2004

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STATISTICS LAB

Course Name	Course Code	LTP	Credit	Semester
Statistics Lab	MAM220	0:0:2	1	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	To gain practical knowledge by applying the programming to statistical problems.
CLO2	To build up the logical thinking in programming using array, loops and functions.
CLO3	Apply the analytical techniques and graphical analysis to the data.
CLO4	To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group

Course Objective:

The objective of this Lab work is to acquaint students to use statistical software in computation and interpretation of various statistical results

Contents

Fundamentals of R, and SPSS software and their application in computation of:

1. Measurement of Central Tendencies
2. Measurement of Dispersion
3. Measurement of Skewness & Kurtosis
4. Analysis of Correlation & Regression
5. Sampling from discrete and continuous Probability Distribution (Binomial, Poisson, Geometric, Negative Binomial, Exponential, Gamma, Normal)
6. Test of Significance (Chi-square Test, F-test, Analysis of Variance)
7. Construction of a Matrix
8. Rank of a Matrix
9. Inverse of a Matrix
10. Solution of Linear Equations
11. Estimation of Eigen Values and Eigen Vectors
12. Testing and Evaluation of nature of Quadratic forms (+ve definite, -ve definite, Indefinite)

Examination Scheme:

Components	**TA**	**Viva**	**LR**	**ATTD**	**EE**
Weightage(%)	20	10	15	5	50

TA: Teacher's Assessment, Viva - Viva Voce Exam., LR: Lab Record ATTD: Attendance EE: End Semester Examination

Text & References:

- Biswas and Srivastava- A Textbook, Mathematical Statistics, Ist Edition, Narosa Publishing House, New Delhi.
- Feller,W.(1971): Introduction to Probability Theory and its Applications, Vol. I and II. Wiley Eastern-Ltd

- Hogg, R.V. and Craig, A.T.(1971): Introduction to Mathematical Statistics, McMillan.
- Mood, A.M., Graybill,F.A. and Boes, D.C.(1974): Introduction to the Theory of Statistics, McGraw Hill.
- Des Raj & Chandak (1998): Sampling Theory, Narosa Publishing House.

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NUMBER THEORY

Course Name	Course Code	LTP	Credit	Semester
Number Theory	MAM206	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Use mathematical induction and other types of proof writing techniques.
CLO2	Demonstrate uniqueness of distinguishing to prime number factors at integers
CLO3	Apply Euclid's algorithm and backwards substitution
CLO4	Explain the concepts of divisibility, prime number, congruence and number theorems.

Course Objective:

Number theory is an important area of study in Mathematics. Without the knowledge of the beviour of various numbers and their properties, the study of Mathematics is in a way is meaningless. The purpose of this course is to teach students various concepts that have been used to study and apply in coding theory, cryptology besides in algebra and analysis.

Course Contents:

Module I

Euclid's division lemma, Divisibility, The Linear Diophantine Equation, The fundamental theorem of Arithmetic, Fermat's Little theorem, Wilson's Theorem, Generating functions, Basic Properties of Congruences, Residue Systems, Linear Congruence, The Theorems of Fermat and Wilson Revisited, The Chinese Remainder Theorem, Polynomial Congruences.

Module II

Combinatorial Study of $\phi(n)$, Formulae for d(n) and $\sigma(n)$, Multiplicative Arithmetic Functions, The Mobius Inversion Formula, Properties of Reduced Residue Systems, Primitive Roots Modulo p, Elementary properties of $\Pi(x)$, Tchebychev's Theorem.

Module III

Euler's Criterion, the Legendre Symbol, The Quadratic Reciprocity Law, Applications of the Quadratic Reciprocity Law, Consecutive Residues and Non-residues, consecutive Triples of Quadratic Residues.

Module IV

Sum of Two Squares, Sum of Four Squares, Euler's Partition Theorem, Dirichlet's Divisor Problem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

Text:

- George E. Andrews: Number Publishing Corporation Theory, Hindustan (India).
- Niven, I., Zuckerman, S.H., Montgomery, L.H., An Introduction to the Theory of Numbers, John Wiley and Sons. New York

References:

- Flath J., Introduction to Number Theory.
- Ireland & Rosen, *A Classical Introduction to Modern Number Theory*, Springer Verlage.
- Cassels, J.W.S., Frolich, A., *Algebraic Number Theory*, Cambridge University Press, London

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TOPOLOGY

Course Name	Course Code	LTP	Credit	Semester
Topology	MAM207	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Understand terms, definitions and theorems related to topology.
CLO2	Demonstrate knowledge and understanding of concepts such as open and closed sets, interior, closure and boundary
CLO3	Use continuous functions and homeomorphisms to understand structure of topological spaces.
CLO4	Create new topological spaces by using subspace, product and quotient topologies.

Course Objective:

Topology is a modern branch of geometry. It serves to lay the strong foundations of concepts for study in analysis and in geometry. It is also a prerequisite for many concepts related to Analysis.

The course is designed to develop an understanding of topological ideas & techniques and their role in analysis.

Course Contents:

Module I: Definition and examples of topological space

Base and sub base for a topology, Subspaces and relative topology, Closed sets, Neighbourhoods, interior, exterior, boundary, contact and limit points of sets, derived sets, dense sets and nowhere dense subsets. Alternate methods of defining a topology in terms of Kuratowski Closure Operator and Neighborhood Systems,

Homeomorphism: Definition and properties of continuous function, open functions, closed functions, Homeomorphisms uniform continuous functions.

Product spaces: Box topology, weak topology, Tychonoff topology.

Module II: Count ability and Separation Axioms

First and Second Countable spaces, Lindeloff spaces, Separable spaces. Their relationship among themselves and other basis properties, To, T1, T2, regular and T_3, completely regular and T3½, normal and T_4 separation axioms, their Characterizations and basic properties. Urysohn's lemma, Tietze extension theorem.

Module III: Compactness

Continuous functions and compact sets. Basic properties of compactness. Compactness and finite intersection property, Sequentially and countable compact sets. Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential compactness in metric spaces. Tychonoff's Product Theorem. Local compactness, Compactification, one point and Stone - Cech compactification.

Module IV: Connected Spaces

Separated sets, Connected and disconnected sets, continuity and connectedness, components, totally disconnected spaces, Connectedness and the real line, locally connected spaces.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

Text:

- R. Munkres, Topology, A First Course, Pearson. N. Delhi, 2000.
- W. J. Pervin, Foundation of General Topology, Academic Press Inc., New York, 1964

Reference:

- N. Bourbaki, Topology I and II, Springer Verlag, New Delhi
- S. Willard, General Topology, Addison-Wesley, Reading, 1970. Reprinted by Dover
- J. Dugundji, Topology, Allyn and Bacon, 1966 (Reprinted in India by PHI).
- J. L. Kelley, General Topology, D Van Nostrand Reinhold Co. New York 1955 (Reprinted by Springer Verlag, New York.

- K D Joshi, Introduction to General Topology, New Age International (p) Ltd, 1983
- L. A. Steen and J A Seebach, Counter Examples in Topology, Holt, Reinhart and Winston, Inc. New York, 1970.

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FUZZY SETS AND THEIR APPLICATIONS

Course Name	Course Code	LTP	Credit	Semester

Fuzzy Sets and their Applications	MAM208	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Understand the basic ideas of fuzzy sets, operations and properties of fuzzy sets and also about fuzzy relations.
CLO2	Understand the basic features of membership functions, fuzzification process and defuzzification process.
CLO3	Design fuzzy rule based system
CLO4	Know about combining fuzzy set theory with probability to handle random and non-random uncertainty, and the decision making process.

Course Objective:

The aim of this course is to familiarize students with fundamental knowledge of fuzzy sets, fuzzy logic and its applications in fuzzy decision making. Upon successful completion of this course, students shall be able to understand basic knowledge of fuzzy sets and fuzzy logic, be able to apply fuzzy inferences, be able to apply fuzzy information in decision making, and be able to appreciate the theory of possibility on the basis of evidences**.**

Course Contents:

Module I: Introduction to Fuzzy Sets

Basic definitions, α-level sets, comparison with classical (crisp) sets, types of fuzzy sets, extension principle, Operations on Fuzzy Sets: Fuzzy complement, t-norms, t-co norms, combination of operations, aggregation operations.

Module II: Fuzzy Numbers and Their Arithmetic

Fuzzy numbers, linguistic variables, arithmetic operations on intervals, arithmetic operations on fuzzy numbers, lattice of fuzzy numbers, fuzzy equations.

Module III: Fuzzy Relations and Possibility Theory

Crisp versus fuzzy relation, projections and cylindrical extensions, binary fuzzy relations, binary relations on single set, fuzzy equivalence relations, fuzzy compatibility and fuzzy ordering relations. Fuzzy measures, evidence theory, possibility theory, fuzzy sets and possibility theory.

Module IV: Fuzzy Logic and Uncertainty-based Information

An overview of classical logic, multivalued logic, fuzzy propositions, fuzzy quantifiers, linguistic hedges, inference from conditional fuzzy propositions, inference from conditional and qualified propositions, Information and uncertainty, non-specificity of crisp and fuzzy sets, fuzziness of fuzzy sets.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall of India, New Delhi.
- H.J. Zimmermann, Fuzzy Set Theory & its Applications, Allied Publishers Ltd. New Delhi.
- Timothy J. Ross, Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw Hills inc. New Delhi.

CODING THEORY

Course Name	Course Code	LTP	Credit	Semester
Coding Theory	MAM209	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Understand important ideas from classical number theory, algebra, geometry and probability theory.
CLO2	Have become familiar with the mathematics behind some of the main encryption systems currently in use.
CLO3	Have developed the necessary mathematical skills to analyse the efficiency and security of cryptosystems in a rigorous mathematical setting.
CLO4	Understand the principles and theory of error-correcting codes, and the various methods for constructing them.

Course Objective:

The objectives of the course are to teach the students how to produce algebraic codes based on the methods of groups and finite fields and to make the students familiar with some of the most widely used codes and their applications. After learning this course, **s**tudents will be able to understand and implement the most widely used algebraic codes, write programs coding and decoding messages.

Course Contents:

Module I

The Communication Channel, the coding problem, types of codes, Error – Detecting and Error – Correcting Codes, linear Codes. The Hemming metric, description of Linear Block Codes by matrices.

Module II

Dual Codes, Standard Array Syndrome, Step by Step Decoding Modular Representation, Error – Correction Capabilities of linear codes, Bounds of Minimum Distance for Block Codes, Plotkin Bound, Hamming sphere packing bound bounds for Burst – Error Detecting and Correcting Codes.

Module III

Important linear Block – Codes, Hamming Codes, Golay Codes, Perfect Codes, Quasi – perfect Codes, Reed – Muller Codes, Codes derived by Hadamard Matrices, Product Codes. Concatenated codes.

Module IV

A double-error correcting decimal Code and an introduction to BCH Codes, BCH bounds, Cyclic Codes, Matrix representation of Cyclic Codes, Hamming and Golay Codes as Cyclic Codes, Error detection with Cyclic codes, MDS Codes.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- J H Van Lint, Introduction To Coding Theory, Springer Verlag, Heidelberg
- V. Pless, Introduction to the theory of Error – Correcting Codes (3rd Ed.), 1998, Wiley Interscience, New York
- V. Pless and W C Huffman, Fundamentals of Error – Correcting Codes, 2003, Cambridge University Press.
- R. Hill, A first course in Coding Theory, Oxford University Press, 1986.
- M. Y. Rhee, Error Correcting Coding Theory, McGraw Hill Inc., 1989

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Special Functions and Transform Calculus

Course Name	Course Code	LTP	Credit	Semester
Special Functions and Transform Calculus	MAM210	3:1:0	4	2

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the solution of a special function.
CLO 2	Create a research skill in the field of Hyper geometric functions and transform.
CLO 3	Apply basic concepts of mathematics to formulate recurrence relations.
CLO 4	Develop the use of special function, their properties, ${}_2F_1$, ${}_1F_1$, hypergeometric function, transform and their use etc.

A. Syllabus

Module I: Gauss's Hypergeometric Functions : Definition,integral representation,deductions from integral representation,Gauss's hypergeometric differential equation and its solutions,relations between the solutions of hypergeometric equation,relations of contiguity, two summation theorems,Kummer's confluent hypergeometric function.

Module II: Bessel's Functions and Legendre's Function : Bessel's functions of first and second kind,simple recurrence relations, orthogonal property of Bessel's,Transformation, Generating functions, Legendre's function of first kind. Simple recurrence relations, Orthogonal property, Generating functions.

Module III: Hermite Polynomials: Hermite differential equation and its solution,generating function,hypergeometric form,recurrence formulas,rodrigue's formula,orthogonal property.

Module IV: Fourier Transform: Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.

Module V: Hankel Transform: Definition and elementary properties,inversion theorem,Hankel transform of derivatives, Parseval theorem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text and References:

Text:

- Special Functions, E.D. Rainville, Chelsea Publishing Comp.,
- Bronx , New York.
- The use of integral transforms,I.N. Sneddon,Mcgraw Hill
- Integral Transform, Sharma and Vasishtha

Reference:

- Advanced Differential Equations,M.D. Raisinghania, S.Chand & Comp.,New Delhi.
- Special Functions and Their Applications, N. N. Lebedev [PH]

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COMMUNICATION SKILLS - II

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS211	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

AMITY UNIVERSITY
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BEHAVIOURAL SCIENCE – II

(BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-II	BSS211	1:0:0	1	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:
Process of Behavioral communication
Aspects of interpersonal communication and relationship
Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication
Scope of Behavioral Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships
Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America

Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

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FRENCH - II

Course Name	Course Code	LTP	Credit	Semester
French-II	FLT211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. Les loisirs
2. Les saisons
3. Les nombres
4. Le logement et la ville
5. Les prépositions de lieu
6. Les verbes de direction
7. Les lieux de l'université
8. Les documents administratifs
9. Les expressions utiliseés en classe par le professeur
10. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

1. Aimer, faire et savoir au present
2. La negation
3. Les adjectifs possessives au pluriel
4. Le partitifs
5. Aller au présent
6. <<il y a>>
7. L'usage des prepositions de lieu
8. Vouloir et pouvoir au présent
9. L'impératif
10. Le conditionnel de politesse

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN – II

Course Name	Course Code	LTP	Credit	Semester
German-II	FLG211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

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SPANISH – II

Course Name	Course Code	LTP	Credit	Semester
Spanish-II	FLS211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:

Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY

Difference between Estar and Hay

Demonstrative pronouns

Interrogatives – what, which, why, how, who, when

Introduction of irregular verbs

Possessive pronouns

ExaminationScheme:

Total: 100 marks

ContinuousEvaluation (Total 50 Marks)	EndSemEvaluation

					(Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – II

Course Name	Course Code	LTP	Credit	Semester
Chinese-II	FLC211	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues

11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press

2. Elementary Chinese Reader Book-I (suggested reading)

2. Chinese Reader (HSK Based) book-I (suggested reading)

3. Practical Chinese Grammar for foreigners (suggested reading)

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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND002	0:0:2	2	2

COURSE LEARNING OUTCOMES (CLO)
The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any

- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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MATHEMATICAL MODELING

Course Name	Course Code	LTP	Credit	Semester
Mathematical Modeling	MAM301	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

A. Course Content

CLO 1	Understand the features of mathematical modeling.
CLO 2	Model physical problems using difference equations.
CLO 3	Analyse and frame physical problems using simulations and inventory problems.
CLO 4	Apply the queuing theory techniques on different problems.
CLO 5	Implement the optimization techniques in different areas.

B. Syllabus

Module I

Introduction to modeling, Examples and definitions, classification of mathematical Modeling, Dimensional Analysis, Traffic flow modeling, techniques of mathematical modeling, Characteristics of mathematical modeling, steps in mathematical modeling, limitations of mathematical modeling.

Module II

Modeling and Simulation, Methods of developing a simulation model, designing a simulation experiment, How to perform simulation analysis, Advantages of simulation modeling, some pitfalls to guard against simulation

Module III

Modeling with difference equations, overview of basic concepts concerning matrices, eigenvalues and eigenvectors, The Harrod Model, the cobweb model, Samuelson's interaction model, application to Actuarial Science, Application to population dynamics and genetics.

Module IV

Queuing models, Poisson Process, Pure birth death process – M/M/1, M/M/c, M/Ek/1 queuing models, steady state probabilities, waiting time distribution. Cost consideration in network models.

Module V

Mathematical modeling through calculus of variations and dynamic programming, optimization principles and techniques, Problems related to maximum entropy distribution, geometrical problems, bio-economical problems, maximization and minimization problems, cargo loading problem, transportation problems, inventory problems.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

Text:

- J N Kapur, Mathematical Modeling, New Age International (P) Ltd., Publishers, New Delhi

References:

- 1.Hamdy A Taha, Operations Research, Pearson Educational Asia Edition
- F R Giordano, M D Weir, and W P Fox, A First Course in Mathematical Modeling
- A. Maria, Introduction to Modeling and simulation, Proceedings, Winter Simulation Conference, 1997
- M M Gibbons, A Concrete Approach to Mathematical Modeling, John Wiley and Sons.
- P.E. Wellstead, Introduction to Physical System Modeling, Academic Press, 1977.

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FUNCTIONAL ANALYSIS

Course Name	Course Code	LTP	Credit	Semester
Functional Analysis	MAM302	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain the duality in various contexts and theoretical results from the course in concrete situations
CLO 2	Demonstrate the statements and proofs of important theorems and be able to explain the key steps in proofs, sometimes with variation
CLO 3	to produce examples and counterexamples illustrating the mathematical concepts presented in the course
CLO 4	Apply specific specific calculations needed in the context of Baire Category

Module I

Normed linear spaces, Banach spaces, Quotient spaces, continuous linear transformations, equivalent norms, the Hahn-Banach theorem and its consequences. Conjugate space and separability, second conjugate space.

Module II

The open mapping Theorem, The closed graph theorem, The conjugate of an operator, The uniform boundedness principle, Definition and examples and simple properties of Hilbert spaces.

Module III

Orthogonal complements, The projection theorem, orthogonal sets, The Bessels inequality, Fourier expansion and Parseval's equation, separable Hilbert spaces, The conjugate space, Riesz's theorem, The adjoint of an operator

Module IV

Self adjoint operators, Normal and unitary operators, Projections, Eigen values and eigen vectors of on operator on a Hilbert space, The determinants and spectrum of an operator, The spectral theorem on a finite dimensional Hilbert space.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- G.F. Simmons : Topology and Modern Analysis, McGraw Hill (1963).
- A.H. Siddiqui: Functional Analysis with Application. Tata Mcgraw –Hill publishing Company Ltd, New Delhi.
- B.K. Lahiri, Elements of functional Analysis, The World Press Pvt. Ltd., Calcutta1994.
- J.B. Conway, A Course in Functional Analysis, Springer - Verlag, New York, 1990.
- E. Kreyszig, Introductory Functional analysis with Applications, John Wiley & sons, New York, 1978

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DISCRETE MATHEMATICAL STRUCTURES

Course Name	Course Code	LTP	Credit	Semester
Discrete Mathematical Strucutres	MAM303	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Formulate Lattices as partially ordered sets, their properties
CLO 2	Join and meet irreducible elements of a lattice and introduction to Boolean algebra.
CLO 3	Understand some basic properties of Boolean algebra to solve problem by different method and definition of graphs.
CLO 4	Euler's formula for connected Planar graphs, coloring of graphs, Definition of trees
CLO 5	Directed Graphs, In degree and out degree of a vertex, and some algorithm to construct graphs

A. Syllabus

Module I

Lattices: Lattices as partially ordered sets, their properties, duality, Lattices as algebraic systems, Sub lattices, Direct products, Bounded Lattices, Complete Lattices, Complemented Lattices and Distributive lattices. Cover of an elements, atoms, join and meet irreducible elements.

Module II

Boolean Algebras: Boolean Algebras as lattices. Various Boolean Identities. The Switching Algebra example. Sub algebras, Direct products and Homeomorphisms. Boolean forms and their Equivalence. Min-term Boolean forms, Sum of product Canonical forms. Minimization of Boolean functions, The Karnaugh Map method.

Module III

Definition of (undirected) graph, Walk, Path, Circuit, Cycles, Degree of a vertex, Connected graphs, Complete and Bipartite graphs, Planar graphs, Euler's formula for connected Planar graphs, Kuratowski's Theorem (Statement only) and its uses. Colouring of graphs, five color theorem and statement of four colour theorem.

Module IV

Trees , Cut-sets, Spanning Trees, Fundamentals Cut-sets and minimum Spanning Trees, Prim's and Kruskal's algorithms, Connectivity, Matrix Representation of graphs, Directed Graphs, Indegree and outdegree of a vertex.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- J. P. Trembley & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1997.
- J. L. Gersting, Mathematical Structure for Computer Science (3rd ed.), Computer Science Press,
- Seymour Lepschutz, Finite Mathematics, McGraw-Hill Book Co. New –York.
- J. E. Hopcroft and J.D. Ullman, Introduction to Automata Theory Languages & Computation, Narosa Publishing House, Delhi.
- C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill Publishing Co. Ltd, New Delhi.
- N. Deo, Graph Theory with Applications to Engineering and Computer Sciences, Prentice Hall of India, New Delhi.

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MATHEMATICAL METHODS

Course Code: **MAM 304** **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Mathematical Methods	MAM304	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO 1	[Investigate the basic concept about Calculation of Variation]
CLO 2	[Create an interest in finding the solution of Integral equations]
CLO 3	[Apply basic concepts and find the Relation between Integral and differential Equation]
CLO 4	[Develop the concept to solve the ordinary and partial differential equations involving initial and boundary value conditions by using Laplace Transforms their applications]

A. Syllabus

Module I

Functional and their Properties, Motivating problems of Calculus of Variation, Shortest Distance, Minimum Surface of Revolution, Branchistochrone problem, Isoperimetric problem, Geodesic problem Fundamental lemma of Calculus of Variation.

Module II

Euler's Equation for one dependent function and its generalization to n-dependent functions and to higher order derivatives, Variational problem with moving boundaries, Variation under constraints Rayleigh-Ritz method.

Module III

Integral Equation and their Classification, Relation between Integral and differential Equation, Fredholm and Volterra equations, Separable kernels, Reduction to a system of algebraic equations, Eigen values and Eigen functions.

Module IV

Iterated Kernels, Iterative Scheme for solving Fredholm Integral Equation of second kind (Neumann Series), Resolvent Kernel, Volterra Equations, Kernels and Functions, Volterra equation of first and second kind, Volterra integral equation and Linear Differential equation. Laplace Transform and its applications in solving Linear Differential Equations

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

Text:

- F.B.Hilderbrand, Methods of Applied Mathematics, Prentice Hall of India, New Delhi.

References:

- V.Lovitt, Linear Integral Equation, Wiley Inter science New York.
- R.P. Kanwal, Linear Integral Equation Theory and Technique, Academic Press New York.
- L.Elsgols; Differential Equation and Calculus of Variation, Mir Publication, Moscow.

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CRYPTOGRAPHY

Course Code: **MAM 305** **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Cryptography	MAM305	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will be able to understand the concept of different cryptography techniques transposition and substitution methods..
CLO2	Students will be able to analyse the DES, IDEA, Feistel Cipher cryptographic algorithm.
CLO3	Students will be able to Understand and analyse public key Cryptosystem using RSA and learn various techniques used for the distribution of key in public key cryptosystem.
CLO4	Students will be able to apply and evaluate Message authentication and hash function using MD5 and SHA and learn the concept of digital signature
CLO5	Students will be able to understand the concept of IP security and password message protocols

Course Objective:

The objective of this course is to make students aware of some tools for network security and the mathematics behind their construction and strength.

Course Contents:

Module I

Classical cryptography: Encryption schemes, Symmetric key encryption, Feistel ciphers, NDS, DES, Multiple encryptions, Modes of operation, Applications to authentication and identification.

Module II

Some Mathematical Tools: Algorithm, complexity, Modular arithmetic, Quadratic residues, Primality testing, Factoring and square roots, Discrete logarithm.

Module III

Public key Cryptography: Public key cryptosystems and their applications, RSA algorithm and its security, Key management, Diffie-Hellman key exchange, Elliptic curve cryptography.

Module IV

Advance Topics: Introductory concepts of Signcryption, ID based public key cryptosystems Certificate less public key cryptosystems.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- D. R. Hankerson et al. Coding Theory and Cryptography (For Modules I and II), Monographs and Textbooks # 234, Marcel Dekker, 2000.
- W. Stallings Cryptography and Network Security (For unit III: Chapter 6), Prentice Hall India, 2000.

The following material from Internet (For Unit IV)

- Y. Zheng, Digital signcryption or How to achieve cost (signature + encryption) < cost (signature) + cost (encryption). Available at http://www.signcryption.org/publications/pdffiles/yz-c97-fnl-rvs.pdf
- D. Boneh and M. Franklin, Identity based encryption from Weil pairing. Available at http://eprint.iacr.org/2001/090.pdf
- S. S. Al-Riyami and K. G. Patterson, Certificate less public key cryptography. Available at http://eprint.iacr.org/2003/126.pdf

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BIOMECHANICS

Course Name	Course Code	LTP	Credit	Semester
Biomechanics	MAM306	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will be able to understand mathematical aspects of population biology.
CLO2	Students will be able to understand biological fluid mechanics.
CLO3	Students will able to understand modeling through partial differential equations.
CLO4	Students will able to understand volume of blood in human body.

Course Objective:

The main object of this paper is to study the mechanics of flow of blood in human beings and movement of insects, spread of viruses etc by using mathematical tools like ordinary differential equation, partial differential equation, Calculus of variation, Laplace Transforms etc .

Course Contents:

Module I

Mathematical Aspects of population biology; Some fundamental aspects, Models and their mathematical formulations, Single species models, Stability and classification of equilibrium points, Relationship between eigen values and critical points.

Module II

Introduction to Biological Fluid Mechanics: Basic concepts of Fluid Dynamics, Fluid Parameters, Viscosity, Navier Stokes Equations of viscous fluid motion, Poiseuille's flow, Model for blood flow, Properties of blood, Pulsatile Flow of blood, sedimentation.

Module III

Modeling through partial differential equations: simple models, mass balance equations, Variational principles, probability generating function, traffic flow problems, initial & boundary conditions.

Module IV

Study of alcohol in the blood stream; Volume of blood in human body; Stochastic epidemic model; Genetic graphs; Food webs: Linear programming in forest management; Mathematics in fisheries; Case studies on anchovy wipe out;

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Belinda Barnes, 'Mathematical modeling'
- J.N. Kapur, 'Mathematical modeling', New Age International Publishers, New Delhi

AMITY UNIVERSITY
RAJASTHAN

CLASSICAL MECHANICS

Course Code: **MAM 307** **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Classical Mechanics	MAM307	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Describe mechanics of system particles and various principles.
CLO2	Demonstrate Lagrangian and Hamiltonian equations.
CLO3	Integrate two-body central force problems
CLO4	Integrate the principles to solve various motion related problems

Course Objective:

A detailed exposition of classical mechanics for the student, opting for physics is so vitally important for a clear understanding of recent intricate theories of quantum mechanics, modern physics and research for they are built an well developed and conceptualized foundation.

Course Contents:

Module I: Lagrangian Formulation

Mechanics of a system of particles, constraints, D'Alembert's principle, Variational calculus and its applications, Lagrangian equations, conservation theorems and symmetry properties, applications of Lagrangian formulation.

Module II: Central Force Problem

Reduction to one body problem, equation of motion and first integral, one dimensional problem and classification of orbits, Differential equation for the orbit, Kepler problem and planetary motion, Rutherford formula, scattering in central force field, transformation to laboratory frames.

Module III: Rigid Body and Vibrating System

Euler angles, tensor of inertia, kinetic energy of a rotating body, symmetric top and applications. Vibrating string, solution wave equation, normal vibrations, dispersion, coupled vibrating system.

Module IV: Hamiltonian Formulation

Hamiltonian equation of motion, the equations of canonical transformations,cyclic coordinates, phase space and Liouville's theorem, Poisson bracket.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- H. Goldstein, Classical Mechanics, 2nd edition, Narosa Publishing House (1994).
- W. Greiner, Classical Mechanics, Springer-Verlag (2003).
- Introduction to classical mechanics – R.G.Takwall and P.S.Puranik, Tata – McGraw Hill, 1980, New Delhi.
- Classical mechanics – N.C.Rana and P.S.Joag, Tata McGraw Hill, 1991, New Delhi.

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PARTIAL DIFFERENTIAL EQUATIONS

Course Code: MAM 308 **Credit Units: 04**

Course Name	Course Code	LTP	Credit	Semester
Partial Differential Equations	MAM308	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain partial differential equations and transform into canonical form.

CLO 2	Demonstrate information from partial derivative models in order to interpret reality.
CLO 3	Identify real phenomena as models of partial derivative equations
CLO 4	Apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of specialisation.

Syllabus

Module I
Partial Differential Equation (PDE) of first order, origin of first order PDE & their classification, classifications of integrals. The Cauchy problem integral surfaces passing through given curve. Charpit‟s method, Jacobi‟s method.

Module II
Second order PDE with constant coefficients, Linear second order PDE with variable coefficients, classification of second order PDE, reduction to canonical forms. Homogeneous PDE

Module III
Transport Equation, Quasi linear equation, Laplace‟s equation, Analytic solutions of Laplace Equation in 2D Cartesian and polar coordinates, Interior & Exterior Dirichlet‟s problem, Neumann problem, Heat equation, solution by method of characteristics, solution by separation of variables.

Module IV
D‟Alembert solution of one dimensional homogeneous un-damped wave equation, initial value problems, solution of wave equation for infinite string, semi infinite string, finite string problems, Solution of one dimensional damped wave equation, Solution by method of separation of variable

Module V
Non linear first order PDE, generalizations, Non linear waves and shocks, conservation laws and shocks, The Rankine Hugonit conditions, Nonlinear diffusion equation, Burger‟s equation, The Hopf-Cole Transformation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. L.C. Evans, Partial Differential Equations, Graduate studies in Mathematics, Volume 19, AMS, 1998
2. N. Sneddon, Partial Differential Equation, Tata McGraw Hill, New Delhi, 1983
3. T. Amarnath, An elementary course in Partial Differential Equations, second edition, Narosa Publishing House, New Delhi
4. G. Donald, Introduction to Partial Differential Equations, Tata Mc Graw Hill, New Delhi, 1961.

LEBESGUE MEASURE THEORY

Course Name	Course Code	LTP	Credit	Semester
Lebesgue Measure Theory	MAM310	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will able to understand Lebesgue measure and its properties.
CLO2	Students will able to understand measurable functions and their properties.
CLO3	Students will able to understand product measure spaces.

Course Objective:

The objective of the present course is to introduce some advanced measure theory concept commonly used in research to the post graduate students.

Course Contents:

Module I:
Semi-algebra, Algebra, Monotone class, Sigma-algebra, Monotone class theorem. Measure spaces. Extension of measures from algebras to the generated sigma-algebras: Measurable sets; Lebesgue Measure and its properties.

Module II:
Measurable functions and their properties; Integration and Convergence theorems. Introduction to Lp-spaces, Riesz-Fischer theorem; Riesz Representation theorem for L2 spaces. Absolute continuity of measures, Radon-Nikodym theorem. Dual of Lp-spaces.

Module III:
Product Measure. Product measure spaces, Fubini's theorem. Differentiation of integrals, absolutely continuous functions.
Fundamental Theorem of Calculus for Lebesgue Integrals

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
1. Inder K. Rana, An Introduction to Measure and Integration (2nd ed.), Narosa Publishing House, New Delhi, 2004.
2. H.L. Royden, Real Analysis, 3rd ed., Macmillan, 1988.
3. G.De.Barra, Measure theory and integration.
4. P. Billingsley, Probability and Measure. John Wiley and Sons, Inc.,1995.

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INFORMATION THEORY

Course Name	Course Code	LTP	Credit	Semester
Information Theory	MAM311	3:1:0	4	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will able to understand measure of information & noiseless coding.
CLO2	Students will able to understand the discrete memory less channels.
CLO3	Students will able to understand error correcting codes.
CLO4	Students will able to understand channel with memory & continuous channels.

Course Objective:

This course is an introduction to Information Theory. It covers the most important results Concerning data compression and reliable communication over a communication channel and error control coding. After learning this course, the students shall be able to understand basic, notion of information and channel capacity, convolution and block codes, decoding technique and automatic repeat request scheme. Side by side, they will learn fundamentals of cryptography.

Course Contents:

Module I: Measure of Information & Noiseless Coding

Axioms for the uncertainty measure, Properties of the Uncertainty function – Joint & Conditional uncertainty, the measure of information, Noiseless Coding, Problem of unique decipherability, Necessary & Sufficient conditions for existence of instantaneous codes, Noiseless coding theorem, Construction of optimal codes

Module II: The Discrete Memory less Channels

Models for communication channels, Information processed by channels, Channel Capacity, Classification of channels, calculation of channel capacity, Decoding schemes; the ideal observer, Fundamental Theorem, Exponential Error Bounds, Weak converse to the Fundamental Theorem.

Module III: Error correcting codes

Minimum Distance Principle, Relation between distance and error correcting properties of codes, Error bounds for general binary codes, Binary symmetric channels, Non-binary coding, Properties of cyclic codes, Single error correcting cyclic codes, Automatic Decoding

Module IV: Channel with Memory & Continuous Channels

Finite-state channels, Finite State Channel, The Coding Theorem for finite state Regular Channels, The capacity of a general discrete channel; Comparison of the weak and Strong converses, The time discrete Gaussian Channels, Uncertainty in the continuous case, Converse to the coding theorem for the time-discrete Gaussian Channel, The time-continuous Gaussian Channel, Band-limited Channels.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	20	5	25	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- F. M. Reza, An Introduction to Information Theory, McGraw Hill Book Inc.1961
- R. Ash , Information Theory, Weley Interscience, New York, 1995
- J M Aczel and Z Daroczy, On Measures of Information and their characterizations, Academic Press, New York.
- T. M. Cover and J. A. Thomas, Elements of Information Theory, 2nd ed. Wiley-Interscience, 2006.
- R. G. Gallager, Information Theory and Reliable Communication. Wiley, 1968.
- T. S. Han, Information-Spectrum Methods in Information Theory. Springer, 2002.

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COMMUNICATION SKILLS - III

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS311	1:0:0	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an idea of professional work place
CLO 2	**Learn about the importance of interviews, etiquette.**
CLO 3	Learn the basic steps and techniques for preparing and for having a successful interview
CLO 4	Demonstrate Workplace Speaking Skills.

B. SYLLABUS

Topic
Group Discussion-2
PI-2 (Mock Sessions)
CV-3 + Profile Mapping
Video Resume
Social Media Profiling

EXAMINATION SCHEME:

Components	Group Discussion	Video Resume	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - III
(LEADING THROUGH TEAMS)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Sciences-III	BSS311	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe team design features and the difference between team and group, and components of the concept
CLO 2	Identify the patterns of interaction in a team, method of studying attractions and repulsions in groupssociometry and construction of socio-gram for studying interpersonal relations in a Team.
CLO 3	Analyze various stages of team growth, team performance curve profiling a team: Role of leadership in managing team.
CLO 4	Differentiate between management values, pragmatic spirituality in life and organization building global teams through universal human values.
CLO5	Demonstrate the leaning of teams, leadership and values, pragmatic spirituality in life and organization building global teams.

Course Objective:

This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview
Team Design Features: team vs. group

Effective Team Mission and Vision

Life Cycle of a Project Team

Rationale of a Team, Goal Analysis and Team Roles

Module II: Team &Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III:TeamBuilding
Types and Development of TeamBuilding
Stages of team growth
Team performance curve

Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Examination Scheme:

Components	**SAP**	**JOS**	**FC/MA/CS/HA**	**P/V/Q**	**A**
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

Organizational Behaviour, Davis, K.

- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, HarcourtCollege Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, HarperCollinsCollege Publishers

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FRENCH - III

Course Name	Course Code	LTP	Credit	Semester
French-III	FLT311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To understand and present the time schedule and to tell the time

Course Contents:

Unité 3 La science au quotidien Page : 40-61 Leçons 7, 8 & 9

Contenu Lexical:

1. L'heure
2. Les jours de la semaine
3. Les mois de l'année
4. Les matières et types de cours
5. Les spécialitésscientifiques.
6. L'annéeuniversitaire
7. Les nationalités
8. Les noms de pays
9. Les métiers scientifiques
10. Les chiffres de 69 à l'infini
11. Quelquesunités de mesure
12. Quelquestermesscientifques
13. Les termes de l'exposition
14. Les expression familières pour accepter une invitation.

Contenu Grammatical:

1. Finir, commencer au présent
2. Les prepositions de temps

3. Féminins et masculine des noms de métiers scientifiques
4. Les adjectifs de nationalité.
5. Le future proche
6. Les adjectifs demonstratives
7. Le but: pour + infinitive
8. Le register familier

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - III

Course Name	Course Code	LTP	Credit	Semester
German-III	FLG311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents

Vocabulary:

- Furniture
- Days and months name
- Time vocabulary like 15 min, quarter, minute, seconds.
- Adjectives use to describe furniture.

Grammar:

- Past participle of verb had
- Usage of negation like **not = nicht; kein= not a single.**
- Preposition of time.
- Use of adjective in sentences.
- Introduction and use of separable verbs

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

PrescribedText-Book: First 10 LessonsfromDeutschalsFremdsprache -1B, INBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

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SPANISH – III

Course Name	Course Code	LTP	Credit	Semester
Spanish-III	FLS311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enable the students to talk about a place like, class room, market, neighborhood and location of thing with the use of prepositions.

Course Content

Vocabulary:

Vocabulary pertaining to describe people/ place /objects, Illness, Currency, Market etc. preferences, opinions , body parts etc.

Grammar:

Introduction of stem changing irregular verbs

Introductionofprepositions (Cerca de/ lejos de/ encima de etc.)

Present continuous tense **(Estar+ gerundio)**

Introduction of third person verbs Gustar/Parecer/Encantar/ Doleretc

Interrogatives – How much/ How many

Introduction of irregular verbs.

Immediate uture plans (Ir a + verbo)

ExaminationScheme:

Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – III

Course Name	Course Code	LTP	Credit	Semester
Chinese-III	FLC311	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

COURSE CONTENTS

1. Description of size
2. Description of quantity
3. Asking and replying questions on shopping
4. Asking and replying questions on Communication
5. Conversation Related to Study
6. Conversation Related to Work
7. Expression of Simple Feelings
8. Listening of dialogues
9. Conversation based on dialogues
10. Programme Specific Vocabulary & Expressions
11. Chinese CBT Package
12. Chinese Festivals (In English)

VOCABULARY CONTENTS

1. Vocabulary will include approx 100 Characters including 50 Characters of HSK-I level.

2. Vocab related to size, quantity, shopping, communication, study, work and simple feelings and Programme Specific Vocabulary will be covered during this semester.

3. By the end of third semester the students will be able to master all 150 characters set for the HSK level-I.

GRAMMATICAL CONTENTS

1. Antonyms
2. Prepositional phrases
3. The object of 在, 从
4. Complement of degree
5. Preposed object
6. Verb 在
7. 有 and 是 indicating existence
8. Question of type (4)
9. The 是 sentence type (2).
10. Sentence with a verb taking two objects

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

Text & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press

2. Elementary Chinese Reader Book-I

2. Chinese reader (HSK Based) book-I

3. Module on Programme specific vocab.

Course Title: Anandam

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND003	0:0:2	2	3

Course Learning Outcomes:

The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted

- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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PROJECT

Course Name	Course Code	LTP	Credit	Semester
Project	MAM460	0:0:0	21	4

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Perform the research work on given topic
CLO 2	Prepare the project file
CLO 3	Demonstrate the performance of work

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgement(s)**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly.

  Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

  Examples:
  For research article:
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* , **8** (suppl 1): 116–117.
  For book:
  Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

Bachelor of Science (Pass Course) PCM

Programme Structure

And

Curriculum & Scheme of Examination

AMITY SCHOOL OF APPLIED SCIENCES

AMITY UNIVERSITY RAJASTHAN

B.Sc. (Pass Course)PCM

Credit Summary Sheet

Credits UG (3 years/ 6 semesters)					
Semester	**Core (CC)**	**Domain Elective (DE)**	**V/ A**	**Open Electives(OE)**	**Total**
1	18	0	6	0	24
2	18	0	6	3	27
3	18	0	6	3	27
4	18	3	6	3	30
5	18	3	6	3	30
6	21	3	2	0	26
Total	**111**	**9**	**32**	**12**	**164**

PROGRAM LEARNING OUTCOMES (PLOs)

The programme acts as a foundation degree and helps to develop critical, analytical and problem solving skills at first level. The foundation degree makes the graduates employable in scientific organisations and also to assume administrative positions in various types of organisations. Further, acquisition of higher level degrees helps the graduates to pursue a career in academics or scientific organisations as a researcher.

After undergoing this programme, a student will be able to:

1. Identify and describe basic laws and principles governing natural and man-made physical systems,
2. Explain the underlying scientific principles that govern the systems
3. Conduct experiments as per the procedures, tabulate data and interpret results
4. Work as a member of a scientific project team and communicate across teams
5. Conduct himself/herself as a responsible citizen and professional which can further act as educationalist, academician, researcher and administrators in public, private and government organisations or business administrator with further training and education
6. Choose appropriate programmes for further learning; participate in seminars and conferencesWork alongside engineering, medical, ICT professionals and scientists to assist them in scientific problem solving
7. Pursue masters and doctoral research degrees to work in colleges, universities as professors or as scientists in research establishments

B. Sc. Pass Course(PCM)

Programme Structure

FIRST SEMESTER

Code	Course	Category	L	T	P	Credits
BSP 101	Differential Calculus	CC	3	-	-	3
BSP 102	Integral and Vector Calculus	CC	3	-	-	3
BSP 103	Mechanics	CC	2	-	-	2
BSP 104	Electromagnetism	CC	2	-	-	2
BSP 105	Physics Lab -I	CC	-	-	2	2
BSP 106	Molecular Structure and Bonding in compounds	CC	2	-	-	2
BSP 107	Some Concepts of Organic Chemistry and Hydrocarbons	CC	2	-	-	2
BSP 108	Chemistry Lab-I	CC	-	-	2	2
	Value Added Courses					
BCS 101	English	VA	1	-	-	1
BSS 103	Behavioral Science – I	VA	1	-	-	1
	Foreign Language -I	VA	2	-	-	2
FLF 101	French- I					
FLG 101	German-I					
FLS 101	Spanish-1					
FLC 101	Chinese-I					
AND001	Anandam	NTCC			2	2
	Total					24

SECOND SEMESTER

Code	Course	Category	L	T	P	Credits
BSP 201	Abstract Algebra	CC	3	-	-	3
BSP 202	Three Dimensional Geometry	CC	3	-	-	3
BSP 203	Oscillation and Waves	CC	2	-	-	2
BSP 204	Optics	CC	2	-	-	2
BSP 205	Physics Lab -II	CC	-	-	2	2
BSP 206	Basics of Organic Chemistry	CC	2	-	-	2
BSP 207	Fundamentals of physical chemistry	CC	2	-	-	2
BSP 208	Chemistry Lab -II	CC	-	-	2	2
Open Elective 1						
		OE	3	-	-	3
Value Added Courses						
BCS 201	English	VA	1	-	-	1
BSS 203	Behavioral Science – II	VA	1	-	-	1
	Foreign Language – II	VA	2	-	-	2
FLF 201	French- II					
FLG 201	German-II					
FLS 201	Spanish-1I					
FLC 201	Chinese-II					
AND002	Anandam	NTCC			2	2
	Total					27

THIRD SEMESTER

Code	Course	Category	L	T	P	Credits
BSP 301	Real Analysis	CC	3	-	-	3
BSP 302	Differential Equations	CC	3	-	-	3
BSP 303	Thermodynamics and statistical physics	CC	2	-	-	2
BSP 304	Electronics	CC	2	-	-	2
BSP 305	Physics Lab -III	CC	-	-	2	2
BSP 306	Inorganic Chemistry -I	CC	2	-	-	2
BSP 307	General Organic Chemistry-I	CC	2	-	-	2
BSP 308	Chemistry Lab -III	CC	-	-	2	2
Open Elective 2						
		OE	3	-	-	3
Value Added Courses						
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS 303	Behavioral Science – III	VA	1	-	-	1
	Foreign Language -III	VA	2	-	-	2
FLF 301	French- III					
FLG 301	German-III					
FLS 301	Spanish-1II					
FLC 301	Chinese-III					
AND003	Anandam	NTCC			2	2
	Total					27

FOURTH SEMESTER

Code	Course	Category	L	T	P	Credits
BSP 401	Dynamics	CC	3	-	-	3
BSP 402	Numerical Analysis	CC	3	-	-	3
BSP 403	Mathematical Physics	CC	2	-	-	2
BSP 404	Solid state Physics and Devices	CC	2	-	-	2
BSP 405	Physics Lab -IV	CC	-	-	2	2
BSP 406	Chemistry of States of Matter	CC	2	-	-	2
BSP 407	General Organic Chemistry II	CC	2	-	-	2
BSP 408	Chemistry Lab -IV	CC	-	-	2	2
DE Electives: Student has to select 1 course from the list of following DE electives						
BSP 409	Number Theory	DE	3	-	-	3
BSP 410	Digital Electronics & Microprocessor					
BSP 411	Nuclear/Radio chemistry					
Open Elective 3						
		OE	3	-	-	3
Value Added Courses						
BCS 401	Communication Skills – II	VA	1	-	-	1
BSS 403	Behavioral Science – IV	VA	1	-	-	1
	Foreign Language – IV	VA	2	-	-	2
FLF 401	French- IV					
FLG 401	German-IV					
FLS 401	Spanish-1V					
FLC 401	Chinese-IV					
AND004	Anandam	NTCC			2	2
	Total					30

FIFTH SEMESTER

Code	Course	Category	L	T	P	Credits
BSP 501	Metric and Vector space	CC	3	-	-	3
BSP 502	Operations Research	CC	3	-	-	3
BSP 503	Quantum Physics	CC	2	-	-	2
BSP 504	Nuclear and Particle Physics	CC	2	-	-	2
BSP 505	Physics Lab -V	CC	-	-	2	2
BSP 506	Inorganic Chemistry-II	CC	2	-	-	2
BSP 507	Advance Physical Chemistry	CC	2	-	-	2
BSP 508	Chemistry Lab -V	CC	-	-	2	2
DE Electives: Student has to select 1 course from the list of following DE electives						
BSP 509	Partial Differential Equation	DE	3	-	-	3
BSP 510	Laser Physics					
BSP 511	Quantum Chemistry& Spectroscopy-I					
Open Elective 4						
		OE	3	-	-	3
Value Added Courses						
BCS 501	Communication Skills - III	VA	1			1
BSS 503	Behavioral Science – V	VA	1			1
	Foreign Language – V	VA	2	-	-	2
FLF 501	French- V					
FLG 501	German- V					
FLS 501	Spanish- V					
FLC 501	Chinese- V					
AND005	Anandam	NTCC			2	2
	Total					30

SIXTH SEMESTER

Code	Course	Category	L	T	P	Credits
BSP 601	Function of Complex Variable	CC	3	-	-	3
BSP 602	Linear Algebra	CC	3	-	-	3
BSP 603	Atomic and Molecular Spectroscopy	CC	2	-	-	2
BSP 604	NanoScience & technology	CC	2	-	-	2
BSP 605	Physics Lab -VI	CC	-	-	2	2
BSP 606	Bio-inorganic and Polymer Chemistry	CC	2	-	-	2
BSP 607	Bio-OrganicChemistry	CC	2	-	-	2
BSP 608	Chemistry Lab -VI	CC	-	-	2	2
BSP 640	Seminar (P/C/M)	CC	-	-	-	3
DE Electives: Student has to select 1 course from the list of following DE electives						
BSP 609	Atmospheric Physics	DE	3	-	-	3
BSP 610	Game Thoery					
BSP 611	Heterocyclic Chemistry&Spectroscopy-II					
AND006	Anandam	NTCC			2	2
	Total					26

AMITY UNIVERSITY
RAJASTHAN

Differential Calculus

Course Name	Course Code	LTP	Credit	Semester
Differential Calculus	BSP101	3:0:0	3	1

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the basic concept and applications of differential and integral Calculus.
CLO 2	Apply Lagrange's theorem, Taylor's theorem and mean value theorems.
CLO 3	Calculate asymptotes, curvature, tangents & normals, maxima & minima, partial derivatives.
CLO 4	Recognize and able to trace the Cartesian and polar curves.

Course Objective:

Calculus was first invented to meet the mathematical needs of scientists of the sixteenth and seventeenth centuries, needs that mainly mechanical in nature. Nowadays it is a tool used almost everywhere in the modern world to describe change and motion. Its use is widespread in science, engineering, medicine, business, industry, and many other fields. Calculus also provides important tools in understanding functions and has led to the development of new areas of mathematics including real and complex analysis, topology, and non- euclidean geometry. The objective of this course is to introduce the fundamental ideas of the differential and integral calculus of functions of one variable.

Course Contents:

Module I

Mean Value theorems (Lagrange's, Cauchy, Taylor's and Maclaurins with different remainders). Expansion of sin(x), cos(x), e^x, log(1+x), $(1+x)^m$.

Module II

Derivative of an arc, Intrinsic equation of the curve, Pedal equation (Cartesian and Polar Curves), Curvature.

Module III

Partial differentiation, Total derivative , Euler's theorem for homogeneous functions, Maxima and Minima of functions of two independent variables – necessary and sufficient conditions (without proof) , Lagrange's undetermined multipliers (without proof) and simple problems.

Module IV

Envelopes, Asymptotes (Cartesian and Polar curves).

Module V

Multiple points, Classification of double points – Node, cusp, point of inflexion. Tracing of curves: Cartesian and Polar form.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1. Differential Calculus, Shanti Narayan, S. Chand and Co., New Delhi., 1996
2. Differential Calculus, M. Ray & G.C. Sharma, Shivlal agarwal & Co. Agra, 1998.
3. Text Book on Diff.Calculus, Gorakh Prasad, Pothishala Pvt.Ltd, Allahabad, 1992.

References:

1. Theory and problems of Advanced Cal. Schaum's outline series New York, 2011.
2. Differential Calculus, H.S. Dhami, New Age Int. Ltd., New Delhi, 2012.
3. A text Book of Differential Calculus, Akhtar & Ahsan, PHI Ltd. New Delhi, 2002.
4. A Problem book in Mathematical Analysis, G.N. Berman, Mir Publishers, Moscow, 2004

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Integral and Vector Calculus

Course Name	Course Code	LTP	Credit	Semester
Integral and Vector Calculus	BSP102	3:0:0	3	1

CLO 1	Reduction Formulae of trigonometric functions and know properties of Gamma and Beta functions
CLO 2	Understand some basic properties of length of Cartesian and polar curves. Quadrature: Area of Cartesian and polar curves, Volumes and Surfaces of solids of revolution.
CLO 3	Understand Double integrals, Change of order of integration, Triple integrals, Drichlet's Integral.
CLO 4	Understand Scalar and vector point functions and their properties.
CLO 5	Understand Identities involving differential vector operators.

Course Objective:

The second in the series of three calculus courses. Integral Calculus develops a set of advanced symbolic and numerical integration techniques, building on skills developed in the first course in the series, Differential Calculus. The course includes applications of integration, sequences and series, and the use of the Taylor polynomial to approximate functions. Students are introduced to parametric and polar equations.

Course Contents:

Module I

Reduction Formulae: $I_{m,n}$ where m, n are positive integers. Definition and properties of Gamma and Beta functions, Relation between Gamma and Beta functions, Duplication formula and simple problems related to these functions.

Module II

Rectification: length of Cartesian and polar curves. Quadrature: Area of Cartesian and polar curves, Volumes and Surfaces of solids of revolution.

Module III

Double integrals, Change of order of integration, Triple integrals, Drichlet's Integral

Module IV

Scalar and vector point functions, Differentiation and Integration of vector point function, Gradient, directional derivatives, Divergence and Curl of a vector point function.

Module V

Identities involving differential vector operators, Gauss divergence, Stokes and Greens theorems (without proofs) and their applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1.A text book on Integral Calculus, Gorakh Prasad, Pothishala Pvt .Ltd , Allahabad, 1992.
2. Integral Calculus, Sharma & Jain Galgotia Publication, Dariyaganj, New Delhi, 2001.
3. Integral Calculus, Shanti Narayan, S.Chand and Co., New Delhi, 1996.
4. A text book of Vector Calculus, Shanti Narayan, S.Chand and Co.New Delhi, 1996.
5. Vector algebra &Calculus, Ray and Sharma, Students and Friends Co. Agra, 1998

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and sons, 2005.
2. Vector Analysis, Muray R. Spiegel , Schaum Publishing Company , New York, 2007.
3. Introduction to Vector Analysis, Saran and Nigam , Pothisala Pvt. Ltd, Allahabad, 2001.

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Mechanics

Course Name	Course Code	LTP	Credit	Semester
Mechanics	BSP103	2:0:0	2	1

Course learning outcomes (CLO)

CLO1	Explain PhysicalLawsand FramesofReference
CLO2	Discuss Centreofmass
CLO3	Describe Motionundercentral forces
CLO4	Explain Specialtheory ofrelativity

OBJECTIVE:

To acquaint the students with the fundamental laws and principles involved in motion so that they develop abilities and skill that are relevant to the study and practice of Physics.

MODULE I:

Physical Laws and Frames of Reference:

Inertial and non inertial frames, examples, Transformation of displacement, velocity and acceleration between different frames of reference involving translation in uniform motion, Galilean transformation and invariance of Newton's laws, Transformation equations of displacement velocity and acceleration for rotating frames, Fictitious forces (Coriolis force and centrifugal force).

MODULE II:

Centre of mass:

Centre of mass of a two particle system, motion of centre of mass and reduced mass conservation of linear momentum, elastic and inelastic collision of two particles in laboratory and center of mass frames, motion of a system with varying mass, Angular momentum conservation with examples.

MODULE III:

Motion under central forces:

Motion under central forces, gravitational interaction, general solution under gravitational interaction, discussion of trajectories, cases of elliptical and circular orbits, Keplers laws.

MODULE IV:

Special theory of relativity:

Postulates of special theory of relativity, Lorentz transformations, length contraction, Time dilation, transformation and addition of velocities, Relativistic Doppler's effect.

Text & References:

1. "Elements of Mechanics", Gupta, Prakash and Agrawal, PragatiPrakashan,Meerut.
2. "Elements of Mechanics", J.C.Upadhyaya ,Himalaya Publishing House,2006.

References

1. "Fundamental University Physics", Vol. I and II, Addison Wesley, Reading Mars, LISA.
2. "Berkley Physics Course", Vol. I, Mc. Graw Hill, New York.
3. "The Feynmann Lectures in Physics", Vol. 1, R. P. Feynman, R.B. Leighton and M. Sands , B.I. Publications, Bombay, Delhi, Calcutta, Madras.
4. "Physics",Part 1, David Halliday and Resnick , John Wiley and Sons, Inc. Newyork.

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Electromagnetism

Course Name	Course Code	LTP	Credit	Semester
Electromagnetism	BSP104	2:0:0	2	1

Course learning outcomes (CLO)

CLO1	develop an understanding of the various concepts of Vector and scalar field.
CLO2	solve simple problems on Vector and scalar field.
CLO3	explain and interpret the electromagnetic wave.
CLO4	define and understand electrostatics and dielectrics.
CLO5	Impart Maxwell's equations and their problems.

OBJECTIVE:

This course will acquaint the students with the scalar and vector fields, gradient, divergence, curl and their physical significance. Students will also learn about the fields produced by moving charges and magnetic fields in matter, electromagnetic induction, Maxwell's equations and electromagnetic waves.

MODULE I:

Scalar and vector fields:

Partial derivatives, Gradient of a scalar function. Line integral of a vector field, Divergence and Curl of a vector field, Physical significance of divergence & curl and their expressions in Cartesian coordinates, Gauss divergence theorem, Stokes curl theorem, Laplacian operator.

MODULE II:

Dynamics of a charged particle

Magnetic forces, Invariance of charge, Electric field measured in different frames of reference, Field of a point charge moving with constant velocity, Interaction between a moving charge and other moving charges.

MODULE III:

Magnetostatics:

Ampere's law in differential form, Magnetic Vector Potential, Poisson's equation for vector potential, magnetic field due to a current carrying wire and deduction of Biot-Savart's law.

Electric current due to an orbiting electron, Bohr Magneton, Orbital gyro magnetic ratio, Electron spin and spin magnetic moment, magnetic susceptibility, magnetic field caused by magnetized matter, Magnetization current.

MODULE IV:

Electrostatics:

Moments of a charge distribution, Atomic and molecular dipoles, Atomic Polarizability, Permanent dipole moment, Dielectrics, capacitor filled with dielectric, the potential and field due to a polarized sphere, dielectric sphere in a uniform electric field, The electric field of charge in dielectric medium and Gauss law, Relation between electric susceptibility and atomic polarizability, Polarization due to changing electric field.

MODULE V:

Maxwell's equations and electromagnetic waves:

Text & References:

1. "Electricity and Magnetism with Electronics", K.K.Tewari, S.Chand& Co. Ltd. (2001)
2. "Electricity and Magnetism", D.Chattopadhyay, P.C.Rakshit, New Central Book Agency (P) Ltd.

Faraday's laws of electromagnetic induction, its integral and differential form, Maxwell's displacement current, Maxwell's equations in differential and integral form,Poynting's theorem,

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Physics Lab-I

Course Name	Course Code	LTP	Credit	Semester
Physics Lab-I	BSP105	0:0:2	2	1

Course learning outcomes (CLO)

CLO1	develop an understanding of the various concepts of Vector and scalar field.
CLO2	solve simple problems on Vector and scalar field.
CLO3	explain and interpret the electromagnetic wave.
CLO4	define and understand electrostatics and dielectrics.
CLO5	Impart Maxwell's equations and their problems.

Course Contents:

1. To determine the Moment of Inertia of a Flywheel.
2. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
3. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
4. Determination of moment of inertia of metallic cylinder / rectangular bar about an axis passing through its C.G.and to determine the rigidity modulus of the material of the suspension wire.
5. To determine the wavelength of a monochromatic light by Newton's ring method.
6. Measurement of the slit width and the separation between the slits of a double slit by observing the diffraction and interference fringes.
7. To calibrate a polarimeter and hence to determine the concentration of sugar solution.
8. To determine the refractive index of material of Prism using Spectrometer.
9. To determine the wavelength of spectral lines of Mercury lamp using diffraction grating.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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Molecular, Structure & Bonding in compounds

Course Name	Course Code	LTP	Credit	Semester
Molecular, Structure & Bonding in Compounds	BSP106	2:0:0	2	1

CLO1	**To acquire knowledge of atomic bonds**
CLO2	**To understand the properties p block elements**
CLO3	**To acquire knowledge of molecular structure**

Module I

Ionic Solids: Ionic structures, radius ratio effect and coordination number, limitations of radius ratio rule, lattice defects, semiconductors, lattice energy and born haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions, fajans rule.

Metallic Bond: Free electron, valence bond and band theories

Weak Interactions: Hydrogen bonding, vanderwaals forces

Module II

Covalent Bond: Valence bond theory and its limitations, directional and shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl_2, H_2O

Molecular Orbital Theory: Homonuclear and heteronuclear (CO and NO) diatomic molecules, multicentre bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Module III

S-block elements: Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their functions in Biosystems, an introduction to alkyls and aryls

Periodicity of p-block elements: Periodicity in properties of p-block elements with special reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, diagonal relationship, catenation

Books Suggested:

1. Concise Inorganic Chemistry: J. D. Lee
2. General Inorganic Chemistry: J. A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry: B. R. Puri and L. R. Sharma
4. Basic Inorganic Chemistry: F. A. Cotton and G. Wilkinson, Wiley Eastern
5. Molecular Geometry: R. J. Gillespie, Van Nostrand Reinhold

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE

Weightage (%)	15	5	10	70

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Some concepts of Organic Chemistry& Hydrocarbons

Course Name	Course Code	LTP	Credit	Semester
Some concepts of organic Chemistry & Hydrocarbons	BSP107	2:0:0	2	1

CLO1	**Understanding of organic reactions**
CLO2	**To understand IUPAC nomenclature**

Module I

Mechanism of organic reactions: Homolytic and heterolytic bond cleavage, types of reagents, electrophiles and nucleophiles, reactive intermidiates- carbocations, carbanions, free radicals, carbenes, arynes and nitrenes with examples, types of organic reactions, energy considerations, methods of determination of reaction mechanism (product analysis, intermidiates, isotope effects, kinetic and stereochemical studies)

Module II

Alkanes and Cycloalkanes: IUPAC nomenclature of branched and unbranched alkyl group, classification of carbon atoms in alkanes, methods of formation (with special reference of wurtz reaction, kolbe reaction, corey-house reaction and decarboxylation of carboxylix acids), physical properties and chemical reactions of alkanes, mechanism of free radical halogenation, orientation, reactivity and selectivity, cycloalkanes-nomenclature, methods of formation, chemical reaction, baeyer's strain theory and its limitations, theory of strainless rings

Module III

Alkenes, Cycloalkenes, Dienes and alkynes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikof's rule, hydroboration- oxidation, oxymercutation –reduction, Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO4 Polymerization of alkenes, Substitution at the allylic and vinylic-positions of alkenes. Industrial applications of ethylene and propene, Methods of formation, conformation and chemical reactions of cycloalkenes, Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions- 1,2- and 1,4- additions, Diels-alderreaction Nomenclature, structure and bonding in alkynes, Methods of formation, Chemical reactions of alkynes, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition reactions, hydroborationoxidation, metal ammonia reductions, oxidation and polymerizations.

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain and S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd. (New Age International)

7. Organic Chemistry: Morrison & Boyd, Prentice Hall

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Chemistry Lab-I

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-I	BSP108	0:0:2	2	1

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 5 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:

Figure /Formula/Theory	:	5
Observations/Calculations	:	8
Result /Result Analysis	:	5
Precautions	:	2
Viva -Voce	:	10

Experiments:

1. Semimicro / Macro Analysis -Cation analysis, separation and identification of ions from groups I,II,III,IV, V and VI, Anion analysis.(4 radicals)
2. Crystallization

   Concept of induction of crystallization: Phthalic acid from hot water (using fluted filter paper and stemless funnel) Acetanilide from boiling water, Napthelene from Ethanol Benzoic acid from water.

3. Decolorisation and crystallization using charcoal

   Decolorisation of brown sugar (sucrose) with animal charcoal using gravity filtration, Crystallization and decolorisation of impure naphthalene (100 g of naphthalene mixed with 0.3g. of Congo Red using l.0 g decolorising carbon) from ethanol, Sublimation (Simple and vacuum) Camphor, Naphthalene, phthalic acid and Succinic acid

4. Qualitative Analysis

   Detection of extra elements (N, S and halogens) and functionl groups (phenolic, caboxylic, carbonyl, ester, carohydrates, amine, amide, nitro and anilide) in simple organic compunds
5. Colloids
   To prepare arsenious sulphide sol and compare the precipitating power of mono-, bi- and trivalalent anions.
6. **Viscosity, Surface Tension**
   To determine the percentage composition of a given, mixture (non interactingsystems) by vicosity method.
   To determine the viscosity of Amyl alcohol in water at different concentrations and calculate the viscosity of these solutions.
   To determine the percentage composition of a given binary mixture by surface - tension method (acetone & ethyl-ketone).

Books suggested:

1. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi

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ENGLISH

Course Name	Course Code	LTP	Credit	Semester
English	BCS 101	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel offormal communication.
CLO 4	Develop and empower self with the power ofWords.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)
Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Selfintroduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE - I

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-I	BSS103	1:0:0	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO2	Manage your emotions and feelings more effectively to have the impact that you need
CLO3	Develop the way that you regulate and control your emotions
CLO4	Learn about your behavioral preferences to become more self-awareness

Course Objective:

This course aims at imparting an understanding of:

Self and the process of self exploration

Learning strategies for development of a healthy self esteem

Importance of attitudes and their effect on work behavior

Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self

Formation of self concept

Dimension of Self

Components of self

Self Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem

Characteristics of High and Low Self Esteem

Importance & need of Self Esteem

Self Esteem at work

Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power

Introduction to EI

Difference between IQ, EQ and SQ

Relevance of EI at workplace

Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need and importance of Emotions

Healthy and Unhealthy expression of emotions

Anger: Conceptualization and Cycle

Developing emotional and interpersonal competence

Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude

Understanding Attitudes

Formation of Attitudes

Types of Attitudes

Effects of Attitude on

Behavior

Perception

Motivation

Stress

Adjustment

Time Management

Effective Performance

Building Positive Attitude

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

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FRENCH - I

Course Name	Course Code	LTP	Credit	Semester
French-I	FLF101	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts.
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To tell ones name and to spell it

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN - I

Course Name	Course Code	LTP	Credit	Semester
German-I	FLG101	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:
Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to**<
- talk about gender, numbers and articles.
- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book:First 10 LessonsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

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SPANISH – I

Course Name	Course Code	LTP	Credit	Semester
Spanish-I	FLS101	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Contents:

Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:

Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

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CHINESE – I

Course Name	Course Code	LTP	Credit	Semester
Chinese-I	FLC101	2:0:0	2	1

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好， 再见。。。

2。Vocab related to personal information; 名字， 年纪， 家， 住， 爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Elementary Chinese Reader Book-I (suggested reading)

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Anandam

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND001	0:0:2	2	1

Course Learning Outcomes:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).

4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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Abstract Algebra

Course Name	Course Code	LTP	Credit	Semester
Abstract Algebra	BSP201	3:0:0	3	2

CLO 1	Investigate the fundamental concepts including groups, subgroups, normal subgroups, homeomorphisms and isomorphism.
CLO 2	Demonstrate knowledge and understanding of rings, fields and their properties.
CLO 3	Apply algebraic ways of thinking.
CLO 4	Develop algebraic methods to solve the problems using appropriate techniques.

Course Objective:
In this course, students will be expected to learn, understand, and communicate definitions, examples, fundamental theorems and applications relevant to the study of rings and

fields, and analyze, develop, and communicate rigorous mathematical proofs of statements concerning rings and fields.

Course Contents:

Module I

Definition of a group with examples and simple properties. Order of elements in a Group and related theorem.

Module II

Subgroups ,Cyclic groups, Permutation groups, Alternating groups.

Module III

Cosets, Lagrange's theorem Normal subgroups , Quotient group.

Module IV

Homomorphism and Isomorphism, the Fundamental theorem of homomorphism. Rings:- Definition, Examples and Elementary properties.

Module V

Integral domain, Fields, Subfields and their simple properties, Subrings. Ideal of a ring, Characteristic of a ring.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1. K. C. Sarangi , Elements of Abstract Algebra, RBD, Jaipur, 2009.
2. P. B. Bhattacharya , S.K.Jain and S.R.Nagpaul,Basic Abstract Algebra , Cambridge University Press, 2001.
3. K.C. Sharma and D.C. Gokhroo, Abstract Algebra, publisher JPH
4. G. C. Sharma, Modern Algebra, Shivlal Agarwal & Co. Agra, 1998.

References:

1. Abstract Algebra, Deepak Chatterjee, PHI. Ltd. New Delhi,2001
2. Topics in Algebra, I.N. Herstein , Wiley Eastern Ltd., New Delhi,2008
3. Abstract Algebra, Theory and Applications by Thomas W. Judson & Robert A. Beezer,2015

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Three Dimensional Geometry

Course Name	Course Code	LTP	Credit	Semester
Three Dimensional Geometry	BSP202	3:0:0	3	2

CLO1	**Understanding geometrical strucutures**
CLO2	**Application of coordinate system**
CLO3	**Understanding spherical dimensions**

Course Objective:

Geometry is a part of mathematics concerned with questions of size, shape, and relative position of figures. The purpose of this course is to construct, develop logical arguments, and apply established theorems to two and three-dimensional figures. Coordinate geometry is an ongoing theme in the course to maintain student's prior algebraic skills needed for future courses. In this course, students are expected to demonstrate their ability to solve multi-dimensional figure problems by use of geometric tools, proofs, and formulas. Additionally, they are expected to justify steps in a geometric procedure and verify algebraically when possible.

Course Contents:

Module I

Equation of plane. Pair of planes. Equations of a line. Line and plane. Shortest distance.

Module II

Equation of a sphere, Centre and radius of a sphere, Great circle, Equation of circle, Diameter form of the equation of a sphere, Tangent line and tangent plane of a sphere, Condition of tangency for a line and equation of tangent plane, Angle of intersection of two spheres, Condition of orthogonality of two spheres.

Module III

Cone, Quadratic Cone, Equation of a cone, Enveloping cone, Condition for general equation of second degree to represent a cone, Intersection with a line and a plane, Angle between the intersecting lines of cone, Tangent plane, Reciprocal Cone, Right Circular Cone.

Module IV

Equation cylinder, Enveloping and right circular cylinders. Equations of central conicoids, Tangent plane, Normal, Plane of contact and polar plane, Enveloping cone and enveloping Cylinder, Conjugate diameters and diameters planes. Equations of paraboloids and its simple properties.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Analytical Geometry of three dimensions, N. Saran and R.S. Gupta , Pothisala Pvt.Ltd , Allahabad, 1992.
2. Text book on Coordinate Geometry, Gorakh Prasad and H.C. Gupta , Pothisala Pvt. Ltd., Allahabad, 1992.
3. A text book of Analytical Geometry of Two dimensions, P.K. Jain and Khalil Ahmad, Wiley Eastern Ltd, 1997..
4. Co-ordinate Geometry, Sharma & Jain, Galgotia Publication, Dariyaganj, New Delhi, 1996.
5. A text book of Analytical Geometry of Three Dimensions, P.K. Jain and Khalil Ahmad, Wiley Eastern Ltd, 2000.

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and sons, 2005.
2. Vector Analysis, Muray R. Spiegel , Schaum Publishing Company , New York, 2007.
3. Introduction to Vector Analysis, Saran and Nigam , Pothisala Pvt. Ltd, Allahabad, 2001.

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Oscillation and Waves

Course Name	Course Code	LTP	Credit	Semester
Oscillation and waves	BSP203	2:0:0	2	2

Course learning outcomes (CLO)

CLO1	Develop an understanding of Simple harmonic motio
CLO2	Drivenharmonicoscillator
CLO3	Explain **Coupledoscillators**
CLO4	Define and understand **Wave motion**

OBJECTIVE:

To familiarize the students with motion of different types of oscillators and also with wave motion in different medium. This will enable the students to develop abilities and skill to solve problems related to waves and oscillations.

MODULE I:

Simple harmonic and damped oscillator

Simple harmonic motion, Differential equation of simple harmonic motion, examples:-mass on a spring, Torsional oscillator. LC Circuit, Potential energy curve and small oscillations in one dimensional potential well, Energy of oscillations, mass and two spring system.

Damped harmonic oscillator, Mathematical formulation of damped harmonic oscillator, Energy of damped oscillator, Power dissipation, Relaxation time, Quality factor of damped harmonic oscillator.

MODULE II:

Driven harmonic oscillator

Driven harmonic oscillator, Mathematical formulation of driven harmonic oscillator, Frequency

response on amplitude and phase, Quality factor of driven oscillator, Resonance, Sharpness of resonance, Power absorption by forced oscillator, Series and parallel LCR circuit.

MODULE III:

Coupled oscillators

Equation of motion of two coupled simple harmonic oscillators, Normal modes, motion in mixed modes,dynamics of a linear chain of coupled oscillators with nearest neighbor interaction, Energy transfer between modes, Electrically coupled circuits (capacitive and inductive), Reflected impedance, effect of coupling and resistive load.

MODULE IV:

Wave motion

Wave equation, Transverse waves in a string, Elastic waves in a solid rod, Pressure waves in a gas column, Plane electromagnetic waves, Energy and Momentum of EM waves, Radiation pressure, Radiation resistance of free space.

TEXT & REFERANCES:

1. "The Physics of Waves and Oscillations", N.K.Bajaj, Tata McGraw Hill Publishing Co., 2003.
2. "Oscillations,waves and electromagnetism", SatyaPrakash, PragatiPrakashan, Meerut.

REFERENCES:

1. "Fundamental University Physics", Vol I and II , M.Alonso&J.Finn, AddissonWiesley.
2. "Vibrations and Waves", A.P. French, CBS Publication and Distributors.
3. "Berkeley Physics Course", Vol. I , New York, McGraw Hill.
4. "Vibrations and waves", I.G. Main ,Cambridge University Press. "

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Optics

Course Name	Course Code	LTP	Credit	Semester
Optics	BSP204	2:0:0	2	2

Course learning outcomes (CLO)

CLO1	Develop an understanding of GeometricOptics anditsapplications
CLO2	Explain Interference, diffraction and polarization

MODULE II:

Interference

Young's double slit experiment, types of interference: division of amplitude, division of wave front, Coherence: temporal and spatial coherence, Interference in thin films, colour in thin films, Newton's rings, Determination of wavelength and refractive index of liquid by Newton's rings, Michelson interferometer, Applications of Michelson interferometer: determination of wavelength, difference of wavelength and thickness of thin films.

MODULE III:

Diffraction

Fresnel diffraction: Fresnel's assumptions, Half period zones, Distinction between interference and diffraction, Difference between Fresnel and Fraunhoffer diffraction, diffraction at a circular aperture, straight edge and thin slit, zone plate, difference between zone plate and a convex lens. Franunhoffer diffraction: Diffraction at single slit, Diffraction at double slit, Diffraction at N slits (simple derivation), plane diffraction grating, dispersion by a grating, resolving power of a grating.

MODULE IV:

Polarization

Plane electromagnetic waves. E and B of linearly, circularly, elliptically polarized electromagnetic waves. Polarization by reflection, Huygens theory of double refraction, production and Analysis of plane, circularly and elliptically polarized light, Quarter and half wave plate. Optical activity, specific rotation, Biquartz and half shade polarimeters.

Text & References:

1. "A textbook of Optics", Brijlal and Subramaniam, S.Chand & Company Ltd.,23rd edition.

2. "Essentials of Lasers and non-linear Optics",G.D.Baruah, Pragati Prakashan, Meerut.

- A Textbook of Optics: N. Subrahmanyam and B. Lal (S. Chand & Co.,N. Delhi, 1987).
- Physical Optics: B. K. Mathur and T. P. Pandya.
- Geometrical and Physical Optics: Longhurst.

- Introduction to Modern Optics: G. R. Fowels.
- Optics: P. K. Srivastav.

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Physics Lab-II

Course Name	Course Code	LTP	Credit	Semester
Physics Lab	BSP205	0:0:2	2	2

Course content

1. To determine the Coefficient of Thermal Conductivity of Copper by Searle's apparatus.
2. To determine the Coefficient of Thermal Conductivity of Copper by Angstrom's Method.
3. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
4. To investigate the Motion of Coupled Oscillators.
5. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment.
6. To verify λ^2 – T Law by Melde's Experiment.
7. To study the variation of Thermo-Emf of a Thermocouple with Difference of temperature of its Two Junctions.
8. To determine the value of acceleration (g) due to gravity.
9. To determine the frequency of tuning fork using sonometer.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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Basics of Organic Chemistry

Course Name	Course Code	LTP	Credit	Semester
Basics of organic Chemistry	BSP206	2:0:0	2	2

CLO1	Recognise many functional groups such as arenes and alkyl halides and their reactivity
CLO2	Interpret data related to the aromaticity and stereochemistry
CLO3	Recognise many fundamental bond forming reactions and how to apply them in synthesis
CLO4	Describe bonding models and appreciate how these impact on the properties of a simple molecule
CLO5	Apply the use of various commercially used alkyl halide
CLO6	Appreciate when different reactions are likely to compete and ways to bias reactions towards a single outcome
CLO7	Understand how stereochemistry can be used to delineate a molecule's structure
CLO8	Understand the influence of aromaticity and stereochemistry on a molecule's structureand reactivity

Module I

Arenes & Aromaticity

Nomenclature of benzene derivatives, the aryl group, Aromatic nucleus and side chain structure of benzene: molecular formula and Kekule structure Stability. Aromaticity: the Huckle's rule, aromatic ions, Aromatic electrophilic substitution-general pattern of the mechanism, role of σ and π complexes, Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel Crafts reaction, energy profile diagrams. Activating & deactivating substituentss, orientation and otho/para ratio, Side chain reactions of benzene derivatives. Birch reduction

Module II

Stereochemistry of organic compounds: concept of isomerism, types of isomerism, differences between configuration and conformation, flying wedge and fisher projection formulae

Optical isomerism: elements of symmetry, molecular chirality, enantiomers, stereogeniccentre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, distereomers threo and erythro isomers, meso compounds, resolution of enantiomers, inversion, retention and racemization with examples, relative and absolute configuration, sequence rule D/L, R/S systems of nomenclature

Geomatric isomerism: Determination of configuration of geometric isomers-cis/trans and E/Z systems of nomenclture, geometric isomerism in oximes and alicyclic compounds

Module III

Nomenclature and classes of alkyl halides, mothods of formation, chemical reactions, Mechanism of nucleophilic substitution reactions of alky halides, SN_2 and SN_1reactions with energy profile diagrams,Polyhalogen compounds: chloroform, carbon tetrachloride. Methods of formation of aryl halides, nuclear and side chain reactions, The addition, elimination and

the elimination-addition mechanism of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl vs allyl, vinyl and aryl halides, Synthesis and use of D.D.T. and B.H.C

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain and S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd. (New Age International)
7. Organic Chemistry: Morrison & Boyd, Prentice Hall

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Fundamentals of Physical Chemistry

Course Name	Course Code	LTP	Credit	Semester
Fundamental of Physical Chemistry	BSP207	2:0:0	2	2

CLO1	Understanding of electro chemistry
CLO2	Understanding chemical kinetics
CLO3	Application of Thermodynamics in chemistry

Module I

Electro Chemistry - I

Electrical Transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution, migration of ions and kohlrausch law, Arrhenius theory of electrolyte dissociation and Its limitations, weak and strong electrolytes, Ostwald dilution law, its uses and limitations. debye-Huckle- onsager's equation for strong electrolytes (Elementary Treatment Only). Transport number, definition and determination by Hittorf's method and moving boundary method.

Applications of conductivity measurements: Determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Module II

Chemical Kinetics and Catalysis

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction concentration, temperature,pressure, solvent,light,catalyst, Concentration dependence of rates, mathematical characteristics of simple chemical reactions zero-order, first order, second order, pseudo order, half-life and mean life period. Determination of the order of reaction: differential method; method of integration, method of half life period and isolation methodRadioactivedccay as a first order phenomenon. Experimental methods of chemical kinetics: conductometric, Potentiometric,opticalmethods, polarimetry and spectrophotometry, Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius concept of activation energy, Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis), Expression for the rate constant based on equilibrium constant and thermodynamic aspects, Catalysis, characteristics of catalysed reactions, classification of catalysis, miscellaneous examples.

Module III

Thermodynamics - I

Definition of thermodynamic terms : System, Surroundings etc, Types of systems, Intensive and extensive properties. state and path functions and their differentials. Thermodynamic process, concept of heat and work, First Law of Thermodynamics: Statement, Definition of internal energy and enthalpy, heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law, Joule- Thomson coefficient, Calculation of w,q, dU&dH, for the expansion of Ideal gases under adiabatic conditions for reversible process. Second law of Thermodynamics: Need for the Law, different statements of the law, Carnot cycle and its efficiency, Carnot-Theorem, Thermodynamic scale of temperature. Concept of entropy: Entropy as a state function, entropy as a function of V&T, Entropy as a function of P&T, Entropy change in physical change, Clausius inequality and Entropy as a criteria of spontaneity and equilibiruim, Entropy change in ideal gases and mixing of gases.

Third Law of Thermodynamics : Nernst heat theorem, Statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data, Gibbs and Helm -holtz function's : Gibbs function (G) and Helm holtz function (A) as: Thermodynamic quantities. A&G as criteria for Thermodynamic equilibrium and spontaneity, their advantage over entropy change, variation of G and A with P.V. and T.

Books Suggested:

1. Principles of Physical Chemistry: B. R. Puri and L. R. Sharma
2. A Text Book of Physical Chemistry: A. S. Negi and S. C. Anand
3. Physical Chemistry, Pt. I & II: C. M. Gupta, J. K. Saxena and M. C. Purohit
4. Computers and Applications to Chemistry: Ramesh Kumari, Narosa Publishing House P. Ltd.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Chemistry Lab-II

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-II	BSP208	0:0:2	2	2

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   - Figure /Formula/Theory : 5
   - Observations/Calculations : 8
   - Result /Result Analysis : 5
   - Precautions : 2
3. Viva -Voce : 10

List of Experiments:

1. Semi-micro / Macro Analysis -Cation analysis, separation and identification of ions from groups I,II,III,IV,V and VI, Anion analysis.(6 radicals)
2. Determination of melting point: Naphthalene, Benzoic acid, Urea, Succinic Acid, Cinnamic acid, m-Dinitrobenzene, p-Dichlorobenzene,Aspirin
3. Detemination of boiling Points: Ethanol, Cyclohexane, Toluene, Benzene,
4. Mixed Melting point determination: Urea -Cinnamic acid mixture of various compositions (1:4,1;1,4;1)
5. Distillation: Simple distillation of ethanol -water, using water condenser
6. Chemical Kinetics

- To determine the specific reaction rate of the hydrolysis of methyl ac etate/ ethyl acetate catalyzed by hydrogen ions at room temperature.
- To study the effect of acid strength on the hydrolysis of an ester.
- To comopare the strengths of HCl and H2SO4 by studying the Kinetics of hydrolysis of ethyl-acetate.
- To study kinetically the reaction of decomposition of iodide by H_2O_2

7. Distribution Law

- To study the distribution of iodine between water and CCl_4
- To study the distribution of benzoic acid between benzene and water

Books suggested:

1. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi

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ENGLISH

Course Name	Course Code	LTP	Credit	Semester
English	BCS201	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print

- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE – II

(BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-II	BSS203	1:0:0	1	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:

Process of Behavioral communication

Aspects of interpersonal communication and relationship

Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication

Scope of Behavioral Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America

Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

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FRENCH - II

Course Name	Course Code	LTP	Credit	Semester
French-II	FLF201	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. Les loisirs
2. Les saisons
3. Les nombres
4. Le logement et la ville
5. Les prépositions de lieu
6. Les verbes de direction
7. Les lieux de l'université
8. Les documents administratifs
9. Les expressions utiliseés en classe par le professeur
10. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

1. Aimer, faire et savoir au present
2. La negation
3. Les adjectifs possessives au pluriel
4. Le partitifs
5. Aller au présent
6. <<il y a>>
7. L'usage des prepositions de lieu
8. Vouloir et pouvoir au présent
9. L'impératif
10. Le conditionnel de politesse

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN – II

Course Name	Course Code	LTP	Credit	Semester
German-II	FLG201	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

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SPANISH – II

Course Name	Course Code	LTP	Credit	Semester
Spanish-II	FLS201	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

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CHINESE – II

Course Name	Course Code	LTP	Credit	Semester
Chinese-II	FLC201	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND002	0:0:2	2	2

COURSE LEARNING OUTCOMES (CLO)

The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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Real Analysis

Course Name	Course Code	LTP	Credit	Semester
Real Analysis	BSP301	3:0:0	3	3

CLO 1	Order completeness of Real numbers
CLO 2	Real Sequences
CLO 3	Alternating Series
CLO 4	Reimann Integration
CLO 5	Uniform convergence , Sequence and series of function

Course Objective:
The aim of the module is to introduce the students to the fundamental ideas of Real Analysis: Limits of sequences, infinite series, limits of real functions, continuity, differentiability and the Riemann integral. The module should encourage students to think clearly and critically and to begin to be able to prove simple statements on their own.

Course Contents:

Module I
Order completeness of Real numbers, open and closed sets, limit point of sets, Bolzano Weirstrass theorem , concept of compactness, Heine Borel theorem.

Module II:
Real Sequences , Limit and convergence of a sequence, Monotonic sequences, Cauchy's sequences, Sub sequences and Cauchy's General principle of convergence, Infinite series and their convergences – Comparison test, Cauchy's nth root test, D'Alembert, Raabe's, Cauchy's Test, Logarithmic test.

Module III

Alternating Series – Leibnitz Test, Absolute and conditional convergence, Properties of continuous function on closed interval, derivable functions:-Derivative of composite function, The inverse function theorem and darboux theorem.

Module IV
Reimann Integration, Lower and upper Reimann integrals, Properties of Reimann integration, Mean value theorem of Integral calculus, Fundamental theorem of integral calculus.

Module V
Uniform convergence , Sequence and series of function – pointwise and uniform convergence , Weirstrass M- Test, Abel's and Drichlet's Test for uniform convergence of series of functions . Continuity of the sum functions of the limit functions.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1.A course of Mathematical Analysis, Shanti Narayan, S.Chand and Co. NewDelhi, 1995.
2. Mathematical Analysis, T.M. Apostol, Norosa Publishing House, New Delhi, 2000.
3. Real Analysis and Metric spaces, K.C.Sarangi, Ramesh Book Depot, Jaipur, 2006.

References:

1. An introduction to Real Analysis,Jain and Kaushik, S.Chand and Co., New Delhi, 1990.
2. Undergraduate Analysis, S.Lang , Springer-Verlag, 1997.
3. Real Analysis, R.R.Goldberg, Oxford and IBH publishing Company, New Delhi, 1999.

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Differential Equations

Course Name	Course Code	LTP	Credit	Semester
Differential Equations	BSP302	3:0:0	3	3

CLO 1	Explain the concept of differential equation.
CLO 2	Demonstrate the existence-uniqueness theorem of differential equations.
CLO 3	Identify ODEs and system of ODEs concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation.
CLO 4	Apply the method of undetermined coefficients to solve the non-homogeneous linear differential equations with constant coefficients.

Course Objective:

This is a course in ordinary differential equations. The focus of this course will be on the applications of ordinary differential equations (ODE"s) to problems from the physical, biological, and social sciences. You will find that the tools we develop this semester are used by researchers in every branch of science. You should also be aware that we will rely on material you have studied in prior courses. In particular, your skills in algebra and calculus should be sharp.

Course Contents:

Module I

Degree and order of a differential equation .Equations of first order and first degree – Variable separable method , Homogeneous and equations reducible to homogeneous form , Linear and equations reducible to linear form.

Module II

Exact differential equations and equation which can be made exact using I.F. First order higher degree equations – solvable for x, y, p. Clairaut's form.

Module III

Linear differential equation with constant coefficients, complimentary function and particular integral. Homogeneous linear differential equations with variable coefficient. Simultaneous differential equations.

Module IV

Linear differential equations of second order- Linear independence of solutions . Solution by transformation of the equations by changing the dependent and independent variable. Factorization of operators. Method of variation of parameters, Method of undetermined coefficients.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1.Introductory course on Differential Equations, D.A.Murray, Orient Longman, 2004
2. Elements of Partial Differential Equations, I. N. Sneddon, TMH, 2001
3. Differential Equations & their applications, Zafar Ahsan, PHI ,New Delhi, 1998.
4. Differential Equations, Bansal and Dhami, vol. I, JPH, 2012.

References:

1.A Treatise on Differential Equations, A.R. Forsyth, Macmillan and Co. Ltd, London, 1997.
2. Theory and Problems of Differential Equations, Frank Ayres, TMH, 2002.

Thermodyı

AMITY UNIVERSITY
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Course Name	Course Code	LTP	Credit	Semester
Thermodynamics and Statistical Physics	BSP303	2:0:0	2	3

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of thermodynamics.
CLO2	Immense understanding of thermodynamic relations
CLO3	Knowledge of production of low temperature
CLO4	Understanding of classical and quantum statistics.

OBJECTIVE:

To acquaint the students with basic laws of thermodynamics and statistical physics, methods of producing low temperatures, Carnot's engine so that they develop the scientific attitude to relate this knowledge to their daily life experiences.

MODULE I:

Basic Thermodynamics:

The Zeroth law, Various indicator diagrams (P-V diagram), First law of thermodynamics, Reversible and irreversible processes, Carnot's engine, Carnot's cycle and efficiency of Carnot's engine, reversibility of Carnot's engine, Carnot's theorem. Second law of thermodynamics, (different statements and their equivalence) Entropy, Principle of increase of entropy, Thermodynamic scale of temperature, Thermodynamic scale as an absolute scale, Third law of thermodynamics.

MODULE II:

Thermodynamic Relations:

Maxwell's thermodynamic relations, Triple point, ClausiusClapyron latent heat equation,Effect of pressure on boiling point of liquids, Helmholtz free energy, Enthalpy, Gibbs function,Internal energy,Thermodynamic potentials, Deduction of Maxwell's relations from thermodynamic potentials.

MODULE III:

Distribution of molecular velocities:

Distribution law of molecular velocities, Most probable, Average and RMS velocities, energy distribution function, Experimental verification of Maxwell velocity distribution, Principle of equipartition of energy.Mean free path and collision cross section, distribution of mean free path, Transport of mass, momentum and energy and their interrelationship.

MODULE IV:

Classical Statistics and Quantum Statistics

Classical Statistics:

Phase space, micro and macro states, Thermodynamic probability, relation between entropy and thermodynamic probability, Monatomic ideal gas, specific heat capacity of diatomic gas and

specific heat of solids.
Quantum Statistics:

Failure of classical statistics (Blackbody radiation and various laws of distribution of radiation, qualitative discussion of Weins and Rayleigh Jeans Law) Postulates of quantum statistics, Indistinguishability of wave function and exchange degeneracy, Bose Einstein statistics and its distribution function, Planck's distribution function and radiation formula, Fermi Dirac statistics and its distribution function.

ESSENTIAL READINGS:

1. "Heat and Thermodynamics", Singhal, Agarwal and Prakash ,PragatiPrakashan.
2. "Heat and Thermodynamics", Brijlal andSubramaniam, S. Chand & Sons.

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Electronics

Course Name	Course Code	LTP	Credit	Semester
Electronics	BSP304	2:0:0	2	3

Course learning outcomes (CLO)

CLO1	Understanding of basic circuit analysis
CLO2	Explain Semiconductordiodeandrectification
CLO3	Explain BJT and amplifier.

OBJECTIVE:

This course aims to develop the fundamental knowledge of electronics by learning various topics viz. circuit analysis, network theorems, P-N diode equation, rectifiers, filters, transistors and transistor amplifiers and their analysis. Students will also learn feedback amplifiers.

MODULE I:

Basic Circuit Analysis:

Impedance, Admittance and Hybrid parameters of any four terminal network, Kirchoff's laws, Mesh and Node analysis.

Various Circuit theorems:

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transformer theorem and Reciprocity theorem.

MODULE II:

Semi conductor diode and rectification:

p-n junction diodes, I-V characteristics, diode as a rectifier, half-wave and full-wave rectifiers:calculations of ripple factor, efficiency and regulation, bridge rectifiers.

Filters: Series inductor, shunt capacitor, L-section and p section filters.

Voltage regulation: Zener diode, breakdown voltage (avalanche and zener effect), voltage regulation, voltage multipliers

MODULE III:

BJT and amplifiers:

Basic construction of pnp and npn transistors and their operation, Input and output characteristics of CB, CC and CE configurations, active, saturation and cut-off regions, Load line and Q-point, Two-port analysis of a transistor using h-parameters, Analysis of CB, CE and CC amplifier for current gain, voltage gain, input and output impedances using h-parameters,Gain-frequency response of an amplifier.

MODULE IV:

Feed-back amplifier:

Concept of feed-back, positive and negative feedback, voltage and current feedback circuits (series and parallel circuits).Advantages of negative feedback: Stabilization of gain, effect on input and output impedances, reduction of non-linear distortion, effect on gain-frequency response.Oscillators: Barkhausen criterion, RC oscillators, Colpitt's oscillator, Hartley oscillator, crystal oscillators.

ESSENTIAL READINGS:

1. "Electronic Devices and Circuits", Jacob Millman and Christos Halkias, TMH , 9th edition.
2. "Electronic Fundamentals and Applications", John D. Ryder, Prentice Hall of India Pvt. Ltd.,(1983) New Delhi.
3. "Hand book of Electronics", Kumar and Gupta, PragatiPrakashan, Meerut.

REFERENCES:

1. "Basic Electronics and Solid State", B.L. Theraja, S.Chand, 2002.
2. "Integrated Electronics, Analog and Digital circuits and systems", Millman&Halkias, McGraw Hill Ltd. (1972).
3. "Electronic devices and circuits" ,Soni and Gupta, DhanpatRai and Sons.
4. "Basic Electronics and Linear circuits", Bhargava and Kulshreshtha, TMH ,1984.
5. "Principle of Electronics" (for numerical problems) V.K. Mehta, S.Chand ,2002.
6. "Basic Electronics", Kal, Prentice Hall of India, 2002.
7. "Electronic Devices and Circuit Theory", Robert Boylestad and Nashelsky, Prentice Hall ofIndia, Fifth edition.
8. "Engineering Electronics", John D Ryder, McGraw Hill Book Co.

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PHYSICS LAB-III

Course Name	Course Code	LTP	Credit	Semester
Physics Lab-III	BSP305	0:0:2	2	3

Course Contents:

1. To determine a Low Resistance by Carey Foster's Bridge.
2. To determine a Low Resistance by a Potentiometer.
3. To determine High Resistance by Leakage of a Capacitor.4.To investigate the Motion of Coupled Oscillators.
4. To study the response curve of a Series LCR circuit and determine its (a) Resonant
5. Frequency, (b) Impedance at Resonance and (c) Quality Factor Q, and (d) Band Width.
6. To study the response curve of a Parallel LCR circuit and determine its (a) Anti-
7. Resonant Frequency and (b) Quality Factor Q.
8. To study (a) Half-wave Rectifier and (b) Full-wave Bridge Rectifier.
9. To study the Forward and Reverse characteristics of a Zener Diode and to study its use as a Voltage Regulator.
10. To study the CE Characteristics of a PNP Transistor.
11. To study the characteristics curves of PN junction diode in forward and reversed bias

To study the Frequency Response of Voltage Gain of a RC-Coupled Amplifier.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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Inorganic Chemistry-I

Course Name	Course Code	LTP	Credit	Semester
Inorganic Chemistry-I	BSP306	2:0:0	2	3

CLO1	**Understanding first and second transction series**
CLO2	**Acqurire knowloedge of steoreo knowledge**
CLO3	**Acquaire knowlged of cooridnation chemmistry**

Module I

Chemistry of Elements of first Transition Series : Characteristics properties of d-Block elements. Properties of the elements of the first transition series, their Binary Compunds and complexes. Illustrating relative stability of their oxidation states, Coordination number and geometry.

Module II

Chemistry of Elements of Second and Third Transition Series : General characteristics, comparative treatment with their 3d-analogues in respect of ionicRadii, Oxidation States, magnetic, behaviour, Spectral properties, Stereo-chemistry.

Module III

Coordination Compounds: Werner's coordination theory and its experimental verification, Effective atomic number concept, Chelates, Nomenclature of coordination Compounds, Isomerism in coordination compounds, valence bond theory of transition metal complexes.

Books Suggested:

1. Text book of Quantitative Inorganic Analysis: A. I. Vogel (Chapter – I, II and XXIII)
2. Text book of Quantitative Inorganic Analysis: I. M. Kothoff and E. R. Sandell
3. Concise Inorganic Chemistry: J. D. Lee
4. General Inorganic Chemistry: J. A. Duffy
5. Principle of Inorganic Chemistry: B. R. Puri and L. R. Sharma
6. Basic Inorganic Chemistry: Cotton and Wilkinson and Gaus, Willey

Examination Scheme For Exams:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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General Organic Chemistry-I

Course Name	Course Code	LTP	Credit	Semester
General Organic Chemistry-I	BSP307	2:0:0	2	3

CLO1	Understand the UV absorption spectroscopy, IR spectroscopy and their applications in syntheticorganic chemistry.
CLO2	Understand types of alcohols and different types of name reactions.
CLO3	Find out the types of aliphatic alcohols, aromatic alcohols, and re-arrangement reactions.
CLO4	Find out the types carbonyls compounds and different type of condensation

	reactions.
CLO5	Find out the applications of different types of alcohols and carbonyls compound in daily life.

Module I

Alcohols: Classification and nomenclature. Monohydric alcohols - Nomenclature, Method of formation by Reduction of aldehydes, Ketones,Carboxylic acids and esters, Hydrogen bonding, Acidic nature, Reactions of alcohols, Dihydric Alcohols - Nomenclature, methods of formation, Chemical reaction of vicinal glycols, Oxidative-Cleavage [Pb $(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric Alcohols - Nomenclature and methods of formation, chemical reactions of glycerol.

Phenols: Nomenclature, Structure and bonding, Preparation of Phenols, Physical Properties and acidic character, Comparative acidic strengths of alcohols and phenols, Resonance stabilization of phenoxide ion, Reactions of phenols: electrophylic aromatic substitution, acylation and carboxylation, mechanism of fries rearrangement, Claisen rearrangement, gatter-man synthesis. Hauben- HoeschReaction, Lederer-manasse reaction and Reimer-tiemann Reaction.

Module II

Aldehydes And Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3Dithianes synthesis of ketones from nitriles and from carboxylic acids. Physical properties, Mechanism of Nucleo-philic additions to carbonyl, aldol, perkin and Knoevenagel condensations, Condensation with ammonia and its Derivatives, Wittig reaction, Mannich reaction. Use of acetals as Protecting group Oxidation of aldehydes, baeyer-villiger oxidation of ketone, cannizzaro's reaction, MPV, Clemmensen, Wolff-kishner, Li AlH4 reductions, Halogenation of enolizable ketones, An introduction to O□O Unsaturated aldehydes and ketones.

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain & S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R P. Kapoor

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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CHEMISTRY LAB-III

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-III	BSP308	0:0:2	2	3

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   Figure /Formula/Theory : 5
   Observations/Calculations : 8
   Result /Result Analysis : 5
   Precautions : 2
3. Viva -Voce : 10

List of Experiments:

1. Quantitative analysis
2. Volumetric analysis
   - Determination of acetic acid in commercial vinegar. Using NaOH
   - Determination of Alkali content in Anta-acid tablet Using HCl.
   - Estimation of calcium content in chalk as calcium oxalate by permangano-metry.
   - Estimation of hardness of water by EDTA.
   - Estimation of ferrous and ferric by dichromate method.
   - Estimation of copper using thiosulphate.
3. Qualitative analysis:
   - Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives
4. Thermo chemistry:
   - To determine the solubilies of benzoic acid at different temperatures and to determine OH of the dissolution process
   - To determine the enthalpy of neutralization of a weak acid weak base verses strong acid and strong base and determine the enthalpy of ionisation of the weak acid/weak base.
   - To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using born haber cycle.

Books Suggested:

1. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi
2. Practical Chemistry (Hindi Ed.): Suresh Ameta& P. B. Punjabi, Himanshu Publication

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COMMUNICATION SKILLS - I

Course Name	Course Code	LTP	Credit	Semester
Communication Skills-I	BCS301	1:0:0	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE – III

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-III	BSS303	1:0:0	1	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:

Process of Behavioral communication

Aspects of interpersonal communication and relationship

Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication

Scope of Behavioral Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR

Escalating, maintaining and terminating IPR

Direct and indirect strategies of terminating relationship

Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America

Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

AMITY UNIVERSITY RAJASTHAN

FRENCH - II

Course Name	Course Code	LTP	Credit	Semester
French-III	FLF301	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

11. Les loisirs
12. Les saisons
13. Les nombres
14. Le logement et la ville
15. Les prépositions de lieu
16. Les verbes de direction
17. Les lieux de l'université
18. Les documents administratifs
19. Les expressions utiliseés en classe par le professeur
20. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

11. Aimer, faire et savoir au present
12. La negation
13. Les adjectifs possessives au pluriel
14. Le partitifs
15. Aller au présent
16. <<il y a>>
17. L'usage des prepositions de lieu
18. Vouloir et pouvoir au présent
19. L'impératif
20. Le conditionnel de politesse

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

AMITY UNIVERSITY
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GERMAN – II

Course Name	Course Code	LTP	Credit	Semester
German-III	FLG301	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

AMITY UNIVERSITY
RAJASTHAN

SPANISH – III

Course Name	Course Code	LTP	Credit	Semester
Spanish-III	FLS301	2:0:0	2	3

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

AMITY UNIVERSITY
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CHINESE – III

Course Name	Course Code	LTP	Credit	Semester
Chinese-III	FLC301	2:0:0	2	2

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money

8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References
1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND003	0:0:2	2	2

COURSE LEARNING OUTCOMES (CLO)
The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:
After the completion of this course, students will be able to:
- apply their knowledge and skills to solve specific community problem

- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

7. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
8. The group member shall write his/her name at the end of the blog.
9. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
10. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
11. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
12. For the topic chosen by the group, students are recommended to cover the following points:
    g) Current scenario (Regional, national and international level as applicable)
    h) Future predictions
    i) Duty of the government
    j) Government policies (related to the topic), if any
    k) Duty of public
    l) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

4. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
5. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
6. Conclusion is clearly stated. The underlying logic is explicit.

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Dynamics

Course Name	Course Code	LTP	Credit	Semester
Dynamics	BSP401	3:0:0	3	4

CLO 1	Velocity and acceleration
CLO 2	Motion in a resisting medium
CLO 3	Central orbits-p-r equations, Apses, time in an orbit, Kepler's law of planetary motion.
CLO 4	Constrained motion in two dimensions

CLO 5	Moment of Inertia

Course Objective:
This Course introduces students to the analysis of dynamic systems encountered in engineering design practice. As a result, students will develop a clear understanding of the basic principles that govern the dynamics of particles and rigid bodies; as well as an ability to use that Understanding in the solution of so many problems.

Course Contents:

Module I
Velocity and acceleration-along radial and transverse directions, along tangential and normal directions, S.H.M. – Hooke's Law, Horizontal and vertical elastic strings.

Module II
Motion in a resisting medium-Resistance varies as velocity and square of velocity, Work and Energy, Motion on a smooth curve in a vertical plane, Motion on the inside and outside of a smooth vertical circle.

Module III

Central orbits-p-r equations, Apses, time in an orbit, Kepler's law of planetary motion.

Module IV
Constrained motion in two dimensions: Motion of a particle on the inside and outside of a smooth vertical circle.

Module V
Moment of Inertia: Moment of inertia of a rod, Rectangular lamina, Circular ring and circular disc, Hollow and solid spheres, Cylinder, Theorem of perpendicular and parallel axis.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

1. Dynamics , Ramsey A.S. , CBS Publishers and distributors
2. Dynamics , Bali , Laxmi Publications,Meeerut
3. Dynamics , M.Ray, S. Chand & Co.
4. Statics ,Dynamics,Gokhroo&Gokhroo,Navkar Prakashan Ajmer.s

References:

1. Dynamics of a Particle, Loney, Macmillan India Ltd.
2. Principles of mechanics , J. L. Synge and B. A. Griffith, New York andLondon,McGraw-Hill,1942.
3. Dynamics of a Particle, Ray , Students Friends and Co., Agra,1981
4. Dynamics of a Particle, Vasishtha A.R., Gupta, Krishna Prakhasan Mandir,2014
5. Dynamics, Y.N.Gaur, A.K.Mathur,M.C.Goyal,RBD, 2015
6. Elements of Dynamics,Gokhroo,Saini,Arora JPH,2014

Numerical Analysis

Course Name	Course Code	LTP	Credit	Semester
Numerical Analysis	BSP402	3:0:0	3	4

CLO 1	Investigate the solution of a nonlinear equation.
CLO 2	Create a function which closely fits given n- points in the plane by using interpolation method.
CLO 3	Apply numerical methods to obtain approximate solutions to mathematical problems.
CLO 4	Develop appropriate numerical methods to solve a differential equation.

Course Objective:

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

Course Contents:

Module I

Differences, Relation between differences and derivatives, difference of polynomials, Factorial notation, Newton's forward and backward interpolation formula (including proof).

Module II

Divided differences: Newton's and Lagrange's divided differences formulae, Central differences: Gauss's, Stirling's and Bessel's interpolation formulae.

Module III

Numerical differentiation, Numerical integration – Quadrature formula-trapezoidal rule, Simpson's 1/3 rd and 3/8 th formulae, Gaussian Integration, Newton cotes formula.

Module IV

Inverse Interpolation, Numerical solution of algebraic and transcendental equations- Bisection method , Regula-falsi method, Method of iteration and Newton Raphson's Method, Newton's iterative formula for obtaining square and inverse square roots.

Module V

Solution of system of linear equations: Gauss elimination method, Jacobi and Gauss Seidal method, Solutions of ordinary differential equations with initial boundary conditions: Picard's method, Euler's and modified Euler's method, Runge's Kutta Method.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

Note: Non Programmable scientific calculator up to 100 MS is permitted.

1. Calculus of Finite Differences and Numerical Analysis, Gupta and Malik, Krishna Prakashan Mandir,2013
2. Numerical Methods Problems and Solutions, M.K. Jain, Iyengar, New Age International Ltd.,2007
3. Numerical Analysis, Sharma & Sharma, Ratan Prakashan Mandir, Agra,IInd edition,1989
4. Numerical Mathematical Analysis, Scarborough, James B., Oxford and IBH publishing co.,6th edition,1966

References:

1. Applied Numerical Analysis , Gerald, Addison Wesley Publishing Company,2009
2. Applied Numerical Methods, Gourdin; Boumahrat, Prentice Hall of India,1996
3. Numerical Methods Problems and Solutions , M.K.Jain, Iyengar,New Age International Ltd,2007
4. Numerical Analysis a Practical Approach , Melvin J.Maron, Robert J.Lopez, Machmillon , Publishing Company, New York, 3rd Edition ,1991
5. Finite differences& Numerical analysis, H.C.Saxena, S.Chand & Co.New Delhi,2010

Mathematical Physics

Course Name	Course Code	LTP	Credit	Semester
Mathematical Physics	BSP403	2:0:0	2	4

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of VectorCalculus
CLO2	Immense understanding of InfiniteSeriesand FourierSeries
CLO3	Knowledge of DifferentialEquations
CLO4	Understanding of Curvilinearcoordinates.

OBJECTIVE:

This course aims at exposing the students to basic Mathematics which will be useful for them to solve the problems of Physics.

Module I: Vector Calculus

Dot and cross product of vectors, Gradient, divergence and curl, their physical significance, Laplacian, vector identities, Line integral, surface integral and volume integral, Gauss divergence theorem, Stokes theorem.

Module II: Infinite Series and Fourier Series:

Infinite series: Fundamental concepts, convergence tests, alternating series, algebra of series, power series, Taylor series.

Fourier Series: Periodic functions, Fourier series, Euler's formulae, Even functions, Half range series, Change of interval and functions having arbitrary period, practical harmonics analysis.

Module III: Differential Equations

Differential equations with examples from Physics, their degree and order, Linear Differential equations, solution of 1^{st} and 2^{nd} order differential equations. Standard integrals and their applications in Physics.

Module IV: Curvilinear coordinates:

Orthogonal curvilinear coordinates, line element, gradient, divergence and curl in curvilinear coordinates, Cartesian coordinate system, Polar coordinates, Cylindrical coordinate system, Spherical polar coordinate system.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Mathematical Methods in the Physical Sciences : M.L.Boas (Wiley) (2002).
- Introduction to Mathematical Physics : C. Harper (Prentice Hall of India) (2004).
- Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (Tata McGraw-Hill).
- Mathematical Physics – P.K. Chattopadhyay (Wiley Eastern).

Solid State Physics and Devices

Course Name	Course Code	LTP	Credit	Semester
Solid State Physics and Devices	BSP404	2:0:0	2	4

Course learning outcomes (CLO)

CLO1	have a basic knowledge of crystal systems and spatial symmetries
CLO2	**have an understanding thermal, electrical and superconducting properties of solids**
CLO3	**have an understanding of the magnetic properties of condensed matter**
CLO4	have an understanding of the recent trends in electronics devices

OBJECTIVE:

To familiarize the students with the basics of condensed matter physics which form the basic for further studies in condensed matter physics. The students get acquainted with the crystal structure, properties of solids, superconductivity and magnetism which strengthen the theoretical base for research in contemporary fields of condensed matter physics like imperfect solids and nano particle physics..

MODULE I:

Crystal structure: Symmetry elements in crystal, Unit cell, fundamental lattice system and types, Miller indices, crystal structures of simple cubic, FCC, BCC, HCP, diamond. **Crystal Diffraction:** Bragg's law, X-ray and neutron diffraction, Rotating crystal method, laue Method and Powder method.

MODULE II:

Thermal Properties of solids: Concepts of thermal energy and Phonons, Einstein theory of specific heat, Debye model of lattice specific heat.

Band theory of solids: Formation of bands, distinction between metals, insulators and semiconductors, periodic potential of a solid, wave function in a periodic lattice and Bloch theorem, Physical origin of effective mass,negative effective mass and holes.

MODULE III:

Electrical conductivity: Drude Lorentz theory of electrical conductivity. Sommerfield theory of conduction in metals, The Hall effect.

Superconductivity: Zero resistivity, Critical temperature, critical magnetic field, Meissner effect, Type I and type II superconductors, BCS theory (Basic idea),High Tc superconductors.

MODULE IV:

Magnetic Properties: Classification of magnetic material, Diamagnetism, Paramagnetism due to free ions and conduction electrons, Curie's law, ferromagnetismNature and Origin of Weiss

molecular field. Domains, hysterisis loop, outline of antiferromagnetism andferrimagnetisms, ferrites.

MODULE V:

Solid State Devices: Light emitting diode, Solar cell, SCR.

Operational amplifier: Differential amplifiers, differential gain and CMRR, inverting and non-inverting configurations Applications of op-amp: adder, subtractor, differentiator and integrator. **Field affect Transistor (FET):** Classification of various types of FET, constructional details of FET, drain characteristics and baising of FET, operating regions, pinch-off voltage, idea of metal oxide semiconductor field effect transistor (MOSFET).

ESSENTIAL READINGS:

1. "Introduction to Solid State Physics", C. Kittel, Wiley Eastern, New Delhi, Seventh Edition.
2. "Solid State Physics", S.O. Pillai, 3rd edition 1999, New Age International, New Delhi.

3. "ElectronicDevices&Circuit Theory",Boylestad&Nashelsky , Prentice Hall of India.

REFERENCES:

1. "Solid state physics", A.J Dekker ,Macmilan India Ltd.
2. "Solid state Physics", R.L. Singhal, KedarNath Ram Nath Publishers, 2001.
3. "Theory of solids", L. Azaraf, Tata Mc.Graw Hill Publishing Co.
4. "Solid State Physics", S.L. Gupta and V.Kumar, KedarNathRamNath& Co., Meerut
5. "Electronic Devices and Circuits" ,Soni,Gupta , DhanpatRai and Sons.
6. "Elements of Solid State Physics", J.P.Srivastava, Prentice Hall of India, New Delhi.

PHYSICS LAB-IV

Course Name	Course Code	LTP	Credit	Semester
Physics Lab-IV	BSP405	0:0:2	2	4

Course Contents:

1. To investigate the use of an op-amp as an Integrator.
2. To investigate the use of an op-amp as a Differentiator.
3. To study Amplitude Modulation using Transistor.
4. To study Pulse Width / Pulse Position and Pulse Amplitude Modulation using ICs.
5. To verify the basic logic gates using logic gate trainer kit.
6. To design and verify the following digital circuits using basic gates:
   i) S-R flip-flops , ii) J-K flip-flops.
7. To execute half adders and full adders with basic gates and hence to verify addition of binary numbers.
8. To determine the value of e/m by Thomson's method.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DIGITAL ELECTRONICS AND COMMUNICATION

Course Name	Course Code	LTP	Credit	Semester
Digital Electronics and Communication	BSP410	3:0:0	3	4

Course Objective:
This course aims at exposing the students to Digital Electronics and Communication.

Course Contents:

Module I: Combinational Logic
Boolean Algebra, Logic systems, Circuits for OR, AND, NOT gates, transistor switching times, Exclusive OR gate, De Morgan's laws, Verification and design of AND, OR, NOT and XOR gates using NAND gates to design, a combinational logic system for a specified truth table to convert a, To minimize a given logic circuit, To study TTL ICs (binary decoder, 7segment decider, Schmitt trigger), Design a 7-segment display driver.

Module II: Arithmetic and Logic Units

Half adder, full adder, and 4 bit binary adder,Half substractor, full subtractor, adder subtractor using full adder IC.

Module III: Flip-Flops, Counters, Shift Registers and Converters:

Build a flip flop circuits using elementary gates (RS, clocked RS, D-type, JK),Build a 4 bit counter using D-type JK flip-flop, Make a shift register from D type flip-flop, Serial and parallel shifting of data, A/D converter, D/A converter.

Module IV: Communication

Modulation and detection, AM, FM, Radio wave propagation, Radio transmitter and receiver, TV receiver, Pulse Modulation, Modem, Operation Amplifier (OP-AMP).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Pulse, Digital and Switching Waveforms : J. Millman and H. Taub (Tata Mcgraw Hill)
- Electronic Devices and Circuits: A. Mottershead (Prentice Hall).
- Electronics Fundamental and Application: D. Chattopadhyay and P.C. Rakshit.

Chemistry of States of Matter

Course Name	Course Code	LTP	Credit	Semester
Chemistry of States of Matter	BSP406	2:0:0	2	4

Module I

Solid State

Definition of space lattice, unit cell, Laws of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry, Symmetry elements in crystals. X-ray diffraction by crystals, Derivation of Bragg's equation Determination of Crystal structure of NaCl and CsCl(Laue's method and powder method.)

Module II

Gaseous States

Postulates of kinetic theory of gases, deviation from ideal behaviour, vanderwaals equation of state. Critical Phenomena: PV isotherms of real gases, continuity of states, the isotherms of vander Waals equation, relationship between critical constants and vanderwaals constants, the law of corresponding states, reduced equation of state. Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussions of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect)

Module III

Liquid state

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases, Liquid Crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholestric phases, Thermography and seven segment cell.

Colloidal State

Definition of colloids, classification of colloids, Solids in liquids (sols) properties- kinetic, optical and electrical,

stability of colloids, Protective action, Hardy-Schulze law, gold number, Liquids in liquids (emulsions): types of emulsions, preparation, Emulsifier, Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Books Suggested:

1. Principles of Physical Chemistry: B. R. Puri and L. R. Sharma
2. A Text Book of Physical Chemistry: A. S. Negi and S. C. Anand
3. Physical Chemistry, Pt. I & II: C. M. Gupta, J. K. Saxena and M. C. Purohit
4. Computers and Applications to Chemistry: Ramesh Kumari, Narosa Publishing House P. Ltd.
5. A Text Book of Physical Chemistry : Kundu and Jain

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

GeneralOrganic Chemistry II

Course Name	Course Code	LTP	Credit	Semester
General Organic Chemistry-II	BSP407	2:0:0	2	4

CLO1	**Acquire knowledge of** Ethers And Epoxides
CLO2	**Acquire knowledge of** Carboxylic Acids
CLO3	Organic Compounds of Nitrogen

Module I

Ethers And Epoxides: Nomenclature of ethers and methods of formation, physical properties. Chemical reaction, cleavage and autoxidation, ziesel's method of synthesis of epoxides, Acid and Base catalyzedring opening, Reactions of Grignard and organolithium reagents with epoxides.

Module II

Carboxylic Acids: Nomenclature structure and bonding, Physical properties, Acidity of carboxylic acids, Effect of subsituents on acid Strength, preparation of carboxylic acids, Reactions of carboxylic acids, Hell-Volhardzelinsky reaction, Synthesis of acid chlorides, Esters and amides. Reductions of carboxylic acids, Mechanism of decarboxylation, Methods of formation and chemical reactions of unsaturated mono carboxylic acids, Dicarboxylic Acids: Methods of Synthesis and effect of heat and dehydrating agents.

Carboxylic Acid Derivatives: Structure and nomenclature of acid chlorides, Esters, Amides and acid-anhydrides, Relative stability and reactivity of acid derivatives, physical properties, Inter conversion of acid derivatives by nucleophilic acyl substitution, preparation of carboxylic acid derivatives, chemical reactions, mechanism of esterification and hydrolysis (Acidic and Basic)

Module III

Organic Compounds of Nitrogen: Preparation of nitro alkanes and nitro arenes. Chemical Reactions of Nitro alkanes, Mechanism of nucleophilic substitution in nitro arenes and their reduction in acidic, neutral and alkaline media, Picric Acid

Alkyl and aryl amines: Reactivity, Structure and nomenclature of amines, physical properties. Stereo chemistry of amines, Separation of a mixture of primary, secondary and tertiary amines .Structural features, effecting basicity of amines. Amine salts as phase- transfer catalysts, preparation of alkyl and aryl amines (Reduction of nitro compounds, Nitriles) Reductive amination of aldehydic and ketonic compounds, Gabriel-Phthalimide reaction, Hofmann bromamide Reaction, Reactions of amines, Electrophilic Aromatic substitution in arylamines, Reactions of amines with nitrous acid, Synthetic transformations of aryl- diazonium salts, azo couplin.

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain & S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R P. Kapoor

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Nuclear/Radio chemistry

Course Name	Course Code	LTP	Credit	Semester
Nuclear/Radio Chemistry	BSP411	3:0:0	3	4

CLO1	Nuclear Chemistry: Fundamental principles of nucleaus (nucleons)
CLO2	Chemistry of Noble gases: Chemical properties of the noble gases
CLO3	defect and binding energy, nuclear reactions, spallation

Module I

Some Important Compounds of p-block elements: Hydrides of boron, diborane and higher boranes, borazine, borohydride, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphurtetranitride, basic properties of halogens, interhalogens and polyhalides

Chemistry of Noble gases: Chemical properties of the noble gases, chemistry of xenon, structure and bonding in Xenon compounds

Module II

Nuclear Chemistry: Fundamental principles of nucleaus (nucleons), concepts of nuclides and its representation, isotopes, isobars and isotones (with specific examples), forces operating between nucleons (n-n, n-p, p-p), qualitative idea of stability of nucleaus (n/p ratio)

Module III

Radiochemistry: Natural and artificial radioactivity, radioactive disintegration series, radioactive displacement law, radioactivity decay rates, half life and average life, nuclear binding energy, mass defect and calculation of defect and binding energy, nuclear reactions, spallation, nuclear fission and fusion

Books suggested:

1. Concise Inorganic Chemistry: J. D. Lee
2. General Inorganic Chemistry: J. A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry: B. R. Puri and L. R. Sharma
4. Basic Inorganic Chemistry: F. A. Cotton and G. Wilkinson, Wiley Eastern
5. Molecular Geometry: R. J. Gillespie, Van Nostrand Reinhold

Examination Scheme

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

CHEMISTRY LAB IV

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab –IV	BSP408	0:0:2	2	4

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   - Figure /Formula/Theory : 5
   - Observations/Calculations : 8
   - Result /Result Analysis : 5
   - Precautions : 2
3. Viva -Voce : 10

1. Calibration of fractional weights, pipettes and burettes, preparation of standard solution, dilution- 0.1 M to 0.001 M solutions.
2. Gravimetric analysis: Analysis of copper (cu) as CuSCN and Ni as Ni Dimethyl glyoxime.
3. Thin layer Chromatography

- Determination of Rf values and identification of organic compounds.
- Separation of green leaf pigments (spinach leaves may be used)
- Preparation and seperation of 2,4-Dinitro -Phenyl Hydra-Zones of acetone, 2-butanone, hexan-2 and 3-one using toluene and light petroleum (40:60)
- Separation of a mixture of dyes using cyclohexane and Ethyl acetate (8.5 : 1.5)

4. Paper Chromatography:

- Separation of a mixture of phenyl alanine and glycine, Alanine and aspartic acid, leucine and glutamic acid, spray reagent-Ninhydrin.
- Separation of a mixture of D,L- alanine, glycine, and L-leucine using n-butanol: acetic acid:water (4:1:5) spray reagent-aniline hydrogen phthalate.
- Separation of mono saccharides- a mixture of D-galactose and D-fructose using n-butanol:acetone: water (4:1:5) spray reagent- aniline hydrogen phthalate.

5. Transition temperature Determination of the transition temperature of the given substance by thermo-metric/dialometric method (e.g. $MnCl_2.4H_2O$/ $SrBr_2.2H_2O$)
6. Phase Equilibrium

- To study the effect of a solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids (e.g.Phenol- water system)
- To construct the phase diagram of two component(e.g.Diphenyl- Benzophenone) system by cooling curve method.

Books Suggested:

1. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi
2. Practical Chemistry (Hindi Ed.): Suresh Ameta& P. B. Punjabi, Himanshu Publication

COMMUNICATION SKILLS - II

Course Name	Course Code	LTP	Credit	Semester
Communication Skills-II	BCS401	1:0:0	1	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE – IV

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-IV	BSS403	1:0:0	1	4

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:

Process of Behavioral communication

Aspects of interpersonal communication and relationship

Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication

Scope of Behavioral Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR

Escalating, maintaining and terminating IPR

Direct and indirect strategies of terminating relationship

Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America

Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

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FRENCH - IV

Course Name	Course Code	LTP	Credit	Semester
French-IV	FLF401	2:0:0	2	4

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

21. Les loisirs
22. Les saisons

23. Les nombres
24. Le logement et la ville
25. Les prépositions de lieu
26. Les verbes de direction
27. Les lieux de l'université
28. Les documents administratifs
29. Les expressions utiliseés en classe par le professeur
30. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

21. Aimer, faire et savoir au present
22. La negation
23. Les adjectifs possessives au pluriel
24. Le partitifs
25. Aller au présent
26. <<il y a>>
27. L'usage des prepositions de lieu
28. Vouloir et pouvoir au présent
29. L'impératif
30. Le conditionnel de politesse

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN – IV

Course Name	Course Code	LTP	Credit	Semester
German-IV	FLG401	2:0:0	2	4

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

AMITY UNIVERSITY
RAJASTHAN

SPANISH – IV

Course Name	Course Code	LTP	Credit	Semester
Spanish-IV	FLS401	2:0:0	2	4

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

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CHINESE – IV

Course Name	Course Code	LTP	Credit	Semester
Chinese-IV	FLC401	2:0:0	2	4

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money

8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References
1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND004	0:0:2	2	2

COURSE LEARNING OUTCOMES (CLO)
The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:
After the completion of this course, students will be able to:
- apply their knowledge and skills to solve specific community problem

- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

13. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
14. The group member shall write his/her name at the end of the blog.
15. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
16. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
17. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
18. For the topic chosen by the group, students are recommended to cover the following points:
    m) Current scenario (Regional, national and international level as applicable)
    n) Future predictions
    o) Duty of the government
    p) Government policies (related to the topic), if any
    q) Duty of public
    r) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

7. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
8. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
9. Conclusion is clearly stated. The underlying logic is explicit.

Metric and Vector Space

Course Name	Course Code	LTP	Credit	Semester
Metric and Vector space	BSP501	3:0:0	3	5

CLO1	**Metric Space: Definition with examples, Bounded set, Open set, closed sets**
CLO2	**Continuous mappings, Sequence in a Metric Space**
CLO3	**Separable Space, Compact spaces and Compact Sets**

Course Objective:

To gain proficiency in dealing with abstract concepts, with emphasis on clear explanations of such concepts to others. To gain proficiency in the art of writing proofs. To gain familiarity with the concepts of "metric and vector space" and to see how these provide a context in which standard concepts of mathematical analysis, such as convergence and continuity, can be studied. To understand the concepts of completeness and compactness of metric spaces. To understand the Contraction Mapping Theorem, and see how it can be applied to prove the existence of solutions of equations of various kinds.

Course Contents:

Module I

Metric Space: Definition with examples, Bounded set, Open set, closed sets, Neighbourhoods Boundary points and limit points, Exterior point, Closure of a set, Metric Subspace.

Module II

Continuous mappings, Sequence in a Metric Space, Cauchy Sequence, Subsequence, Completeness of Metric Space.

Module III

Separable Space, Compact spaces and Compact Sets, Connected Spaces and Connected Sets, Bolzano's Theorem, Product Spaces.

Module IV

Vector Spaces, Definition, examples and basic properties. Subspaces. Linear independence. Linear combinations and span. Basis and dimension. Sum and intersection of subspaces. Direct sum of subspaces.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1. Real Analysis and Metric Space, K. C. Sarangi, RBD, Jaipur.
2. Basic Abstract Algebra, P. B. Bhattacharya , S. K. Jain and S. R. Nagpaul,Basic Cambridge University Press.
3. Modern Algebra, G. C. Sharma, Shivlal Agarwal & Co. Agra.

References:

1. Abstract Algebra, Deepak Chatterjee, PHI. Ltd. New Delhi.
2. Topics in Algebra, I.N. Herstein, Wiley Eastern Ltd., New Delhi

Operations Research

Course Name	Course Code	LTP	Credit	Semester
Operation Research	BSP502	3:0:0	3	5

CLO1	**objective of OR, scope of OR. General Linear Programming problem**
CLO2	**for Linear Programming, Big**

Course Objective:

The problems in optimization are the most common applications of mathematics. The main aim of this course is to present different methods of solving optimization problems in the areas of linear programming, non linear programming, and integer linear programming. In addition to theoretical treatments, there will be some introduction to numerical methods for optimization problems.

Course Contents:

Module I

Introduction, objective of OR, scope of OR. General Linear Programming problem: Formulation of the problem- Graphical method for the solution of the L.P.P., Spanning set, Basis set, Basic solution, Basic feasible solution, Convex set, Convex combination, Extreme points.

Module II

Simplex Method for Linear Programming, Big M method and two phase Method. Dual Linear Programming Problem, Rules for Constructing the Dual from Primal, Solution of Duality.

Module III

Transportation problem: Optimality test. Degeneracy in transportation problem. Unbalanced transportation problems. Assignment problems.

Module IV

Basic Idea of PERT & CRM, Difference between PERT & CPM, PERT/CPM Network Components and Precedence Relationship Critical Path Analysis, Project Scheduling, Project Time-Cost, Trade-Off, Resource Allocation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1. Operations Research Kanti Swaroop, Gupta P.K. and Manmohan , Sultan Chand and sons ,2002
2. Operations Research an introduction , H.A.Taha , Macmillan Publishing Company , New York.,10th Edition,2017
3. Operations Research , Sharma & Jain, Students friends & Co.,5thEdition,2013
4. Operations research Theory, Methods and Applications, S.D. Sharma, Kedarnath & Ramnath Co., Meerut,2012

References:

1. Linear Programming Methods and Applications, S.I., Gauss, MaGraw Hills Book Company,5th edition.
2. Problems in O.R. Gupta P.K. and Hira D.S., S.Chand and Co.,2010
3. Introduction to Operations Research, Hillier & Lieberman,7th Edition,2001

Quantum Physics

Course Name	Course Code	LTP	Credit	Semester
Quantum Physics	BSP503	2:0:0	2	5

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of WavemechanicsandSchrodingerequation.
CLO2	Immense understanding of Schrodingerequation
CLO3	Knowledge of SimplesolutionsofSchrödingerequationandBoundaryvalueproblems
CLO4	Understanding of Simpleharmonicoscillator

OBJECTIVE:

: This paper aims to develop the basic knowledge of quantum mechanics and its application to various problems. It also deals with the techniques of wave mechanics like Schrödinger equation and its solution, angular momentum and spin.

MODULE I:

Introduction to Wave mechanics and Schrodinger equation:

Introduction to Wave mechanics :

Duality of radiation and matter, De broglie's hypothesis, Davisson and Germer experiment, Uncertainty principle relating to position and momentum, relating to energy and time, its applications to various quantum mechanical problems

MODULE II:

Schrodinger equation:

Wave function and its interpretation, Schrödinger time dependent and time independent one-dimensional and three-dimensional wave equation, probability current density, physical meaning of ψ, conditions to be satisfied by ψ. Operators, eigen values and eigen functions, operators for momentum, K.E., Hamiltonian, total energy and angular momentum, Fundamental postulates of Q.M.Hermitian operators,

MODULE III:

Simple solutions of Schrödinger equation and Boundary value problems:

Boundary and continuity conditions on the wave function, Particle in one dimensional box, discrete energy levels, generalization to 3-D and degeneracy of levels.

Boundary value problems:

Step potential, Penetration through rectangular barrier, calculation of reflection and transmission coefficientsand resonant scattering, Quantum mechanical tunneling, Square well potential problem,

MODULE IV:

Simple harmonic oscillator

Simple harmonic oscillator (1-D Case): Schrödinger equation and its solutions, eigen function, energy eigen values. Zero point energy, parity, symmetric and anti-symmetric wave functions with graphical representation.

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ESSENTIAL READINGS:

1. "Quantum mechanics" L.L. Schiff, Tata McGraw Hill.
2. "Quantum mechanics", Chatwal and Anand, Himalaya Publishing House.

3. "Elementary Quantum Mechanics and Spectroscopy" Kakani, Hemrajani and Bansal, College Book House Jaipur.

REFERENCES:

1. "Introduction to Modern Physics",H.S. Mani and G.K. Mehta, East West Press Pvt. Ltd., New Delhi.
2. "Quantum Mechanics", S.P. Singh, M.K. Bage and Kamal Singh,S. Chand & Co.
3. "Quantum Mechanics", A Listair, I M Rac, ELBS (low price edition).
4. "Quantum Mechanics", S.N.Biswas, Books &Allied,Calcutta (P) Ltd.
5. "Perspectives of Modern physics", A.Beiser, McGraw Hill.

Nuclear and Particle Physics

Course Name	Course Code	LTP	Credit	Semester
Nuclear and Particle Physics	BSP504	2:0:0	2	5

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of nuclear properties.
CLO2	Immense understanding of nuclear fission
CLO3	Knowledge of production of Particle physics
CLO4	Understanding of classical accelerator and deviveces.

OBJECTIVE:

To give the students insight into the fundamentals of nuclear and particle physics.

MODULE I:

Nuclear Properties

Rutherford's theory of a particle scattering, Basic properties: charge, mass, size, spin, magnetic moment, electric quadrupole moment, Parity, Binding energy per nucleon and its observed variation with mass number of the nucleus. Semi empirical mass formula –coulomb energy, volume energy, surface energy, other corrections, explanation of binding energy curve, Liquid drop model,Nuclear forces and their properties, Theory of nuclear forces.

MODULE II:

Nuclear Fission: Energy release in fission, Theory of nuclear fission and liquid drop model, Barrier penetration – Theory of spontaneous fission, Nuclear chain reaction, condition of controlled chain reaction, Principle of nuclear reactors, classification of reactors.
Nuclear Fusion: Energy release in fusion, fusion reactions in stars: carbon and pp cycle.

MODULE III:

Particle Physics: Classification of elementary particles, properties of particles. Fundamental interactions, Conservation laws : Energy,momentum, angular momentum, charge, lepton number, Baryon number, isospin, strangeness, Invariance under charge,parity,C.P.,time and C.P.T.,(Qualitative discussion).
Cosmic rays: Properties of cosmic rays,properties of secondary radiation, electronic showers ,geomagnetic effects, cosmic ray stars, the origin of cosmic rays.

MODULE IV:

Accelerators:

REFERENCES:
1. "Atomic Nucleus", R.D. Evans ,McGraw Hill, New York.
2. "Introduction to Elementary Particles", D. Griffiths, Harper and Row, New York, 1987.
3. "Elements of Nuclear Physics", Pandey and Yadav, KedarNath Ram Nath, Meerut, Seventh Edition .
4. "Nuclear Physics : Theory and experiments", R.R. Roy and B.P. Nigam, New Age International (P) Limited.
5. "Radiation Detectors and Measurement", F.Knoll, John Wiley & Sons, Second Edition.

PHYSICS LAB-V

Course Name	Course Code	LTP	Credit	Semester
Physics Lab-V	BSP505	0:0:2	2	5

Course Contents:

1. To measure the Resistivity of a Ge Crystal with Temperature by Four-Probe Method (from room temperature to 200 ^{0}C) and to determine the Band Gap Eg for it.
2. To determine the Hall Coefficient a Semiconductor.
3. To study the Hysteresis loop (B-H) of ferromagnetic material.
4. To measure the Magnetic susceptibility of Solids and Liquids.
5. To determine the band gap energy of a given semiconductor by four-probe method.
6. To study the characteristics of Photovoltaic cell.
7. To measure the dielectric constant of a ferroelectric material as a function of temperature.
8. To measure magnetic susceptibility of a solution of a paramagnetic salt in water for 3 different concentrations by using Quincke's method.

Any other experiment carried out in the class.

Course: Inorganic Chemistry-II
BSP506 Credits: 02

Course Name	Course Code	LTP	Credit	Semester
Differential Calculus	BSP101	3:0:0	3	1

Module I
Hard and Soft Acids and Bases (HSAB) : Classification of acids and bases as hard and soft, Pearson's HSAB concept acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electro negativity and hardness and softness.

Module II
Metal-Ligand Bonding in Transition Metal complexes: Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters. Magnetic Properties of Transition Metal Complexes: Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of µs and µeff and values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Module III
Organometallic Compounds: Organometallic Compounds: The Grignard reagents-formation, structure and chemical reactions. Organozinc Compounds: Formation and chemical reactions. Organolithium compounds: Formation and chemical reactions. Organosulphur compounds Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine.

Books Suggested:
1. Basic Inorganic Chemistry F.A. Cotton. G. Wilkinson and P.L. Gaus. Wiley.
2. Concise Inorganic Chemistry, J.D. Lee ELBS.
3. Concepts of Models Inorganic Chemistry B.Douglas. D.McDaniel and J.Alexander, John Wiley.

4. Inorganic Chemistry. D.E. Shriver P.W. Atkins and C.H. Langfor, Oxford.
5. Inorganic Chemistry, W.W. Porterfield Addison Wesley.
6. Inorganic Chemistry, A.G. Sharpe. ELBS.
7. Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Group Theory and Its Chemical Applications: P. K. Bhattacharya
9. Inorganic Chemistry: J. E. Huyee, Principles of Structure & Reactivity, 3rd Ed.
10. Selected Topics in Inorganic Chemistry: W. U. Malik, G. D. Tuli and R. Madan
11. Principles of Inorganic Chemistry: D. Banerje
12. Modern Aspect of Inorganic Chemistry: H. J. Emeleus and A. G. Sharpe

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Advance Physical Chemistry

Course Name	Course Code	LTP	Credit	Semester
Advance Physics Chemistry	BSP507	2:0:0	2	5

CLO1	Photochemistry: Interaction of radiation with matter, difference between thermal and photochemical processes
CLO2	Physical Properties and Molecular Structure: Optical activity, polarization
CLO3	Solutions, Dilute Solutions and Colligative Properties: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient

Module I

Photochemistry: Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Stark -Einstein law, Jablonski diagram depicting various processes occuring in the exited sate, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simplex examples).

Module II

Physical Properties and Molecular Structure: Optical activity, polarization - (Calusius-Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties paramagnetism, diamagnetism and ferromagnetics.

Module III

Solutions, Dilute Solutions and Colligative Properties: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution: colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination, Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure, Elevation of boiling point and depression in freezing point, Experimental methods for determining various colligative properties, Abnormal molar mass, degree of dissociation and association of solutes.

Books Suggested:

1. Physical Chemistry, G.M. Barrow. International Student Edition, McGraw Hill.
2. Basic Programming with Application, V.K. Jain. Tata McGraw Hill.
3. Computers and Common Sense. R Hunt and Shelly, Prentice Hall.
4. University General Chemistry, C.N.R Rao, Mac Millan.
5. Physical Chemistry, RA. Alberty, Wiley Eastern Ltd.
6. The elements of Physical Chemistry, P.W. Atkins, Oxford.
7. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern Ltd.
8. Principles of Physical Chemistry: B. R. Puri Sharma and M. S. Pathania
9. A Text Book of Physical Chemistry: A. S. Negi and S. C. Anand
10. A Text Book of Physical Chemistry: Kundu and Jain

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Quantum Chemistry & Spectroscopy-I

Course Name	Course Code	LTP	Credit	Semester
Quantum Chemistry & Spectroscopy-I	BSP511	3:0:0	3	5

CLO1	Elementary quantum Mechanics: Black-body, radiation, Planck's radiation law
CLO2	Molecular orbital theory: Basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO. H_2^+ ion calculation of energy
CLO3	Spectroscopy: Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement

Module I

Elementary quantum Mechanics: Black-body, radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's mode of hydrogen atom (no derivation) and its defects. Compton effect. Luis De Broglie hypothesis Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box. Schrodinger wave equation for H-atom; separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave, functions.

Module II

Molecular orbital theory: Basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO. H_2^+ ion calculation of energy level from wave functions, physical picture of bonding and anti-bonding wave functions, concept of σ, σ^*, π, π^* orbitals and their characteristics. Hybrid orbitals - sp, sp^2, sp^3, calculation of coefficients of A. O's used in these hybrid orbitals, Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.

Module III

Spectroscopy: Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom. Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotator (semi-classical principles), selection rules, spectral intensity, using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotator, isotope effect.

Vibrational Spectrum: Infrared spectrum : Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Raman Spectrum: concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules. Electronic Spectrum: Concept of Potential Energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank Condon principle, qualitative description of σ, π and n M.O. their energy levels and the respective transitions.

Books Suggested:

1. Physical Chemistry, G.M. Barrow. International Student Edition, McGraw Hill.
2. Basic Programming with Application, V.K. Jain. Tata McGraw Hill.
3. Computers and Common Sense. R Hunt and Shelly, Prentice Hall.
4. University General Chemistry, C.N.R Rao, Mac Millan.
5. Physical Chemistry, RA. Alberty, Wiley Eastern Ltd.
6. The elements of Physical Chemistry, P.W. Atkins, Oxford.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

CHEMISTRY LAB V

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-V	BSP508	0:0:2	2	5

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   Figure /Formula/Theory : 5
   Observations/Calculations : 8
   Result /Result Analysis : 5
   Precautions : 2
3. Viva -Voce : 10

1. Synthesis and Analysis

- Preparation of sodium trioxalato ferrate (III) $Na_3[Fe(C_20_4)_3]$ and determination of its composition by permagnomotry.
- Preparation of Ni-DMG complex, $[Ni(DMG)_2]$.
- Preparation of copper tetraammine complex $[Cu(NH_3)_3]S0_4$.
- Preparation of cis-and trans-bisoxalatodiaquachromate (III) ion.

2. Synthesis of Organic Compounds

- Acetylation of salicylic acid aniline, glucose and hydroquinone, Benzoylation of aniline and phenol
- Aliphatic electrophilic substitution: Preparation of Iodoform from ethanol and acetone.
- Aromatic Electrophilic substitution:Nitration: Preparation of m-dinitrobenzene, Preparation of p-nitroacetanilide or Halogenation: Preparation of p-bromoacetanilide Preparation of 2,4,6-tribromophenol.
- Diazotization/coupling: Preparation of methyl orange and methyl red.
- Oxidation: Preparation of benzoic acid from toluene.
- Reduction: Preparation of aniline from nitrobenzene, Preparation of m-nitroaniline fromm-dinitrobenzene.

3. Colorimetry

- To verify Beer-Lambert law $KMn0_4/K_2Cr_20_7$ and determined the concentration of the given solution of the substance.

4. Molecular Weight Determination

- Determination of molecular weight of a non-volatile solute by Rast method/Beckmann freezing point method.
- Determination of the apparent degree of dissociation of an electrolyte (e.g. NaCl) in aqueous solution at different concentrations by ebulliscopy.

COMMUNICATION SKILLS - III

Course Name	Course Code	LTP	Credit	Semester
Communication Skills-III	BCS501	1:0:0	1	1

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setupof Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formalcommunication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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BEHAVIOURAL SCIENCE – V

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science-V	BSS503	1:0:0	1	V

COURSE LEARNING OUTCOMES (CLO)

CLO1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO2	Identify the effects of behaviour on interpersonal communication
CLO3	Demonstrate a range of effective interpersonal communication skills
CLO4	Use assertiveness and interpersonal skills in the workplace team
CLO5	Utilise effective communication skills to build strong relationships
CLO6	Develop, implement and promote effective communication techniques

Course Objective:

This course aims at imparting an understanding of:

Process of Behavioral communication

Aspects of interpersonal communication and relationship

Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioral Communication

Scope of Behavioral Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR

Escalating, maintaining and terminating IPR

Direct and indirect strategies of terminating relationship

Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme;**JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- HarvardBusinessSchool, Effective Communication: United States of America

Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon

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FRENCH - V

Course Name	Course Code	LTP	Credit	Semester
French-V	FLF501	2:0:0	2	V

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc
CLO5	To speak about the activities and hobbies

Course Contents

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

31. Les loisirs
32. Les saisons
33. Les nombres
34. Le logement et la ville
35. Les prépositions de lieu
36. Les verbes de direction
37. Les lieux de l'université
38. Les documents administratifs
39. Les expressions utiliseés en classe par le professeur
40. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

31. Aimer, faire et savoir au present
32. La negation
33. Les adjectifs possessives au pluriel
34. Le partitifs
35. Aller au présent
36. <<il y a>>
37. L'usage des prepositions de lieu
38. Vouloir et pouvoir au présent
39. L'impératif
40. Le conditionnel de politesse

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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GERMAN – V

Course Name	Course Code	LTP	Credit	Semester
German-V	FLG501	2:0:0	2	V

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

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SPANISH – V

Course Name	Course Code	LTP	Credit	Semester
Spanish-V	FLS501	2:0:0	2	V

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts .
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.
CLO5	To enhance all five skills of the language: Reading, Writing, Listening, Interacting and speaking.

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	MidTerm Test	Presentation	Viva Voce	Attendance	End-TermExam
10	15	10	10	5	50

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

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CHINESE – V

Course Name	Course Code	LTP	Credit	Semester
Chinese-V	FLC501	2:0:0	2	V

COURSE LEARNING OUTCOMES (CLO)

CLO1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO2	Students will be able to read and interpret small texts
CLO3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money

8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References
1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

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ANANDAM

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND005	0:0:2	2	2

COURSE LEARNING OUTCOMES (CLO)
The student should develop:

CLO1	Awareness and empathy regarding community issues
CLO2	Interaction with the community and impact on society
CLO3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

Course Objectives:
After the completion of this course, students will be able to:
- apply their knowledge and skills to solve specific community problem

- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

19. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
20. The group member shall write his/her name at the end of the blog.
21. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
22. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
23. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
24. For the topic chosen by the group, students are recommended to cover the following points:
    s) Current scenario (Regional, national and international level as applicable)
    t) Future predictions
    u) Duty of the government
    v) Government policies (related to the topic), if any
    w) Duty of public
    x) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

10. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
11. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
12. Conclusion is clearly stated. The underlying logic is explicit.

Function of Complex Variable

Course Name	Course Code	LTP	Credit	Semester
Function of complex variable	BSP601	3:0:0	3	6

CLO1	De-Moivre‟s Theorem and its applications, Exponential, Sine, Cosine and Logarithm of a complex number
CLO2	Analytic functions, C-R equation, Harmonic functions. Construction of analytic functions, Line integrals and their properties
CLO3	Cauchy's integral theorem, Cauchy's Fundamental theorem, Fundamental theorem of Integral Calculus

Course Objective:

The main objective of Function of Complex Variable is to study the development of functions of one complex variable. Students will perform a thorough investigation of the major theorems of complex analysis – the Cauchy-Riemann Equations, Cauchy‟s Theorem, Cauchy‟s Integral Formula, the Maximum Modulus Principle, Liouville‟s Theorem, the Residue Theorem, Rouche‟s Theorem, the Riemann Mapping Theorem – including their proofs. They will also apply these ideas to a wide range of problems that include the evaluation of both complex line integrals and real integrals.

Course Contents:

Module I

De-Moivre‟s Theorem and its applications, Exponential, Sine, Cosine and Logarithm of a complex number, Inverse circular and hyperbolic functions. Complex Plane, connected and compact sets, extended complex plane: Stereographic projection. Complex valued functions,

Module II

Analytic functions, C-R equation, Harmonic functions. Construction of analytic functions, Line integrals and their properties, closed curve theorem for entire functions.

Module III

Cauchy's integral theorem, Cauchy's Fundamental theorem, Fundamental theorem of Integral Calculus for complex functions, Cauchy's Integral Formula, Analyticity of the derivative of an analytic function, Taylor expansions for entire functions, Liouville's theorem and the fundamental theorem of algebra.

Module IV

Singularities, Contour integration, Conformal mapping (Introduction), bilinear transformation and their simple properties, Power series.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1. Complex Analysis , Purohit and Goyal , Jaipur Publishing House,2015
2. Complex Variables: Theory and Applications ,H.S.Kasana, Prentice Hall, Delhi,2005
3. Introduction to Complex Analysis, S.Ponnuswamy, Narosa Publishers,2011

References:

1. Theory and Problems of Complex Variables, R.Murray Spiegel , Schaum Outline Series,1974
2. Complex Variables and Application, Brown and Churchill, McGraw Hills Book Co.,2010

LINEAR ALGEBRA

Course Name	Course Code	LTP	Credit	Semester
Linear Algebra	BSP602	3:0:0	3	6

CLO1	Linear Systems and Gaussian Elimination, Linear systems. Matrix representation of linear systems
CLO2	Orthogonality in Vector Spaces, Scalar products in R^n and C^n. Complex matrices and orthogonality in C^n
CLO3	Eigenvalues and Eigenvectors, Eigenvalues and eigenvectors. Characteristic equation and polynomial. Eigenvectors and eigenvalues

Course Objective:

Linear algebra is the study of vector spaces and certain operators on vector spaces (called linear transformations). This is an important branch of mathematics which provides the tools and methods essential for studying many mathematical structures that arise within mathematics and sciences (such as the solution spaces of problems in mathematics, engineering, the natural sciences, and social sciences). The purpose of this course is to help students learn these tools and methods in a rigorous manner; develop mathematical skills needed to apply these to the problems arising within their field of study; gain increased understanding of how the concepts they learned in this and the previous mathematics courses apply to various real world problems.

Course Contents:

Module I

Linear Systems and Gaussian Elimination, Linear systems. Matrix representation of linear systems. Gaussian-Jordan elimination. Homogeneous linear systems. Row echelon form and the General solution. Row rank of a matrix and solution sets of homogeneous linear systems and general linear systems. Elementary matrices.

Module II

Linear Transformations, Definition and examples. Properties of linear transformations. Rank and kernel. The rank and nullity of a matrix. The matrix representation of a linear transformation. Change of basis. Isomorphism.

Module III

Orthogonality in Vector Spaces, Scalar products in R^n and C^n. Complex matrices and orthogonality in C^n. Inner product spaces. Orthogonality in inner product spaces. Normed linear spaces. Inner product on complex vector spaces. Orthogonal complements. Orthogonal sets and the Gram-Schmidt process. Unitary matrices.

Module IV

Eigenvalues and Eigenvectors, Eigenvalues and eigenvectors. Characteristic equation and polynomial. Eigenvectors and eigenvalues of linear transformations. Similar matrices and diagonalization. Triangolizable matrices. Eigenvalues and eigenvectors of symmetric and Hermition matrices.

Module V

Canonical Forms, Quadratic forms and conic sections. Quadrices. Bilinear forms. Minimal polynomials.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

1. V. Krishnamurthy, V. P. Mainra, J. L. Arora -An Introduction to Linear Algebra
2. D. T. Finkbeiner -Introduction to Matrices and Linear Transformation
3. S. Kumaresan - Linear Algebra; A Geometric Approach Prentice Hall of India, 2000
4. Shanti Narayan : A Course of Mathematical Analysis; New S. Chand & Co. Pvt. LId.
5. Titu Andreescu and Dorin Andrica, Complex Numbers from A to …. Z, Birkhauser, 2006.
6. E.J. Barbeau, Polynomials, Springer Verlag, 2003.
7. Joseph A. Gallian, Contemporary Abstract Algebra (4th Edition), Narosa Publishing House, New Delhi, 1999.
8. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory (2nd Edition), Pearson Education (Singapore) Pvt. Ltd., Indian Reprint, 2003.
9. David C. Lay, Linear Algebra and its Applications (3rd Edition), Pearson Education Asia, Indian Reprint, 2007.

Atomic and Molecular Spectroscopy

Course Name	Course Code	LTP	Credit	Semester
Atomic and Molecular Spectroscopy	BSP603	3:0:0	3	6

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of atomic spectrum
CLO2	Immense understanding of spectra of alkali and alkaline atoms
CLO3	Knowledge of X-ray spectra.
CLO4	Understanding of infrared spectroscopy and Raman spectra.

OBJECTIVE:

This course aims to introduce various types of spectra for hydrogen, alkali and alkaline earth atoms. It also gives an introduction to X-ray spectra. Techniques of Molecular spectroscopy are also discussed in this paper, which include IR and Raman spectra.

MODULE I:

Introduction to Atomic Spectra

Types of spectra, spectrum of Hydrogen atom, spectral lines, the spinning electron, quantum numbers and their physical interpretation, quantum numbers for complete atom, magnetic moments of an atom and Landes 'g' factor, Larmor's theorem, Stern and Gerlach experiment, fine structure of the Hydrogen lines, spectral terms and their notation

MODULE II:

Spectra of alkali and alkaline atoms

Different series in alkali spectra, Ritz combination formula, spin orbit interaction, explanation of salient features of alkali spectra, doublet structure in alkali spectra (fine structure), Transition rules, intensity rules, spectra of alkaline earth metals, coupling schemes: L.S and j-j coupling, selection rules in atoms of two valence electrons, singlet and triplet series, spectrum of Helium atom.

MODULE III:

X-ray spectra

Continuous x-ray spectrum, characteristic emission and absorption spectrum and their explanation, energy levels, Moseley's law, combination principle, fine structure of x-ray lines, fluorescence yield and Auger effect, soft x-ray emission and structure of absorption edges.

MODULE IV:

Infra red spectroscopy (vibrational and rotational spectra)

Salient features of vibrational rotational spectra, vibrating diatomic molecules as a harmonic oscillator, fine structure of vibrational rotational bands, interaction of vibrational and rotational energies, experimental arrangements for studying IR spectra.

MODULE V:

Raman Spectra

Raman effect and its salient features, Observation of Raman spectra, classical theory of Raman effect, quantum theory of Raman effect, probability of energy transition in Raman effect, vibrational Raman spectra, Pure rotational Raman spectra, structure determination from Raman and infra red spectroscopy.

ESSENTIAL READINGS:

1. "Elements of Spectroscopy", Gupta, Kumar, Sharma, PragatiPrakashan, 2006.

2. “Fundamentals of molecular spectroscopy”, Collin N. Banwell and Elaine M. McCash, Tata McGraw Hill Publishing Company Ltd. New Delhi, 2005.

REFERENCES:

1. “Atomic Spectra and Atomic structure”, Gerhard Herzberg ,KreigerPub.Co.,Second Edition.
2. “Molecular Spectra and Molecular structure: Spectra of diatomic Molecules”, Gerhard Herzberg, Dover Publications.
3. “Introduction to Atomic Physics”, Enge, Wehr and Richards, Addison Wiesley, London.
4. “Atomic and Nuclear Physics”, A.B. Gupta, New Central book agency Pvt. Ltd.

NANO SCIENCE & TECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
Nano Science & Technology	BSP604	2:0:0	2	6

Course learning outcomes (CLO)

CLO1	Understanding of nanoparticles.
CLO2	Comprehension knowledge of preparation method.
CLO3	Immense understanding of characterization techniques.

Objective:

This course aims at students to get acquainted with introductory knowledge of Nano science & technology.

Course Contents:

Module I: Introduction

Concepts of Nano (Feynmann), Classification of nanostructured materials, Nanoparticles, Quantum wire,Quantum well ,Quantum dots, Carbon nanotubes, Graphene, Nanowires, Ultra thin films- multilayered materials, Length scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties.

Module II: Preparation Methods

Bottom-up synthesis, Top-down approach: Mechanical milling, Sputtering, Evaporation.Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition
,Microwave Synthesis of materials, Principles of SEM, TEM and AFM.

Module III: Characterization Techniques

XI- ray diffraction technique, Scanning Electron Microscopy, Tunneling Electron Microscopy, Surface Analysis Techniques- AFM, SPM STM, ESCA.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- T. Pradeep, NANO The Essential, understanding Nanoscience and Nanotechnology, Tata McGraw-Hil Publishing Company Limited, 2007.
- Charles P.Poole Jr., Introduction to Nanotechnology, John Willey & Sons, 2003.
- Nanotechnology by Mark Ratner and Daniel Ratner, Pearson Education.

Nanomaterials by A.K. Bandyopadhyay; New Age International Publishers.

Physics Lab-VI

Course Name	Course Code	LTP	Credit	Semester
Physics Lab-VI	BSP605	0:0:2	2	6

OBJECTIVE:

NOTE - Students are expected to perform any eight experiments from the given list. Two experiments out of the eight will be set in the examination paper.

1. Determination of Stefan's constant.
2. Determination of Planck's constant using a Photocell.
3. Determination of Planck's constant using a solar cell.
4. Study of power supply using two diodes/bridge rectifier with various filter circuits.
5. To perform various logic functions using NOR and NAND gates, i.e., OR, NOT, AND, NOR, NAND, X-OR gates.
6. To measure CMRR and input bias current and offset current using OP-AMP.
7. Study of characteristics of GM counter and verification of inverse square law for same strength of a radioactive source.
8. Study of absorption of β-rays in Aluminum foil using GM counter and to determine its absorption coefficient.
9. Determine ballistic constant of a ballistic galvanometer.
10. To determine self-inductance of a given coil by Anderson's bridge using AC.
11. To study Hall Effect and to determine Hall coefficient.
12. Application of operational amplifier as (a) inverting amplifier and (b) non inverting amplifier

Bio-inorganic and Polymer Chemistry

Course Name	Course Code	LTP	Credit	Semester
Bio-inorganic and Polymer Chemistry	BSP606	2:0:0	2	6

CLO1	Bioinorganic Chemistry: Essential and trace elements in Biological processes, metalloporphyrins with special reference to haemoglobin
CLO2	Synthetic Dyes: Colour and constitution (electronic concept), Classification of dyes, Synthesis of Methyl orange, Congo red. Malachite
CLO3	Silicones and Phosphazenes : Silicones :Phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes

Module I

Bioinorganic Chemistry: Essential and trace elements in Biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca.+2 , Mg+2 Nitrogen fixation

Module II

Silicones and Phosphazenes : Silicones :Phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

Module III

Synthetic Dyes: Colour and constitution (electronic concept), Classification of dyes, Synthesis of Methyl orange, Congo red. Malachite green, Crystal violet, Phenolphthalein, Fluorescein, Alizarin and Indigo

Books Suggested:

1. Basic Inorganic Chemistry F.A. Cotton. G. Wilkinson and P.L. Gaus. Wiley.
2. Concise Inorganic Chemistry, J.D. Lee ELBS.
3. Concepts of Models Inorganic Chemistry B.Douglas. D.McDaniel and J.Alexander, John Wiley.
4. Inorganic Chemistry. D.E. Shriver P.W. Atkins and C.H. Langfor, Oxford.
5. Inorganic Chemistry, W.W. Porterfield Addison Wesley.
6. Inorganic Chemistry, A.G. Sharpe. ELBS.
7. Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Group Theory and Its Chemical Applications: P. K. Bhattacharya
9. Inorganic Chemistry: J. E. Huyee, Principles of Structure & Reactivity, 3rd Ed.
10. Selected Topics in Inorganic Chemistry: W. U. Malik, G. D. Tuli and R. Madan
11. Principles of Inorganic Chemistry: D. Banerje
12. Modern Aspect of Inorganic Chemistry: H. J. Emeleus and A. G. Sharpe

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Bio-OrganicChemistry

Course Name	Course Code	LTP	Credit	Semester
Bio-organic Chemistry	BSP607	2:0:0	2	6

CLO1	Organic Synthesis via Enolates : Acidity of α Hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate
CLO2	Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, is electric point and electrophoresis, Preparation and reactions of α - amino acids, Structure and nomenclature of peptides and proteins
CLO3	Introduction, constituents of nucleic acids. Ribonucleosides and ribonucleotides, the double helical structure of DNA

Module I

Organic Synthesis via Enolates : Acidity of α Hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation, Keto-enol tautomerism of ethyl acetoacetate, Alkylation of 1, 3 - dithianes. Alkylation and Acylation of enamines

Carbohydrates: Classification and nomenclature monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening. of aldoses, Configuration of monosaccharides, Erythro and threo.diastereomers, Conversion of glucose into mannose. Formation of glycosides, ethers and esters, Determination of ring size of monosaccharides.Cyclic structure of D(+) glucose, Mechanism of mutarotation. Structure of ribose and deoxyribose, Anintroduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving strcture determination.

Module II

Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, is electric point and electrophoresis, Preparation and reactions of α - amino acids, Structure and nomenclature of peptides and proteins, Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides, Classical peptide synthesis, solidphase peptide synthesis. Structures of peptides and proteins, Levels of protein structure, Protein denaturation/renaturation, Nucleic acids: Introduction, constituents of nucleic acids. Ribonucleosides and ribonucleotides, the double helical structure of DNA

Books Suggested:

1. Organic Chemistry, Morrison and Boyd, Prentice Hall.
2. Organic Chemistry, L.G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry Vol. I, II, III S.M. Mukerji, S.P. Singh and RP. Kappor, Wiley Eastern Ltd. (New Age International)
5. Organic Chemistry, F.A. Carey, McGraw Hill, Inc.
6. Introduction to Organic Chemistry. Streitwieser.heathcock and Kosover. Macmilan.
7. Organic Chemistry (Vol. I & II) : S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd.
8. A Text Book of Organic Chemistry (Vol. I & II) : K. S. Tiwari, S. N. Mehrortra& N. K. Vishnoi
9. Organic Chemistry: M. K. Jain and S. Sharma
10. A Text Book of Organic Chemistry (Vol. I & II) : O. P. Agarwal
11. A Text Book of Organic Chemistry: R. K. Bansal
12. Organic Chemistry (Vol. I & II): I. L. Finar
13. Organic Reaction and Their Mechanisms: P. S. Kalsi
14. Introduction of Petrochemicals: SukumarMaiti,
15. Organic Chemistry: P. L. Soni
16. A Text Book of Organic Chemistry: V. K. Ahluwalia andMaduriFoyal, Narosa Publishing House Pvt. Ltd.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Heterocyclic Chemistry & Spectroscopy-II

Course Name	Course Code	LTP	Credit	Semester
Heterocyclic Chemistry & Spectroscophy-II	BSP611	2:0:0	2	6

CLO1	Electromagnetic Spectrum : Absorption Spectra :- Ultra violet (UV) Absorption Spectroscopy - Absorption laws (Beer - Lambert law
CLO2	Heterocylic Compounds: Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine
CLO3	quauinoline and isoquinoline with special reference to Fisher Indole synthesis, Skraup's synthesis and Bischler-Napieralski synthesis, Mechanism of

Module I

Electromagnetic Spectrum : Absorption Spectra :- Ultra violet (UV) Absorption Spectroscopy - Absorption laws (Beer - Lambert law) molar absorptivity, presentation and analysis of UV spectra, types of electronic transition, Effect of conjugation, concept of chromophore and auxochrome, bathochromic, Hypsochromic, Hyperchromic and hypochromic shifts, UV spectra of conjugates and enones.

Infrared (IR) Absorption spectroscopy -

Molecular vibrations, Hooks Law, Selection rules, Intensity and Position of IR bands, Measurement of IR spectrum, Finger print region, Characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

Spectroscopy: Nuclear magnetic resonance (NMR) spectroscopy. (Proton Magnetic Resonance (HNMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spinspin splitting and coupling constant, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2 - tribromoethane, ethyl acetate, toluene and acetophenone, Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

Module II

Heterocylic Compounds: Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Methods of synthesis and chemical reactions, with particular emphasis on the mechanism of electrophilic substitution, Mechanism of nucleophilic substitution reactions in pyridine derivatives, Comparison of basicity of pyridine, piperidine and pyrrole, Introduction to condensed five and six-membered heterocyles. Preparation and reactions of indole, quauinoline and isoquinoline with special reference to Fisher Indole synthesis, Skraup's synthesis and Bischler-Napieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinolone and isoquionoline.

Module III

Electronic Spectra of Transition Metal Complexes: Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of $[(Ti(H_2O)_6)^{3+}$ complexion. Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

Books Suggested:

1. Organic Chemistry, Morrison and Boyd, Prentice Hall.
2. Organic Chemistry, L.G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry Vol. I, II, III S.M. Mukerji, S.P. Singh and RP. Kapoor, Wiley Eastern Ltd. (New Age International)
5. Organic Chemistry, F.A. Carey, McGraw Hill, Inc.
6. Introduction to Organic Chemistry. Streitwieser.heathcock and Kosover. Macmilan.
7. Organic Chemistry (Vol. I & II) : S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

CHEMISTRY LAB-VI

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-VI	BSP608	0:0:2	2	6

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   - Figure /Formula/Theory : 5
   - Observations/Calculations : 8
   - Result /Result Analysis : 5
   - Precautions : 2
3. Viva -Voce : 10

List of Experiments:

1. Instrumentation

2. Colorimetry:
   - Mole-ratio method
   - Adulteration-Food stuff.
   - Effluent analysis - water analysis.
   - Solvent Extraction: Separation and estimation of Mg(II) and Fe(II)
   - Ion Exchange Method: Separation and estimation of Mg(II) and Zn(II)

3. Volumetric Analysis: Iodimetric&Iodimetric titrations.
4. Laboratory Techniques
   - Steam Distillation: Naphthalene from its suspension in water, Clove oil from Clove, Separation of o-and p-nitrophenols
   - Column Chromatography: Separation of fluoressein and methylene blue. Separation of leaf pigments from spinach leaves. Resolution of racemy mixture of (z) mandelic acid.

5. Qualitative Analysis: Analysis of an organic mixture containing two solid components using water, NaHCO3, NaOH for separation and preparation of suitable derivatives.
6. Stereochemical study of Organic Compounds via Models R and S configuration of optical isomers. E, Z configuration of geometrical isomers, Conformational analysis of cyclohexanes and substituted cyc1ohexanes
7. Organic estimation, Amino group, Phenolic group, Carboxylic acid and Glucose.
8. Electrochemistry
   - To determine the strength of the given acid condcutometrically using standard alkali solution.
   - To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrical.
   - To study the saponification of ethyl acetate conductometrica1ly.
   - To determine the ionization constant of a weak acid conductometrically.
   - To titrate potentiometrically the given ferrous ammonium sulphate solution using $KMn0_4/K_2Cr_20_4$ as titmate and calculate the redox potential of Fe^{++}/Fe^{+++} system on the hydrogen scale.

9. Refractometry, Polarimetry

   - To verify law of refraction of mixtures for ego of glycerol and water) using Abe's refractometer.
   - To determine the specific rotation of a given optically active compound.

Books suggested (Laboratory Courses):

1. Vogel's Qualitative inorganic analysis, revised, SveWa, Orient Longman.
2. Vogel's Text Book of Quantitative Inorganic Analysis (revised), J. Bassentt. RC.Deney G.H. Jeffery and J. Mendham.ELBS.
3. Standard methods of chemical Analysis. W.W. Scott. The technical Press.
4. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.
5. Handbook of Preparative Inorganic Chemistry. Vol I & II, Braver, Academic Press.
6. Inorganic Synthesis, McGraw Hill.
7. Experimental Organic Vol I & II, P.R Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
8. Laboratory manual in Organic Chemistry, RK. Bansal, Wiley Eastern.
9. Vogel's Text Book of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V.Rogers, P.W.G. Smith and A.R Tatchell, ELBS.
10. Experiments in General Chemistry, C.N.R Rao and U.c. Agarwal, East-West Press.
11. Experiments in Physical Chemistry, RC. Das and B.Behra, Tata McGraw Hill.
12. Advanced Experimental Chemistry, Vol I Physical, J.N. Gurtu and R Kappor, S Chand & Co.
13. Selected Experiments in Physical Chemistry, N.G. Mukerjee, J.N. Ghose& Sons.
14. Experiments in Physical Chemistry, J.C. Ghosh, BharatiBhavan.
15. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi

LASER PHYSICS

Course Name	Course Code	LTP	Credit	Semester
Laser Physics	BSP510	3:0:0	3	5

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of LaserPumpingandResonators.
CLO2	Immense understanding of dynamicsoftheLaserProcesses.
CLO3	Knowledge of types of Laser.
CLO4	Understanding of applications.

Course Objective:
This course aims at students to give them basic understanding of Laser and its applications.

Course Contents:

Module I: Introduction
Introduction, mono chromaticity, temporal and spatial coherence, Einstein's coefficients, momentum transfer, possibility of light amplification, kinetics of optical absorption, shape and width of spectral lines, line broadening mechanism, natural, collision and Doppler broadening.

Module II: Laser Pumping and Resonators
Resonators, modes of a resonator, number of modes per unit volume, open resonators, confocal resonator (qualitative), quality factor, losses inside the cavity, threshold condition, Quantum yield.

Module III: Dynamics of the Laser Processes
Rate equations for two, three and four level systems, production of a giant pulse – Q switching, giant pulse dynamics, laser amplifiers, mode-locking, hole burning, distributed feedback lasers.

Module IV: Types of Lasers
He-Ne laser, Nitrogen Laser, CO_2 laser, Ruby laser, features of semiconductor lasers, intrinsic semiconductor lasers, doped semiconductors, condition for laser action, Advances in semiconductor lasers, injection lasers, dye lasers.

Module V: Applications
Holography, non-linear optics: harmonic generation, second harmonic generation, phase matching and optical mixing, brief qualitative description of some experiments of fundamental importance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Lasers and Non-linear Optics: B.B. Laud. (Wiley Eastern).
- Principles of Lasers: O. Svelto (Plenum Press).
- An Introduction to Lasers and their applications: D.C.O'Shea, W. Russell and W.T. Rhodes (Addition –Wesley).
- Laser Theory and Applications :Thyagarajan and A. Ghatak (MacMillan)

ATMOSPHERIC PHYSICS

Course Name	Course Code	LTP	Credit	Semester
Atmospheric Physics	BSP609	3:0:0	3	6

Course learning outcomes (CLO)

CLO1	Comprehension knowledge of thermodynamics.
CLO2	Immense understanding of ocean morphology.
CLO3	Knowledge of Earth-AtmosphereRadiationBalance.

At the successful completion of this course you (the student) should be able to:

Course Objectives:

Several fundamental aspects related to Physics, Thermodynamics and Chemistry of the Atmosphere and Oceans will be introduced to the students in order to make them understand, and apply the knowledge to the physico-chemical processes that influence the weather and climate.

Course Contents:

Module I: Thermodynamics

Thermodynamics of dry and moist air, atmospheric stability and dry adiabatic lapse rate, moist processes in the atmosphere, saturated and unsaturated ascent, moist adiabatic and saturated adiabatic processes in the atmosphere, saturated adiabatic lapse rate, pseudo adiabatic processes and equivalent potential temperature, conditional instability second kind, moist convection, aerosols, condensation processes, formation of cloud droplets, precipitation.

Module II: Ocean Morphology

Ocean physics, thermodynamics of sea water, observed temperature, salinity, and density in the ocean, density stratification, water mass distribution, coastal currents and upwelling, thermohaline circulation. Oceans currents, coupling of surface and deep ocean waters, basic foundation of turbulence, turbulent flows, turbulent vorticity, turbulence pressure, eddy diffusivity, coherent structures, surface fluxes, air-sea interaction, mixing processes in the ocean.

Module III: Earth-Atmosphere Radiation Balance

Radiative transfer in atmosphere and ocean: Sun and climate, Planck function, black-body radiation, local thermodynamic equilibrium, radiometric quantities, absorption and emission, Schwarzchild's equation, radiative equilibrium in a grey atmosphere, balance between incoming solar and outgoing thermal radiation, role of aerosols, absorption by atmospheric gases, heating

rates, net radiative heating, Radiative transfer in atmosphere-ocean system.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References

(i) The Solid Earth: An Introduction to Global Geophysics [Paperback] C. M. R. Fowler, Cambridge University Press, 1990.

(ii) Climate and the Oceans, Ed. Geoffray K. Vallies, Princeton University Press, 2012.

(iii) **Ocean Circulation: Wind-Driven and** Thermohaline Processes, Ed. RuiZin Huang, Cambridge University Press, 2009.

SEMINAR

BSP : 640 Credit Units: 03

Course Name	Course Code	LTP	Credit	Semester
Seminar	BSP640	3:0:0	3	6

Guidelines for Seminar

a) Choosing the topic
b) Finding relevant materials
c) Presentation
d) Response to queries
e) Submission of the write up

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Components	Weightage
Content	30
Presentation	40
Response to the queries	20
Write up	10

NUMBER THEORY

Course Name	Course Code	LTP	Credit	Semester
Number Theory	BSP409	3:0:0	3	4

CLO1	Euclid‟s division lemma, Divisibility, The Linear Diophantine Equation, The fundamental theorem of Arithmetic
CLO2	Combinatorial Study of φ(n), Formulae for d(n) and σ(n), Multiplicative Arithmetic Functions, The Mobius
CLO3	The Mobius Inversion Formula, Properties of Reduced Residue Systems, Primitive Roots Modulo

Course Objective:

Number theory is an important area of study in Mathematics. Without the knowledge of the beviour of various numbers and their properties, the study of Mathematics is in a way is meaningless. The purpose of this course is to teach students various concepts that have been used to study and apply in coding theory, cryptology besides in algebra and analysis.

Course Contents:

Module I

Euclid‟s division lemma, Divisibility, The Linear Diophantine Equation, The fundamental theorem of Arithmetic, Fermat‟s Little theorem, Wilson‟s Theorem, Generating functions, Basic Properties of Congruences, Residue Systems, Linear Congruence, The Theorems of Fermat and Wilson Revisited, The Chinese Remainder Theorem, Polynomial Congruences.

Module II

Combinatorial Study of φ(n), Formulae for d(n) and σ(n), Multiplicative Arithmetic Functions, The Mobius Inversion Formula, Properties of Reduced Residue Systems, Primitive Roots Modulo p, Elementary properties of Π(n), Tchebychev‟s Theorem.

Module III

Euler‟s Criterion, the Legendre Symbol, The Quadratic Reciprocity Law, Applications of the Quadratic Reciprocity Law, Consecutive Residues and Non-residues, consecutive Triples of Quadratic Residues.

Module IV

Sum of Two Squares, Sum of Four Squares, Euler‟s Partition Theorem, Dirichlet‟s Divisor Problem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. George E. Andrews: Number Publishing Corporation Theory, Hindustan (India).
2. Niven, I., Zuckerman, S.H., Montgomery, L.H., An Introduction to the Theory of Numbers, John Wiley and Sons. New York
3. Flath J., Introduction to Number Theory.
4. Ireland & Rosen, A Classical Introduction to Modern Number Theory, Springer Verlage.
5. Cassels, J.W.S., Frolich, A., Algebraic Number Theory, Cambridge University Press, London

Partial differential equations

Course Name	Course Code	LTP	Credit	Semester
Partial Differential equations	BSP507	3:0:0	3	5

CLO1	Introduction, classification, construction and geometrical interpretation of first order partial differential
CLO2	Linear PDE with constant coefficient, solution of homogeneous linear PDE with constant coefficient
CLO3	non homogeneous wave equation, Riemann problem, Goursat problem, spherical and cylindrical wave equation. Monge‟s Method for solving PDE of order two with variable coefficient.

Course Objective:

Upon completing the course, the student will be familiar with the modeling assumptions and

derivations that lead to PDEs, know and recognize the major classification of PDEs, understand the qualitative differences between the classes of equations, and be competent in solving linear PDEs using classical solution methods. This course should serve as a good vehicle for students to acquire experience with an integrated computational environment that includes tools for solving differential equations, data analysis, and visualization. A background in ODEs and some basic knowledge of linear algebra is required.

Course Contents:

Module I

Introduction, classification, construction and geometrical interpretation of first order partial differential equations (PDE), method of characteristic and general solution of first order PDE, canonical form of first order PDE, method of separation of variables for first order PDE. Charpit‟s Method, Jacobis Method, Jacobi method to solve a non linear first order PDE in two variables

Module II

Linear PDE with constant coefficient, solution of homogeneous linear PDE with constant coefficient solution of non homogeneous PDE with constant coefficient, Irreducible PDE, PDE of Euler Cauchy Type.

Module III

Cauchy problem for second order PDE, homogeneous wave equation, initial boundary value problems, non-homogeneous boundary conditions, finite strings with fixed ends, non homogeneous wave equation, Riemann problem, Goursat problem, spherical and cylindrical wave equation. Monge‟s Method for solving PDE of order two with variable coefficient.

Module IV

Method of separation of variables for second order PDE, vibrating string problem, existence and uniqueness of solution of vibrating string problem, heat conduction problem, existence and uniqueness of solution of heat conduction problem, Laplace and beam equation, non-homogeneous problem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Gockenbach, M. S., Partial Differential Equations: Analytical and Numerical Methods, 2002.
2. Courant, R. and D. Hilbert, Methods of Mathematical Physics, Volume I, 1991.
3. Strang, G., Introduction to Applied Mathematics, 1986.
4. S. J. Farlow, Partial Differential Equations for Scientists and Engineers
5. Richard Haberman, Applied Partial Differential Equations.

GAME THOERY

Course Name	Course Code	LTP	Credit	Semester
Game Theory	BSP610	3:0:0	3	6

CLO1	**Concept of Game problem. Rectangular games. Pure strategy and Mixed strategy. Saddle point and its existence. Optimal strategy**
CLO2	**Static Games of incomplete information**

Course Objective:

In this course on game theory, we will be studying a range of mathematical models of Conflict and cooperation between two or more agents. This course is an introduction to game theory and strategic thinking. Ideas such as dominance, backward induction, Nash equilibrium, evolutionary stability, commitment, credibility, asymmetric information, adverse selection, and signalling are discussed and applied to games played in class and to examples drawn from economics, politics, the movies, and elsewhere.

Course Contents:

Module I

Concept of Game problem. Rectangular games. Pure strategy and Mixed strategy. Saddle point and its existence. Optimal strategy and value of the game.

Module II

Necessary and sufficient condition for a given strategy to be optimal in a game. Concept of Dominance, Fundamental Theorem of Rectangular games, Algebraic method, Graphical method and Dominance method of solving Rectangular games. Inter-relation between the theory of Games and L.P.P

Module III

Formulation of two person zero sum games, solving two person zero sum games, Dynamic Games with complete information – Extensive games, Backward Induction, Applications, Extensive form representation of games, Sub game Perfect equilibrium, Repeated Games and more applications.

Module IV

Static Games of incomplete information – Bayesian Games, Bayesian Nash Equilibrium Applications, Dynamic Games with complete incomplete information – Perfect Bayesian Equilibrium, Signaling Games and Applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Roger B. Myerson (1991). Game Theory: Analysis of Conflict, Harvard University Press, p. 1. Chapter-preview links, pp. vii-xi.
2. R. J. Aumann ([1987] 2008). "game theory," Introduction, The New Palgrave Dictionary of Economics, 2nd Edition.Abstract.
3. Colin F. Camerer (2003). Behavioral Game Theory: Experiments in Strategic Interaction, pp. 5-7 (scroll to at 1.1 What Is Game Theory Good For?).
4. Ross, Don. "Game Theory". The Stanford Encyclopedia of Philosophy (Spring 2008 Edition). Edward N. Zalta (ed.). Retrieved 2008-08-21.