Bachelor of Technology - Computer Science Engineering

Syllabus - First Semester

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code:CSE2104 **Credit Units : 03**

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.

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	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; 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.

PROGRAMMING IN C LAB

Course Code:CSE2107 **Credit Units : 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

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.

Syllabus - Second Semester

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: CSE2204 **Credit Units: 03**

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 hiérarchies, 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, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: CSE2208 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

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

Syllabus - Third Semester

DATA COMMUNICATION AND COMPUTER NETWORKS

Course Code: CSE2301 **Credit Units: 03**

Course Objective:
The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Contents:

Module I: Introduction
Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks
The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system

Module II: The data link layer
Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols- HDLC, PPP Access

Module III: Medium access layer
Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONETISDH, Virtual-Circuit Networks: Frame Relay and ATM.

Module IV: The network layer
Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion controland quality of service, internetworking, Ipv4

Module V: The transport layer
The transport services, elements of transport protocols, TCP and UDP
The application layer: Brief introduction to presentation and session layer, DNS,E-mail**,** WWW

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; Att: Attendance

Text & References:
Text:
- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & neworking: Forouzan, B. A.

References:
- Computer network protocol standard and interface: Uyless, Black
- Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

DATABASE MANAGEMENT SYSTEMS

Course Code: CSE2302 **Credit Units: 04**

Course Objective:
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:

Module I: Introduction
Concept and goals of DBMS, DBMS Architecture, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model:Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constarint, Keys, Mapping, Design of ER Model

Module II: Hierarchical model &Network Model
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model
Relational database, Relational Algebra, Relational Calculus, Tuple Calculus.

Module IV: Relational Database Design and Query Language
SQL, QUEL, QBE, Normalization using Functional Dependency, 1NF, 2NF, 3NF, BCNF, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications
Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

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; Att: Attendance

Text & References:
Text:
- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:
- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

OPERATING SYSTEMS

Course Code: CSE2303 **Credit Units: 03**

Course Objective:
Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system
Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

Module II: Process Management
Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads
Interprocess Communication and Synchronization:
Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.
CPU Scheduling:
Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.
Deadlock:
System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

Module III: Memory Management
Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

Module IV: Device management
Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,
Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

Module V: File System and Protection and security
File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.
Policy Mechanism, Authentication, Internal excess Authorization.

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; Att: Attendance

Text & References:

Text:

- Milenekovic, “Operating System Concepts”, McGraw Hill
- A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

References:

- Dietel, “An introduction to operating system”, Addision Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- Willam Stalling “ Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “ Your UNIX The ultimate guide” Tata Mcgraw Hill
- “Design of UNIX Operating System “ The Bach Prentice – Hall of India

DATA STRUCTURES USING C

Course Code: CSE2304 **Credit Units: 04**

Course Objective:
Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:
Module I: Introduction to Data structures
Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade offs. Use of pointers in data structures.
Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue
Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.
Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure
Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation.
Stack and queue implementation using linked list.

Module IV: Trees and Graphs
Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.
Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures
Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.
Searching: Linear search, Binary search
File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

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; Att: Attendance

Text & References:
Text:
- Horowitz and Sahani, "Fundamentals of Data structures", Galgotia publications
- Tannenbaum, "Data Structures", PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, "Data structure and program design in C" PHI
- "Data structures and algorithms" – Schaum Series.

DATA STRUCTURES USING C LAB

Course Code: CSE2305 **Credit Units: 01**

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

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.

DATA COMMUNICATION AND COMPUTER NETWORKS LAB

Course Code: CSE2306 **Credit Units: 01**

Equipments Required:
Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc.Platforms required: Linux Server

Course Contents:

- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up MySQL Database Server

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.

DATABASE MANAGEMENT SYSTEMS LAB

Course Code: CSE2307 **Credit Units: 01**

Software Required: Oracle 9i

Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

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.

UNIX PROGRAMMING LAB

Course Code: CSE2308 **Credit Units: 01**

Software Required:UNIX SCO

Assignments will be provided for the following

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

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.

Text & References:

- "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India
- "Unix –Shell Programming" Kochar
- " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

ELECTRONIC DEVICES & CIRCUITS

Course Code: CSE2310 **Credit Units: 02**

Course Objective:
This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semeconductor physics: Mobility & conductivity, Charge densities in a semiconductor, Fermi dirac distribution, carrier concentration and Fermi levels in semiconductor, generation and recombination of charges, diffuse and continuity equations, Hall effect.

Module II: Semiconductor Diode and Diode Circuits
Junction diode, Diode as circuit element,Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module III: Bipolar Junction Transistor
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ V_{BE} &β, Stabilization factors, thermal stability.

Module IV: Small signal Analysis of transistor and Multistage Amplifier
Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module V: Field Effect Transistors
Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module VI: Feedback Amplifiers
Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VII: Power Amplifiers
Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, ClassAB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

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; Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: CSE2311 **Credit Units: 01**

Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

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.

E-COMMERCE AND ERP

Course Code: CSE2312 **Credit Units: 03**

Course Objective:
This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:
Module I: Introduction E-commerce and ERP
E-commerce and its types, EDI and its basics, Digital payment systems, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies-Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT &Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module II: ERP Modules
Business Modules in an ERP Packag- Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Module III: Benefits of ERP
Time Reduction, On time shipment, Improved Resource Utilization, Performance, Customer Satisfaction, Flexibility, information accuracy and decision making capability, reduction in quality costs, Accuracy.

Module IV: ERP Implementation
ERP Implementation Lifecycle, Implementation Methodology, In-house implementation-Pros and cons, Vendors, Consultants and Users and their roles, Project Management and Monitoring after ERP Implementation.

Module V: The ERP Market and Future Directions
ERP Market Place- SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA).Future directions in ERP.

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; Att: Attendance

Text & References:
Text:
- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:
- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000

INTRODUCTION TO IOT

Course Code: CSE2313 **Credit Units: 03**

Course Objective:
The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the workingof Internet of Things. To understand the concepts of Web of Things.

Course Contents:
Module I: IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

Module II:IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

Module III: IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction, IoT and Big Data.

Module IV: WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardizationfor WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals andBusiness Intelligence.

Module V:IOT APPLICATIONS - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc., Introduction to Fog Computing.

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; Att: Attendance

Text & References:
Text:

- Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.
- David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012.

References:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
- CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Syllabus - Fourth Semester

THEORY OF AUTOMATA AND COMPUTATION

Course Code: CSE2401 **Credit Units: 04**

Course Objective:
The course begins with the basic mathematical preliminaries and goes on to discuss the general theory of automata, properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as pushdown automata and it's relation with context free languages, Turing machines and linear bounded automata, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

Course Contents:

Module I:Introduction to Languages and Automata
Formal Grammars and Chomsky Hierarchy, Regular Expression Deterministic and Nondeterministic Finite Automata, Regular Expression, Two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem.

Module II: Context Free Grammars and Pushdown Automata
CFG: Formal Definition, Derivation and Syntax trees, E-removal, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF)
Pushdown Automata:Definitions, Relationship between PDA and context free language, Decision Algorithms

Module III: Turing Machine
The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Universal TM, Church's Machine.
Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).

Module IV: Undecidability
Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL.

Module V: Computability
Partial and Total Functions, Primitive Recursive functions, Recursive functions.

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; Att: Attendance

Text & References:

Text:

- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2^{nd} ed)" by Peter Linz, D. C. Health and Company.

References:

- "Introduction to theory of computation (2^{nd} Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Kohan, "Theory of Computer Sciences".
- Korral, "Theory of Computer Sciences".

DIGITAL ELECTRONICS

Course Code: CSE2402 **Credit Units: 02**

Course Objective:
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions
Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits
Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

Module III: Sequential Circuits
Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

Module IV: Logic families
Logic families: RTL, DTL, TTL, ECL

Module V: Data Converters
Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

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; Att: Attendance

Text & References:

- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications

ARTIFICIAL INTELLIGENCE

Course Code: CSE2412 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Problem solving and Scope of AI
Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.
Problem Solving
State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II: Knowledge Representation
Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III: Understanding Natural Languages
Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts ,Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation..

Module IV
Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN,R1
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. **Programming Language:** Introduction to programming Language, LISP and PROLOG.
Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V: Introduction to Robotics
Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

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; Att: Attendance

Text & References:

Text:

- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
- John J. Craig, "Introduction to Robotics", Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication
- Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication

References:

- D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
- Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
- R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

DIGITAL ELECTRONICS LAB

Course Code: CSE2405 **Credit Units: 01**

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

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.

ARTIFICIAL INTELLIGENCE LAB

Course Code: CSE2413 **Credit Units: 01**

Course Contents:

Assignments will be provided for the following:

- Programming in Prolog
- Programming for Robotics

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.

COMMUNICATION SYSTEMS

Course Code: CSE2414 **Credit Units: 02**

Course Objective:
The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

Course Contents:

Module I: Introduction
Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

Module II: Amplitude modulation
Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

Module III: Angle Modulation
Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

Module IV: Pulse Modulation
Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems,
Basics of digital communications: ASK, PSK, FSK, QPSK basics & wavform with brief mathematical introduction

Module V: Noise
Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

Module VI: Introduction to Information Theory
Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

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; Att: Attendance

Text & References:
Text:
- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition

References:
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

COMMUNICATION SYSTEMS LAB

Course Code: CSE2415 **Credit Units: 01**

List of Experiments:

1. To study the sampling and reconstruction of a given signal.
2. To study amplitude modulation and demodulation.
3. To study frequency modulation and demodulation.
4. To study time division multiplexing.
5. To study pulse amplitude modulation.
6. To study delta and adaptive delta modulation and demodulation.
7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying.
9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
10. To study quadrature phase shift keying & quadrature amplitude modulation.

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.

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES
(PHP and MySql)

Course Code: CSE2416 **Credit Units: 02**

Course Objective:
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc.

Course Contents:

Module I: Introduction to Open Source and PHP programming
Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling
Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array.
Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages
Object orientedprogrammingwithPhp, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.
HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Workingwithdatabase
HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript.
MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.

Module V: WorkingwithFrameworks
Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Woprking with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox
- PHP, MySQL and Apache Julie C Meloni Pearson Education ISBN : 81-297-0443-9

References:

- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES
(PHP and MySql) LAB

Course Code: CSE2417 **Credit Units: 01**

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number using recursion.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password.
12. How to work with sessions in PHP?
13. Introduction to Mysql creating databases, tables, using command line and gui interface, phpmyadmin
14. How to connect to MySQL using PHP ? Write programs for insertion, deletion updates and other sql queries. Design front end using html, css and write php scripts for processing of data. Try all different methods of connecting from php to MySQL
15. Make a small project with mysql and php to perform CRUD operations. Use Session also.
16. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.
17. Write a program to design login form in which find the greatest number amongst three numbers.
18. WAP for Marksheet generation.
19. Design a webpage for entering the student details with all the validations applied on it.
20. Write a php script to print current date and time.
21. Write a pp script to use include and require functions.
22. Write a php script including all the file handling functions.
23. Design a website using Wordpress /Joomla/Drupal
24. Introduction to Laravel frame work and one simple project.

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.

ARTIFICIAL NEURAL NETWORKS

Course Code: CSE2410 **Credit Units: 02**

Course Objective:
Aim of this course is to introduce the students fundamentals concepts of Nural network and its various application in computer science.

Course Contents:
Module I:-
Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

Module II:-
Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms,
Learning rule:-
Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule.

Module III:-
Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.

Module IV:-
Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

Module V:-
Associative memory, auto-associative memory, bi-directional associative memory.

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; Att: Attendance

Text Book:

- Kenji Suzuki (ed.) - InTech **,** 2013
- Todd Troyer **-** University of Texas at San Antonio **,** 2005

ARTIFICIAL NEURAL NETWORKS LAB

Course Code: CSE2411 **Credit Units: 01**

Course Objective

The aim of this lab to gain the practical knowledge of basic neuron models and learning algorithms.

Lab Assignment

To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox

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.

Syllabus - Fifth Semester

SOFTWARE ENGINEERING

Course Code: CSE2501 **Credit Units: 03**

Course Objective:
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

Course Contents:

Module I: Introduction
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Module II: Software Metrics and Project Planning
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Module III: Software Requirement Analysis, design and coding
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

Module IV: Software Reliability, Testing and Maintenance
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing,Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML
Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML, Domain,Component Diagram and Deployement Diagram

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; Att: Attendance

Text & References:
Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.

COMPUTER ARCHITECTURE

Course Code: CSE2502 **Credit Units: 04**

Course Objective:
This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

Course Contents:

Module I: Register Transfer Language
Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

Module II: Basic Computer Organizations and Design
Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

Module III: Central Processing Unit
Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC
Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations

Module IV: Memory and Intrasystem Communication and Input output organisation
Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware
Intrasystem communication and I/O: Peripheral Devices, Input-Output
Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication

Module V: Introduction to Pipelining and MultiProcessor
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline
Multiprocessors: Characteristics of Multiprocessors

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; Att: Attendance

Text & References:

Text:

- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry &Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References:

- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill

JAVA PROGRAMMING

Course Code: CSE2503 **Credit Units: 03**

Course Objective:
The objective is to impart programming skills used in this object oriented language java.
The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:

Module I:Java Basics
Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.

Module II: Java Object Oriented
Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.

Module III: Exception Handling and Threading
Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.
Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.

Module IV : Event Handling And AWT
Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces
AWT: Working with Windows, AWT Controls, Layout Managers

Module V: Java Advanced
AppletClass, Architecture, Skeleton, Display Methods.
Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.
Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.

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; Att: Attendance

Text & References:
Text:
- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

References:
- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999

ANALYSIS AND DESIGN OF ALGORITHM

Course Code: CSE2511 **Credit Units: 03**

Course Objective:
The designing of algorithm isan important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program

Course Contents:

Module I: Introduction
Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences- substitution method, recursion tree method, master method

Module II: Divide and conquer
Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort**,** Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.
Greedy Method
Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming
Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal
Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search)
Back tracking
Overview, 8-queen problem, and Knapsack problem
Brach and bound
LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity
Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

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; Att: Attendance

Text & References:
Text:
- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication
- T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm,"

References:
- Sara Basse, A. V. Gelder, "Computer Algorithms," Addison W
- J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"
- D. E. Knuth, " The art of Computer Program

SOFTWARE ENGINEERING LAB

Course Code: CSE2504 **Credit Units: 01**

Software Required: Rational Rose

Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

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.

JAVA PROGRAMMING LAB

Course Code: CSE2505 **Credit Units: 01**

Software Required: JDK1.3

Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

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.

ANALYSIS AND DESIGN OF ALGORITHM LAB

Course Code: CSE2512 **Credit Units: 01**

Lab assignment will be based on the following:

Programs for binary search and Quick sort by using divide and conquer techniques.
Programs on algorithm based on greedy method.
Programs on algorithm based on Dynamic programming.
Programs on Depth First and Breadth Search traversals of graphs.
Programs on algorithm based on backtracking.
Programs on algorithm based on Brach and Bound.

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.

SUMMER INTERNSHIP EVALUATION-I

Course Code: CSE2535 **Credit Units: 03**

Course Objective:

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

VHDL PROGRAMMING

Course Code: CSE2506 **Credit Units: 02**

Course Objective:
VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I
Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II
Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes
PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV
Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V
Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

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; Att: Attendance

Text & References:
Text:
- J. Bhaskar, "A VHDL Primer", Addison Wesley, 1999.
- Volnei A. Padroni, "Circuit Design with VHDL."
- M. Ercegovac, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley,2000
- C. H. Roth, "Digital System Design using VHDL", Jaico Publishing, 2001

References:
- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: CSE2507 **Credit Units: 01**

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequent ional Circuits like flip-flops, counters, registers.

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.

DISTRIBUTED OPERATING SYSTEM

Course Code: CSE2513 **Credit Units: 03**

Course Objective:
This Subject provides students with an in-depth knowledge about the operating system. The former treats the standard principles of single processor system, including processes, synchronization, I/O, deadlocks, mutual exclusion, fault tolerance , Memory Management, File Management systems, security and so on. This subject covers distributed operating system in detail, including communication process, file system and memory management synchronization and so on but this time in the context of distributed systems

Course Contents:

Module I: Introduction
Functions of an Operating System, Design Approaches, Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks, Modes of communication, System Process, Interrupt Handling, Handling Systems calls, Protection of resources, Micro-Kernel Operating System, client server architecture.

Module II: Distributed Mutual Exclusion
Lamppost's Algorithm, The Critical Section Problem, Other Synchronization Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Programs, Inter process communication (Linux IPC Mechanism), Remote Procedure calls, RPC exception handling, security issues, RPC in Heterogeneous Environment, Case studies.

Module III: Synchronization in Distributed System
Deadlocks in Distributed Systems, Centralized Deadlock- Detection Algorithms, Distributed Deadlock Detection Algorithm' Path Pushing Algorithm, Edge Chasing Algorithm, Diffusion Computation Based Algorithm.
Clock Synchronization: Logical clocks, Physical clocks, Vector Clock, clock synchronization algorithms, Mutual Exclusion, Non-Token Based Algorithms – Lamport's Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithm, Election Algorithms,

Module IV: Distributed Shared Memory
Introduction, Architecture & Motivation Algorithms for Implementing DSM: The Central – Server Algorithms, The Migration Algorithms, The Read – Replication Algorithms, The Full- Replication Algorithms. Memory Coherence, Coherence Protocols: Write Invalidate Protocol, Write Update Protocol, Design Issues: Granularity , Page Replacement

Module V: Concurrency Control Algorithms
Basic Synchronization Primitives, Two –Phase Locking Protocol, Timestamp Based Algorithms, Two –Phase Commit Protocol. Voting Protocols: Static Voting, Majority Based Dynamic Voting Protocol.

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; Att: Attendance

Text & References:

- A. S. Tanenbaum, Distributed Operating Systems, Prentice-Hall, ISBN 0-13-219908-4.
- SinghalShivratri Advanced Concepts in Operating Systems TMH 1994.
- M. Beck et al Linux Kernal, Internal Addition Wesley, 1997.
- B. W. Kernighan and R Pide, The Unix Programming Environment Prentice Hall of India - 2000.
- A. Silberschatz P.B Galvin Operating System Concept, John Wiley & Sons (Asia) 2000.
- Cox K, "Red Hat Linux Administrator's Guide". PHI (200).

FUZZY LOGIC& GENETIC ALGORITHM

Course Code: CSE2514 **Credit Units: 03**

Course Objective:
This course is intended to mathematical introduction to the analysis, synthesis, and design of control systems using fuzzy logic and Genetic Algorithm. A study of the fundamentals of fuzzy sets, operations on these sets, and their geometrical interpretations. Methodologies to design fuzzy models and feedback controllers for dynamical systems,Various applications and case studies.
fuzzy inference systems, fuzzy logic control,parallelprocessors,multilevel optimization- reallife problem and other machine intelligence applications of fuzzy logic and Genetic Algorithm.

Course Contents:
Module I: Introduction
Crisp sets: Overview, Fuzzy sets : Basic types and concepts,Characterstics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets

Module II: Fuzzy operations and Fuzzy arithmetic
Types of operations, Fuzzy complements, Fuzzy intersection:t-norms, Fuzzy union:t-conorms,Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables,Airthmetic operations on intervals, Airthmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.

Module III: Fuzzy systems And Applications
General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata.Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics

Module- IV: Introduction to Genetic Algorithm
Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithmgenetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

Module-V: Genetic Technology
Genetic technology:- steady state algorithm, fitness scaling, inversion.Geneticprogramming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm.Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

Module- VI: Applications **5 lecture hours**
Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallelprocessors- composite laminates- constraint optimization- multilevel optimization- reallife problem.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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; Att: Attendance

Text & References:

Text:

- Fuzzy sets and fuzzy logic theory and application by George. j. klir , Bo Yuan
- David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning"

References:

- A First Course in Fuzzy and Neural Control by Nguyen, Prasad, Walker, and Walker. CRC 2003
- Artificial Intelligence by Negnevisky. Addison-Wesley
- Automatic Control Systems by Colnaraghi and Kuo. 9thedition. Wiley Publisher. 2010
- William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
- 2. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems “

Syllabus - Sixth Semester

MICROPROCESSOR

Course Code: CSE2601 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Interfacing with 8085.Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors
Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

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; Att: Attendance

Text & References:

Text:

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.

References:

- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION

Course Code: CSE2602 **Credit Units: 03**

Course Objective:
The objective is to make aware students the concepts of compiler designing. It is expected students have should knowledge on automata theory. This course includes various Lexical Analysis, parsing techniques and syntax directed translation.

Course Contents:
Module I: Introduction
Phases , FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analyzers, The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Capabilities of CFG.

Module II : System Programming
Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor , First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.Booting techniques and sub-routines.

Module III: Basic Parsing Techniques
Parsers, Shift Reduce Parsing, Operator precedence parsing, topdown Parsing, Predictive Parsers.

Module IV: Automatic Construction of efficient Parsers
LR Parsers, the canonical collection of LR(0) items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, Implementation of LR parsingTables, Constructing LALR sets of items.

Module V: Syntax Directed Translation
Syntax directed Translation Schemes, Implementation of Syntax directed translators, Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Postfix Translation.

Module VI: Error detection and Recovery
Lexical phase errors, syntax phase errors, semantic errors Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis.

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; Att: Attendance

Text & References:

- Alfread V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
- Ullman, Principles of Compiler Design, Narosa publications.
- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
- D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
- Holub, "Compiler Design in C", PHI.
- Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill
- Waite W.N. and Goos G., "Compiler Construction" Springer Verlag.

ADVANCED JAVA PROGRAMMING

Course Code: CSE2604 **Credit Units: 03**

Course Objective:
The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I : Distributed Computing
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

Module II : Database Connectivity
ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.

Module III : Servlet Programming
Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.

Module IV: JSP Programming
JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.

Module V: JEE Web Appliaction
The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application;Introduction to EJB.

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; Att: Attendance

Text & References:
Text:
- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

References:
- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell - A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

MICROPROCESSOR LAB

Course Code: CSE2605 **Credit Units: 01**

Course Contents:

1. To load the numbers 49H and 53H in the memory location 9510 and 9511
2. respectively and add the contents of memory location 9601
3. To write assembly language programming for 8 bit addition with and without carry.
4. To write assembly language programming for 8 bit subtraction with and without borrow.
5. To write assembly language programming for 8 bit multiplication and division.
6. To write assembly language programming for sorting an array of numbers in ascending and descending order.
7. To write assembly language programming with additional instructions.
8. To write and execute a program using stacks.
9. To study and program the programmable peripheral interface (8255) board.
10. To study and program the programmable interval timer (8253) board.
11. To study and program the programmable DMA controller (8257) board.
12. To study and program the programmable interrupt controller (8259) board.

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.

SYSTEM PROGRAMMING & COMPILER CONSTRUCTION LAB

Course Code: CSE2606 **Credit Units: 01**

Software Required: Turbo C++

Assignment will be provided for following:

List of Programs:

1. WAP to check whether string is accepted or not for entered grammar.
2. WAP to convert Infix to Postfix notation.
3. WAP to convert Infix to Prefix notation.
4. WAP to find no of Tokens in an expression.
5. WAP to convert Regular Expression to NFA.
6. WAP to convert NFA to DFA.
7. Write a program to implement Text Editor.
8. WAP calculate FIRST and FOLLOW of a grammar.
9. WAP to implement shift reduce parser.
10. WAP to implement symbol table .

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.

ADVANCED JAVA PROGRAMMING LAB

Course Code: CSE2608 **Credit Units: 01**

Programming Language: Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
   a. Customer name
   b. Customer number
   c. Age
   d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the Resulset.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPException.
15. WAP to read data send by a client (HTML page) using JSP.

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.

CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: CSE2603 **Credit Units: 03**

Course Objective:
Network Security was always important, but has gained significance with the increase of application of Internet associated e-commerce. Threat and compromise /Breach potentially increased with the introduction of the end user involment,communication and networking .Thus the course is introduced to make the student acquainted with the concepts and practices to make the network environment secure.

Course Contents:

Module I
Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Module II
Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, DiscreteLogarithmic Problem,Principals of public key crypto systems, RSA algorithm, security of RSA.

Module III
Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Secure hashalgorithm (SHA)Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).

Module IV
Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange,Public key distribution, X.509 Certificates, Public key Infrastructure.Authentication Applications: Kerberos

Module V
IP Security: Architecture, Authentication header, Encapsulating security payloads, combiningsecurity associations, key management.Introduction to Secure Socket Layer, Secure electronic transaction (SET). Viruses and related threats,Firewalls.

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; Att: Attendance

Text & References:

- William Stallings" Cryptography and Network Security: Principles and Practices" PHI
- "Applied Cryptography", Bruce Schiener.
- Bernard Menezes," Network Security and Cryptography", Cengage Learning.
- Atul Kahate, "Cryptography and Network Security", TMH.

SOFTWARE TESTING AND QUALITY ASSURANCE

Course Code: CSE2612 **Credit Units: 03**

Course Objective:
To apply all the testing skills of software testing in such a way that it can provide and improve the software development methodology. Basic objective of Software Testing is to develop methods and procedures at can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle for the development.

Course Contents:

Module I
Software Testing Fundamentals - Software Testing Definition, Importance, objectives, why is it too hard? Errors, faults and failure. Testing process, STLC, QA and QC, Verification and Validation, Inspections and walkthroughs, Test Plan, test cases, drivers, stubs, Validation checks.

Module II
Black box testing - Definition, Equivalence Class, Boundary Value Analysis, Documentation testing,state based testing, White box testing – Definition, Difference between black box testing and white box testing, Path testing, Cyclomatic complexity, graph metrics, mutation testing.

Module III
Levels of testing- Low level testing- Unit testing and Integration testing. High level testing- System testing, performance testing, stress testing, load testing, volume testing, smoke and sanity testing, Installation testing, usability testing, website testing, security testing, recovery testing, Domain testing, Static testing and dynamic testing,

Module IV
Test cases– Designing, Execution. Reducing number of test cases- Prioritization guidelines, priority category, scheme, risk analysis, regression testing. Designing scripts, RTM, TRS.

Module V
Cohesion and coupling in class testing, GUI testing, integration and system testing, Automated Testing tools - Manual vs. Automated testing, Static and Dynamic Testing tools, Characteristics: Rational tools, Quality Standards- CMM, ISO, Six sigma, McCall's Quality Factors and Criteria, Quality Metrics

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; Att: Attendance

Text & References:
Text:
- Software Testing, Srinivasan Desikan, Pearson Education
- Software Testing, R.B.Chopra
- Software Engineering: A Practitioner's Approach, Roger S. Pressman

References:
- Software Testing tools, K.V.K.K Prasad, Dreamtech
- Foundations of software Testing, ISTQB Certification, Dorothy Graham
- Software Test Engineer's Handbook, Graham Bahms

VLSI DESIGN

Course Code: CSE2610 **Credit Units: 02**

Course Objective:

In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire

Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.

MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device

DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors

The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter

VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer

Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.

Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages

Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits

CMOS LOGIC: Good 0 and poor 0, Goo1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,

Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates

Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain

Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

Module IV: Sequential Logic circuits
Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules
Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*

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; Att: Attendance

Text & References:
- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

VLSI DESIGN LAB

Course Code: CSE2611 **Credit Units: 01**

Course Contents:

1. Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
2. Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
3. Design and simulate V vs t for 2 input NAND and Nor gates.
4. Design and Simulation for general CMOS functions
5. One bit full adder simulation
6. 2:1 MUX using pass transistor logic
7. Other functions using pass transistor logic
8. Layout of CMOS inverter
9. Layout of NAND and NOR gates
10. Design and Simulation SR latch using NAND and NOR representations
11. Design and simulate D flip flop

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.

Syllabus - Seventh Semester

DATAWAREHOUSING & DATA MINING

Course Code: CSE2701 **Credit Units: 03**

Course Objective:
The objective of this course is to introduce students to Data Warehousing & Data mining technologies that will help to Inspect, Control and Secure Information through Databases.

Course Contents:

Module I: Introduction to Data Warehousing
Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing, Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.

Module II: Data Warehousing Components & Architecture
Data Warehouse Architecture, Components of Data Warehouse Architecture, Data Warehousing Topologies, Meta Data, Components of Meta data, Mapping Meta Data. Challenges with Data Warehousing.

Module III: On Line Analytical Processing (OLAP)
Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational & Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.

Module IV: Data Mining
Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Priori Algorithm, Direct Hashing and Pruning (DHP), Classification: Decision Tree, Split Algorithm based on Information Theory, Bayes Method.

Module V: Cluster Analysis: Concepts and Methods
Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations.

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; Att: Attendance

Text & References:

- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.
- (Berry, Michael)Data Mining Techniques.
- (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
- (Gupta, GK) Data Mining with Case Studies.
- (Han & Kamber)Data Mining: Concepts and Techniques.
- (Paulraj Ponniah) Datawarehousing Fundamentals.

COMPUTER GRAPHICS

Course Code: CSE2710 **Credit Units: 03**

Course Objective:
The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

Course Contents:

Module I: Introduction to Graphics and Graphics Hardware System
Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.

Module II: Output Primitives and Clipping operations
Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm), circles (Bresenham's and midpoint circle algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.

Module III: 2D Geometric transformation
2D Transformation: Basic transformat ion, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

Module IV:3D Geometric transformation
3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation

Module V: object modeling and Visible Surface detection
fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter's algorithm), Binary search partition method, Scan line method,

Module VI: Introduction to multimedia
Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design

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; Att: Attendance

Text & References*:*
Text:

- Foley et. al., "Computer Graphics Principles & practice", 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, "Computer Graphics", Prentice Hall, 1986.
- R. Plastock and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill, 1986

References:

- R.H. Bartels, J.C. Beatty and B.A. Barsky, "An Introduction to Splines for use in Computer Graphics and Geometric Modeling", Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, "Introduction to Algorithms", McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, "Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, "Computational Geometry: An Introduction", Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, "Mathematical Elements for Computer Graphics", MacGraw-Hill International Edition, 1989
- David F. Rogers, "Procedural Elements for Computer Graphics", McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, "Advanced Animation and Rendering Techniques", Addison-Wesley, 1992

ADVANCED COMPUTER ARCHITECTURE

Course Code: CSE2711 **Credit Units: 03**

Course Objective:
With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. In this course we have discussed the theory, technology, architecture (hardware) and software aspects of parallel computer and Vector computers.

Course Contents:
Module I: Parallel computer models
The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks
Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module II: System Interconnect Architectures
Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module III: Processors and Memory Hierarchy
Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors
Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module IV: Backplane Bus System
Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design,Computer airthmetic principles.

Module V: Vector Processing Principles
Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms

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; Att: Attendance

Text & References:
Text:
- Kai Hwang, "Advanced computer architecture"; TMH, 2000.

References:
- J.P. Hayes, "computer Architecture and organization", MGH, 1998.
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
- D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
- Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH,

DATAWARE HOUSING & DATA MINING LAB

Course Code: CSE2704 **Credit Units: 01**

Course Contents:

Programming Language: Weka 3.6

List of Experiments/Programs:

1. Defining Weather relation for different attributes
2. Defining employee relation for different attributes
3. Defining labor relation for different attributes
4. Defining student relation for different attributes
5. Exploring weather relation using experimenter and obtaining results in various schemes
6. Exploring employee relation using experimenter
7. Exploring labor relation using experimenter
8. Exploring student relation using experimenter
9. Setting up a flow to load an arff file (batch mode) and perform a cross validation using J48
10. Design a knowledge flow layout, to load attribute selection normalize the attributes and to store the result in a csv saver.

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.

COMPUTER GRAPHICS LAB

Course Code: CSE2712 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

Assignments will be provided for the following:

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

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.

SUMMER INTERNSHIP EVALUATION-II

Course Code: CSE2735 **Credit Units: 03**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:
A4 size paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top & bottom margins: 1 inch/ 2.5 cm
Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

1. **Range of Research Methods used to obtain information**

2. **Execution of Research**

3. **Data Analysis**
    - Analyse Quantitative/ Qualitative information
    - Control Quality

4. **Draw Conclusions**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

SOFT COMPUTING

Course Code: CSE2751 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

Course Contents:

Module I: Soft Computing
Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Module II: Neural Network
Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA

Module III
Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

Module IV: Fuzzy Logic
Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Module V: Genetic algorithm
Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Examination Scheme:

Components	CT	H	V/S/Q	AT	EE
Weightage (%)	10	8	7	5	70

Text & References:

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

MOBILE COMPUTING

Course Code: CSE2707 **Credit Units: 03**

Course Objective:
The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Contents:

Module I:Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling.
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP)
GPRS Architecture, GPRS Network Nodes.
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III:Third Generation (3G) Mobile Services
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Module V:Enterprise Networks
Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

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; Att: Attendance

Text & References:
Text:
- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:
- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

GRID COMPUTING

Course Code: CSE2709 **Credit Units: 03**

Course Objective:
Grid computing (or the use of a *computational grid*) is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Introduction-Cluster to grid computing
Cluster computing models, Grid models, Mobile grid models, Applications.
Parset: System independent parallel programming on distributed systems: Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, Implementing parsets on a loosely coupled distributed system.
Anonymous remote computing model: Introduction, Issues in parallel computing on interconnected workstations, Existing distributed programming approaches, The arc model of computation, The two tired arc language constructs, Implementation

Module II: Integrating task parallelism with data parallelism
Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work
Anonymous remote computing and communication model: Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.

Module III: Parallel programming model on CORBA
Introduction, Existing works, notion of concurrency, system support implementation performance, sitability of CORBA: introspection.
Grid computing model: Introduction, a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

Module IV: Introducing mobility into anonymous remote computing and communication model
Introduction, issues in mobile clusters and parallel computing on mobile clusters, moset overview, moset computation model, implementation, performance.

Module V: Parallel Simulated Annealing algorithms
Introduction, Simulated annealing (SA) Technique, Clustering algorithm for simulated annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

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; Att: Attendance

Text & References:
Text:
- "Grid Computing a Research Monograph" by D. Janakiram, Tata McGraw hill publications, 2005

References:
- "Grid Computing: A Practical Guide to technology and Applications" by Ahmar Abbas, Charles River media – 2003.
- "Grid Computing" Joshy Joseph & Craig Fellenstein, Pearson Education

TERM PAPER

Course Code: CSE2731 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER
The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of Materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the Notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper
a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & Preparing the final Paper
a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.

d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
(i) Show evidence of what an author has said.
(ii) Avoid misrepresentation through restatement.
(iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
1) Title page
2) Table of contentsIntroduction
3) Review
4) Discussion&Conclusion
5) References
6) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Reference
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World

Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: CSE2732 **Credit Units: 02**

Course Objective:
The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

STUDENT ASSESSMENT RECORD (SAR)

Record to be maintained by project guide.

1. **Project Tools (Hardware/ Software) used fot implementation.**

2. **Project Evaluation& Execution.**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

WORKSHOP/INDEPENDENT STUDY

Course Code: CSE2733 **Credit Units: 02**

This is an elective, self-directed course to investigate aemerging areasof IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

Syllabus - Eighth Semester

PROJECT-DISSERTATION

Course Code: CSE2837 **Credit Units: 08**

GUIDELINES FOR PROJECT FILE

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 critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

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 goals.

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 that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**(optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **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

- **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. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given 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 never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains 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 / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on 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

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: 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 File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

DIGITAL IMAGE PROCESSING

Course Code: CSE2803 **Credit Units: 02**

Course Objective:
Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. *Digital Image Processing* is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

Course Contents:
Module I: Introduction and Digital Image Fundamentals
The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Module II: Image Enhancement in the Spatial Domain
Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Module III: Image Enhancement in the Frequency Domain:
Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
Image Restoration
A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

Module IV: Image Compression
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.
Image Segmentation
Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

Module V: Representation and Description
Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.
Object Recognition
Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

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; Att: Attendance

Text & References:
Text:
- Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:
- Rosefield Kak, "Digital Picture Processing",
- W.K. Pratt, "Digital Image Processing",

DIGITAL IMAGE PROCESSING LAB

Course Code: CSE2805 **Credit Units: 01**

Software Required: Java

List of Assignements:

Experiments will be based on Image Representation, Image transformation, Image Enhancements, Edge Detection, Morphological Image processing and Segmentation.

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.

DOT NET PROGRAMMING

Course Code: CSE2804 **Credit Units: 02**

Course Objective:
To create web based applications using ASP.NET.

Course Contents:

Module I: Introduction to .NET technologies
Features of .NET, .NET Framework, CLR, What is ASP.NET? Difference between ASP and ASP.NET.
Design View, HTML View, Default Files used in ASP.NET. Concept of Master pages, Intrinsic Objects of ASP.Net, Structure of ASP.NET page, Cascading Style Sheet: Embeded, Inline, External.

Module II: Controls in ASP.NET
Overview of Dynamic Web page, Understanding ASP.NET Controls, Applications, Web servers, Installation of IIS. Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, validation Controls: Required Field Comparison Range. Calendarcontrol, Ad rotator Control, Internet Explorer Control.

Module III: Overview of ADO.NET and XML
What is ADO.NET, from ADO to ADO.NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets, using Command & Data Reader, binding data to data bind Controls, displaying data in data grid, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, The XML Data Document, Data Binding and its yypes.

Module IV: ASP.NET Applications
Creating, tracking, caching, error handling, Securing ASP.NET applications- form based applications, window based application.

Module V: Web services
Introduction, State management- View state, Session state, Application state, Building ASP.NET web services, working with ASP.NET applications, creating custom controls, Invoking COM/COM+, Activ X Components

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; Att: Attendance

Text & References:
Text:
- ASP.NET Unleashed by Stephen Walther, SAMS publications

References:
- ASP.NET, Wrox Publications
- ASP.NET and VB.NET, Wrox Publication
- ASP.NET and C#.NET, Wrox publication.

DOT NET PROGRAMMING LAB

Course Code: CSE2806 **Credit Units: 01**

Course Contents:

- Use of Controls in creating web pages
- Creating sessions
- Creating Custom controls
- Implementing security

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.

SIMULATION & MODELING

Course Code: CSE2807 **Credit Units: 02**

Course Objective:
The goal is to introduce students to basic simulation methods and tools for modelling and simulation of continuous, discrete and combined systems. The objective is to impart knowledge of simulation principles. The ability to create simulation models of various types.

Course Contents:

Module I: Linear Programming
Linear Programming: Formulation, Graphical solution, standard and matrix form of linear programming problems, Simplex method and its Algorithm, Two-phase Simplex method.

Module II:Integer Programming
Integer Programming: Importance, Need and importance of Integer Programming, Gomory's All Integer Programming Problem technique and its algorithm.

Module III:Modeling & Simulation Concepts and Random Numbers
Modeling & Simulation Concepts:System Concepts**,** What is a Model?,Type of Models, Modeling & Simulation, Continuous vs. Discrete System Simulation, Numerical Integration vs. Continuous Simulation, Analog vs. Digital Simulation, Simulation vs. Monte- Carlo Simulation, Nature of Computer Modeling and Simulation, When to Use Simulation?, Limitations of Simulation, Validation**,** andSimulation Languages.
Random Numbers**:** Pseudo-random generators, Testing of Pseudo-random number generators, Generation of non-uniformly distributed random numbers.

Module IV:Simulation Experiments and Design of Application Simulators
Simulation Experiments:Run length of Static and Dynamic Stochastic Simulation Experiments, Minimizing variability in simulators without increasing Number of simulation Runs.

Module V:Design of Application Simulators Design of Application Simulators – for Multi-server Queuing System, PERT, Optimizing Inventory Policy and Cost in Business environment.

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; Att: Attendance

Text & References:

- Sharma, S.D., Operations Research, Kedar Nath and Ram Nath, Meerut.
- Nar Singh Deo, "System Simulation with Digital computer", PHI, New Delhi.
- Taha, H.A., Operation Research – An Introduction, McMillan Publishing Co, New York.
- Gupta P.K., Hira and D.S., Operation Research, Sultan Chand & Sons, New Delhi.
- Kanti Swarup, Gupta P.K. & Man Mohan, Operation Research, Sultan Chand & sons, New Delhi.
- Rao S.S., Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi.
- Gordon G., "System Simulation", PHI, New Delhi.
- Payne James A. , " Introduction to Simulation : Programming Techniques and Methods of Analysis, McGraw Hill International Editions, Computer Science services, New York.
- Jerry Banks, John S Carson II, Barry L Nelson and David M Nicol, Discrete Event Simulation, Pearson Education Asia, New Delhi.
- Francis Neelamkavil, "Computer Modeling and Simulation", John Wiley & Sons, New York.

SIMULATION AND MODELLING LAB

Course Code: CSE2811 **Credit Units: 01**

1. Basic Concepts of Simulation and Modeling and SIGMA (An Introduction).
2. Exploring the Car Wash Model. (Single queue single server)
3. The Car Wash Model (Single Queue two Servers)
4. Implementation of Buffered Queue Model
5. To Design Airport Model. (One queue multiple servers)
6. To Design a superstore model (Two queue and two servers)
7. To Design a Billing System (Two queues one Server)

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