Master of Technology-Computer Science Engineering

Syllabus - First Semester

DIGITAL COMPUTER ORGANIZATION

Course Code: CSE4102 **Credit Units: 03**

Course Objective:
The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Contents:
Module I: Representation of Information and Basic Building Blocks
Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary Counters, Flip/Flops: SR FF, JK FF, Master Slave FF, T and D FF, Registers: Parallel and Serial Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip.

Module II: Basic Organization
Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.

Module III: Memory Organization
Memory hierarchy, Main Memory (RAM/ROM chips) with mapping, Auxiliary memory, Associative memory and its mapping, Virtual memory, Cache memory with mapping techniques, Memory management hardware.

Module IV: Input-Output organization
Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers, CPU-IOP Communication.

Module V: Processor Organization
Introductory Concept of pipeline, Flynn's Classification, Parallel processing. RISC and CISC characterstics, arithmetic pipeline with example.

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 System Architecture: M. Mano (PHI Publication)
- William Stalling, "Computer Organization & Architecture", Pearson education Asia.
- B. Ram, "Computer Fundamental Architecture & Organization" New Age.

References:

- Computer Organization: Vrarsie, Zaky&Hamacher (TMH Publication).
- Tannenbaum, “Structured Computer Organization”, PHI.

OBJECT ORIENTED SOFTWARE ENGINEERING

Course Code: CSE4103 **Credit Units: 03**

Course Objective:
The objective of this course is to expose the students to the Fundamentals and benefits of software reuse and some reuse problems .To provide a clear understanding of the advance concepts in developing different types of reusable component and processes for reuse .

Course Contents:

Module I
Review of the traditional methodologies, Object oriented methodology, Advantage of Object oriented methodology, Fundamental concepts of Object Orientation: Object, Class, Abstraction, Interface, Implementation, Aggregation, Composition, Generalization, Sub-Class and Polymorphism, Architecture Style, Object-oriented software engineering, layered architecture

Module II
UML – Basics of UML, Class diagram, Object Diagram State, Activity, Use case, Deployment, Component, Package Interaction diagram.

Module III
Requirement Elicitation & Analysis: Requirement Elicitation Concepts, Managing Requirement elicitation, Analysis Concepts & activation.

Module IV
Design Concepts: Object Design, Reuse Concept, Reuse Activities, Case Study, Mapping design to Code.

Module V
Testing Concepts – Testing activities, Managing Testing.

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:
- Bernd Bruegge, Allen H. Dutoid "Object Oriented Software Engineering using UML , Patterns , Pearson Education

References:
- Joffrey S. Poutin, "Measuring Software Reuse: Principles Practices, Economic Models", Addison Wesley, 2001
- Hans-Gerhard Gross, "Component based Software testing with UML", Springer-Verlag, Berlin, 2005

SOFTWARE PROJECT PLANNING AND MANAGEMENT

Course Code: CSE4105 **CreditUnits: 03**

Course Objective:

- To provide students with a clear understanding of the unique risks, issues, and critical success factors associated with technology projects
- To introduce students to the role and function of project management

Course Contents:

Module I

Exposure to Software Project Management: Software development as a project, Stakeholders in software project, Software product, process, resources, quality, and cost, Objectives, issues, and problems relating to software projects.

Module II

Overview of Project Planning: Steps in project planning; Defining scope and objectives; work breakdown structure; Deliverables and other products, Gantt, Pert, CPM.

Module III

Software Effort Estimation: Problem in software estimation; Effort estimation techniques COCOMO model, COCOMO II, Risk Analysis and Management: Nature and categories of risk in software development; risk Identification; Risk assessment; Risk mitigation, monitoring, and management, Resource Estimation and Management.

Module IV

Selection of Appropriate Project Approach: Rapid application development; Waterfall model; V-process model; Spiral model; Prototyping,; Incremental delivery. Agile Methods: screen, extreme programming, crystal technologies, Metrics: Token count, fuction count, LOC(with numerical).

ModuleV

Software Quality Assurance : Planning for quality; Product versus process quality management; Procedural and quantitative approaches; Defect analysis and prevention; Statistical process control; Pareto analysis; Causal analysis; Quality standards; ISO 9000; Capability Maturity Model; Quality audit, Mapping of ISO and CMM, Activity planning.

Module VI

Case Study: Detailed example showing all the project management steps.

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:

- Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
- Software Engineering- A Practitioner Approach: Roger S Pressman
- Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.

ADVANCED DATA STRUCTURE AND ALGORITHM DESIGN

Course Code: CSE4111 **CreditUnits: 03**

Course Objective:

The objective of this course is to expose the students to the Fundamentals and advance concepts in Data Structure Using C. This course discusses about Problem solving approaches, Structured Programming Concepts, Guidelines for good Program Structure, Arrays, Stacks, Trees, Graphs, Searching & Sorting and File Structure.

Course Contents:

Module I

Overview of data structures, Review of Arrays, sparse matrices, Stacks, Queues, linked lists , doubly linked lists, Applications, dynamic storage management

Module II

Algorithm analysis, Efficiency of algorithms, Asymptotic Notations, Time complexity of an algorithm, Analyzing Recursive Programs using various strategies

Module III

Divide and Conquer Paradigm: Divide and conquer recurrence equations and their solutions, Review of various sorting techniques using divide and conquer approach, Strassen's matrix multiplication.

Module IV

Trees: Basic terminology, Binary Trees and its representations, Binary Search Trees, Binary Search Tree traversals, Red-Black Trees, AVL Trees and B Trees, applications of trees, Graphs: Terminology, representations, traversals, spanning trees, shortest paths, Basic Graph Algorithms, Depth first search and Breadth first Search and its analysis, single source shortest path problem, Dijkstra's algorithm

Module V

Greedy Paradigm: Basic greedy strategy, Algorithms of Kruskal's and Prim's, greedy strategy in algorithms for the knapsack problem and Huffman trees.

Dynamic Programming paradigm, all pairs shortest path problem, longest common subsequence problems.

Module VI

Back Tracking: general method, 4 Queen's Problem, Branch and Bound: general method, Bounding, 0 / 1 Knapsack Problem. NP – Complete and NP hard problem, SAT problems

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:

- Thomas H. Cormen, Charles E. Leiserson, and Ronald L. Rivest, "Introduction to Algorithms", MIT press and McGraw Hill, 2001.
- Udi Manber, "Introduction to Algorithms: A Creative Approach", Addison Wesley, 1989.
- Ellis Horowitz, Sartajsahni, "Fundamentals of Data Structures" Galgotia book source, New Delhi, 1983.

References:

- Ellis Horowitz, Sartajsahni, "Fundamentals of Algorithms" Galgotia book source, New Delhi, 1986.
- Jean paul Tremblay and paul G. Soresson, "An introduction to Data structures with applications" Mcgraw Hill International editions.
- Seymour Libschutxz, "Theory and problems of Data structures", Mcgraw Hill International editions. (Schaum's outline series).
- Aho, Hopcroft Ullman, "The design and analysis of computer algorithms" Addison Wesley publishing company
- Robert L Cruse : "Data Structures and Program Design" (Prentice Hall India ,3rd Edition 1999)

ADVANCED COMPUTER NETWORKS

Course Code: CSE4112 **Credit Units: 03**

Course Objective:
The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:
Module I : Introduction to Networks
Networking introduction, Reference Models, TCP/IP, OSI, Addressing, Protocol Layering, Transmission impairment, performance, Switching, Transmission Media, Introduction to MAC, Channel allocation, MAC protocol classification for LAN's, MAN's, MAC protocols for Adhoc N/ws, MAC Protocol for WLAN's(adhoc and sensor n/ws), Introduction to Ethernet protocol (Fast, Gigabit and standard Ethernet).

Module II: Network Layer
Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.
IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III : Mobile IP
Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV : Transport Layer and Application Layer
The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.
The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V : Network Security
Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

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

Text & References:
Text:
- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

***References*:**
- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

ADVANCED COMPUTER NETWORKS LAB

Course Code: CSE4114 **Credit Units: 01**

Course Contents:

Various installations and connections of LAN, WAN, ETC

Working on NS2.

Socket Programming using C Language on Linux

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 DATA STRUCTURE AND ALGORITHM LAB

Course Code:CSE4113 **Credit Units: 01**

Software Required: Turbo C++

1 Write a program to implement the following using an array
a) Stack ADT b) Queue ADT

2 Write a program to implement the following using a singly linked list
a. Stack ADT b. Queue ADT

3 Write Program to implement the deque (double ended queue) ADT using a doubly linked list.

4 Write a program to perform the following operations:
a) Insert an element into a binary search tree.
b) Delete an element from a binary search tree.
c) Search for a key element in a binary search tree.

5 Write a program to implement circular queue ADT using an array.

6 Write a program that use non –recursive functions to traverse the given binary tree in
a) Preorder b) inorder and c) post order

7 Write programs for the implementation of BFS and DFS for a given graph

8 Write programs for implementing the following sorting methods:
a) Quick sort b) Merge Sort c) Heap Sort.

9 Write a program to perform the following operations.
a) Insertion into a B-tree b) Deletion from a B-tree

10 Write a program to perform the following operations.
a) Insertion into a AVL-tree b) Deletion from a AVL-tree

11 Write a program to implement Kruskal's algorithm to generate a minimum spanning tree

12. Write a program to implement Dijkstra's algorithm using priority queues

13. Write a program to Implement Prim's and Kruskal's algorithms

14. Write a program to Implement a backtracking algorithm for Knapsack problem

15. Write a program to Implement a branch and bound algorithm for traveling salesperson problem

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

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

DIGITAL COMPUTER ORGANIZATION LAB

Course Code: CSE4107 **Credit Units: 01**

Equipments Required:

Digital trainer kit with P/S, IC Name, 4 bit binary adder – 7483, Decoder (2 x 4) - 74139, MUX (2 x 1) Quad – 74157, MUX (4 x 1) Dual – 74153
Register (4 bit) – 74195, AND, OR, NOT, XOR, GATE, 8085 microprocessor

Experiments to be performed:

- Study and verification of Gates, Adder, Latches, Flip Flops.
- Study and Verification of Shift Registers, Decoders etc.
- Programming using 8085 microprocessor.

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.

SOFTWARE PROJECT PLANNING AND MANAGEMENT LAB

Course Code: CSE4109 **CreditUnits: 01**

Course Contents:

Software Required: MS-Project

Lab Assignments

1. Create any SRS.
2. Create a MS Project application, set the file properties, and set the Project Calender.
3. Using project planning activities, draw the PERT for the project.
4. Draw the Gantt charts for the software project.
5. Using the SPM – manage, plan and organize the project.
6. Using MS project, plan and organize the software and split the task.
7. Using MS Project Link, Move and copy tasks in Software Project
8. Draw the checkpoints and milestones of a project
9. Using MS Project do the time estimation of tasks and Set task dependencies &constraints.
10. Using MS Project assign the resources and set the notes for resources.
11. Using MS Project workspace base line the project and review the critical path

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

COMPILER DESIGN

Course Code: CSE4201 **Credit Units: 03**

Course Objective:
Compilers and interpreters are among the most widely used tools in software development. It is important for a computer scientist to understand the process by which programs written in high-level languages are translated and executed. The main objective of this course is to gain an in-depth understanding of the compilation process.
After you complete this course, you should be able to: describe the theory and practice of compilation, in particular, the lexical analysis, parsing and code generation and optimization phases of compilation, and design a compiler for a concise programming language.

Course Contents:

Module I: Overview
Review of compiler phases – Informal Compiler Algorithm Notation – Symbol Table Structure – Intermediate Representations – Run Time Issues – Support for Polymorphic and Symbolic Languages.

Module II: Analysis & Attribute Grammars
Control Flow Analysis – Data Flow Analysis – Dependency analysis – Alias analysis
Attribute grammars: Analysis, use, tests, and circularity, Issues in type systems.

Module III: Machine Independent Optimization
The Principal Sources of Optimization.Causes of Redundancy, A Running Example: Quicksort ,Semantics-Preserving Transformations , Global Common Subexpressions , Copy Propagation,Dead-Code Elimination, Code Motion,Induction Variables and Reduction in Strength

Module IV: Machine Dependent tasks
Register Allocation – Local and Global Instruction Scheduling – Advanced Topics in Code Scheduling – Low Level Optimizations – Introduction to interprocedural analysis and scheduling.

Module V: ILP Compilation &Dynamic Compilation
ILP Compilation: Issues in compilation for ILP based processors. Effect of VLIW, Speculative, Predicated instructions, multithreaded processors.
Dynamic Compilation: Introduction, methods, case studies, implementation.

Examination Scheme:

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

Text & References:
Text:
- Steven Muchnick. Advanced Compiler Design Implementation, Morgan Kauffmann Publishers, 1997
- Aho, A. V, Sethi, R. and Ullman, J. D. Compilers: Principles, Techniques and Tools, Addison Wesley, 1986

References:
- Appel, A. W. Modern Compiler Implementation in Java, Cambridge University Press, 2000.
- Kenneth. C. Louden, Compiler Construction. Principles and Practice. Thomson, 2003.

ENTERPRISE JAVA APPLICATIONS USING J2EE

Course Code: CSE4202 **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
J2EE Architecture, N-Tier Architecture, Application Server, Application Server Services, Server Management and Control, Configuration, Monitoring and Mapping of Server, Deployment Issues, Performance Tuning and Security.

Module II
Implementing J2EE Applications, Database connection using JDBC API, Servlets, Java Server Pages. Overview of EJB, Session EJBs, Entity EJBs, and MDB, The Model-View-Controller Architecture, Overview of Struts, Implementation of Struts Framework.

Module III
Overview of XML, XML fundamentals, well-formed XML documents, components of XML document, DTD, Attributes and Entities of DTD, XML style sheets, XSL, CSS, XML namespaces, implementing J2EE Application using XML, Deployment descriptor, Mapping file.

Module IV
Hibernate: Principles of Object Relational Mapping, Hibernate configuration, HQL making objects persistent, Hibernate semantics, Session management, flushing, concurrency and Hibernate, Optimistic and Pessimistic Locking, Object mapping Mapping simple properties, Single and multi valued associations, Bi-directional associations, Indexed collections.

Module V
Application Servers (Case Study of any one of Apache Tomcat, BEA Weblogic, JBoss), Service-Oriented Architectures SOAP, SOAP message structure, handling errors WSDL, UDDI. Java Web Service JAX-RPC.

Examination Scheme:

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

Text & References:

Text:

- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming (a Press) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition (PHI) By Webber
- Jim Farley, William Crawford, O'Reilly and Associates, "Java Enterprise in a Nutshell", 2005
- Java Server Programming J2EE 1.4 Edition (Dreamtech)
- Brett McLaughlin, O'Reilly, "Java and XML, 2nd Edition, 2001

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
- JaisonHunder& William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, "JAVA 2" PEARSON publication
- Elliott Rusty Harold and W. Scott Means, O'Reilly, "XML in a Nutshell", 2001
- James Cooper, "Java Design Pattersn: A Tutorial", Addison Wesley
- GovindSesadri, "Enterprise java Computing: Application and Architectures", Cambridge University Publications, 1999
- "Rule Based Expert Systems", Narosa Publishing House, 1994.

SOFT COMPUTING

Course Code: CSE4203 **CreditUnits: 04**

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. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

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. VijayalakshmiPai, 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

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: CSE4213 **Credit Units: 02**

Course Objectives: The course will enhance scientific , technical and research writing skills and impartknowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination**.**

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

COMPILER DESIGN LAB

Course Code: CSE4206 **CreditUnits: 01**

Course Contents:

Programming Language: C/C++

Assignments:

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. WAP to calculate LEADING and TRAILING of a grammar.
8. WAP to calculate FIRST and FOLLOW of a grammar.

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.

ENTERPRISE JAVA APPLICATIONS USING J2EE LAB

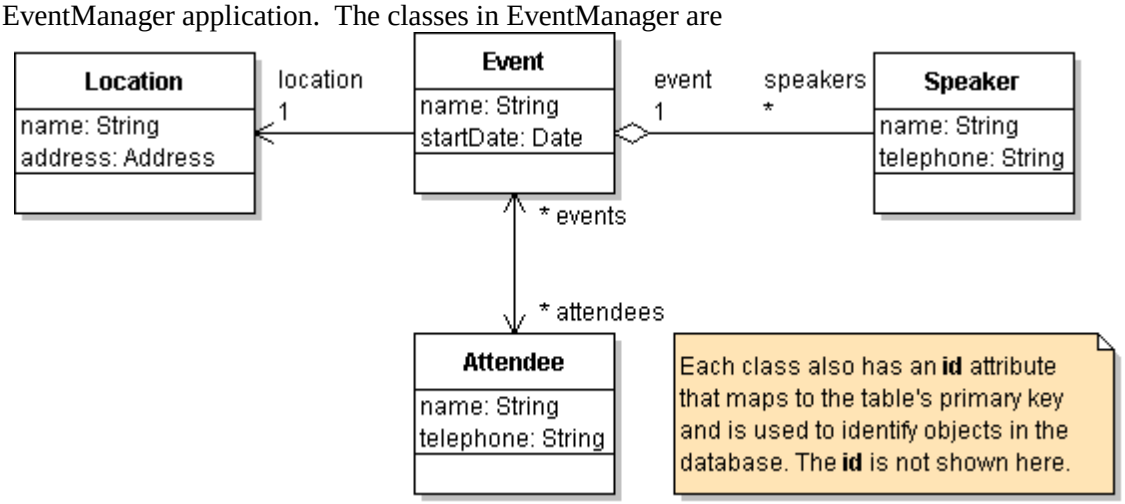
Course Code: CSE4207 **Credit Units: 01**

Course Contents:

Programming Language: JAVA

Assignments:

1. Write a Program to access a table Product Master from MySql4.1 database using Java code.
2. Write a Program using Servlet to display Visitor Count.
3. Write a Program using Servlet to Differentiate between Frequent visitor and a new visitor.
4. Write a Program for authentication, which validate the login-id and password by the servlet code.
5. Write a Program to connecting a database using user-id and password.
6. Write a Program to insert data into the database using the prepared statement.
7. Write a Program to read data from the database using the Resulset.
8. Write a Program to read data send by the client (HTML page) using servlet.
9. Write a Program to include a HTML page into a JSP page.
10. Write a Program to display httprequest Header in JSP.
11. Write a Program to handle the JSPException.
12. Write a Program to read data send by a client (HTML page) using JSP.
13. Write a Program to Develop Login Form in Struts.
14. Create an Enterprise application using Session Bean(Stateless) which convert the amount from Dollar to Rupees.
15. Write a Enterprise Session bean to simulate a income Tax Calculator.
16. Write a Entity bean to find a student record in student data base using primary key property.
17. Write a XML DTD document to validate and authenticate Student Details.
18. Create an XML version of the citations, Create an XML Schema that will be used to validate the XML, Create an XSL Stylesheet that will transform the citations data into HTML.
19. Write a Program to query record based on primary key using Hibernate.
20. Write a Program using Hibernate to develop classes and Hibernate configuration to persist an EventManager application. The classes in EventManager are



Examination Scheme:

IA				EE	
PR	**LR**	**V**	**AT**	**PR**	**V**
10	10	5	5	35	35

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

SYSTEM SOFTWARE

Course Code:CSE4208 **Credit Units: 04**

Course Objective:
The objective of this course is to expose the students to the fundamentals & basic concepts Systems Software. This course discusses Components of System Software, Macros & Macro Processors, Loaders & Linkers, Basic Operating System Functions, Access to system services etc.

Course Contents:

Module I
Components of System Software, Evolution of System Software. General Machine Structure (Memory, Register, Data, Instructions), Machine Language, Assembly Language Program. Assemblers-basic assembler functions, Design of Two Pass Assembler, Translators: Interpreters, Brief description of different phases of compiler.

Module II
Macros & Macro Processors-Macro Instructions, Macro calls and Expansion, Machine-Independent Macro Processor Features, Macro Processor Design Options, Implementation of a Restricted Facility-A two pass algorithm, A Single Pass Algorithm, Implementation of Macro Calls within Macros.

Module III
Loaders & Linkers, Basic Loader Functions, Compile & Go-Loaders, General Loader Scheme, Absolute Loaders, Self- Relocating Loaders, Direct-Linking Loaders, Binders, Overlays, Dynamic Linking, Bootstrap Loaders, Design of an Absolute Loader, Design of a Direct-Linking Loader.

Module IV
Basic Operating System Functions, Machine-Dependent Operating System Features, Machine-Independent Operating System Features, Types of Operating System Software Tools for Program Development: Text Editors, Program Generators, Debug Monitors

Module V: Access to system services
ROM, BIOS, DOS, Mouse and EMS (Expanded Memory Specifications) Functions, Keyboard and Screen Management. Introduction to Terminal Emulator. DOS Device Drivers: Types, Structure and Processing. Interrupt Types, Organization, Interrupt Hardware, Program Status Register (PSR), Interrupt Processing.

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:
- Leland L. Beck, "System Software—An Introduction to Systems Programming", Addison Wesley.

References:
- D.M. Dhamdhere, "Systems Programming & Operating Systems", Mc Graw Hill
- John J. Donovan, "Systems Programming", Mc Graw Hill.

ADVANCED COMPUTER ORGANIZATION

Course Code: CSE4209 **Credit Units: 04**

Course Objective:
The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Contents:

Module I
Overview of Parallel computing, Parallelism in Uniprocessor Systems, Parallel computer structures, Pipeline computers, Array computers, Multiprocessor system, Dataflow computers. Architectural Classification schemes, parallel processing applications.

Module II: Pipelining Processing
An overlapped parallelism, Principal of Linear Pipelining, Classification of linear pipline Instruction and Arithmetic pipelines.
Principles of designing pipelined processors, Internal forwarding and register tagging. Hazard detection and resolution, Job sequencing and collision prevention, Characteristics of Vector processing, Multiple vector task dispatching.

Module III
SIMD array processor, SIMD computer organization, Masking and Data routing, SIMD Interconnection network: Static, Dynamic networks, Cube interconnection network, Shuffle exchange and Omega Network, SIMD Matrix multiplication.

Module IV: Multiprocessor Architecture
Tightly and loosely coupled multiprocessors, Introduction to Data flow computing and flow Graph, Introduction to 8 bit and 16 bit Intel Microprocessor architecture and register set.

Module V
Assembly language programming based on Pentiums; Instruction: Data transfer, Logic, Branch operations, Looping Counting, Indexing, Programming Technique, Counters and Time Delays, Stacks and subroutines, Conditional call and Return Instructions.

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:

- Hwang and Briggs, " Computer Architecture and parallel processing", McGraw Hill
- R.S Goankar, "Microprocessor Architecture, programming and application with the 8085", Pen Ram International.
- Peterson and Heresy, Quantitative approach to Computer architecture", Morgan Kaufman.
- Hwang, "Advanced Computing Architecture", McGraw Hill.
- Quin, "Parallel Computing, Theory and Practices", McGraw Hill.
- Daniel Tabak, "Advanced Microprocessor", McGraw Hill.
- Hall D.V, "Microprocessor and Interfacing, Program and hardware"

SYSTEM SIMULATION AND MODELING

Course Code:CSE4210 **Credit Units: 04**

Course Objective:
The objectives are to: a) familiarize the student with a variety of modelling and simulation techniques, b) teach the student which techniques are applicable under what circumstances, c) stress the advantages and disadvantages of the various approaches that are commonly used, d) give the student practical experience in composing models and running simulations under a variety of circumstances and, e) discuss the presentation of results from modeling and simulation.

Course Contents:

Module I: Introduction
System definition and components, stochastic activities, continuous and discrete Systems, System modeling, types of models, static and dynamic physical models, Static and dynamic mathematical models, types of system study.

Module II: System Simulation & Types
System simulation, Why to simulate and when to simulate, Basic nature of simulation, technique of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem single-server queuing system and an inventory problem, Monte Carlo simulation.

Module III: Continuous time and discrete-time System
Simulation of continuous systems, analog vs. digital simulation, simulation of a servo system, simulation of an autopilot Discrete system Simulation, Fixed time-step vs. event-to-event model, generation of random numbers, Test for randomness, Generalization of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

Module IV: Statistical Models in Simulation
Common discrete and continuous distributions, Poisson process, Random Numbers: Properties of random numbers, generation of pseudo random numbers, techniques of random number generation, tests for randomness.

Module V: Queuing Models
Characteristics of queuing systems, notation, transient and steady state behaviour, performance, network of queues. Large Scale systems: Model Reduction, hierarchical control, decentralized control, structural properties of large-scale systems.
Simulation of PERT networks, Critical path computation, uncertaintities in Activity duration, Resource allocation and consideration.

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:

- Geoftrey Gordon, "System Simulation", PHI
- NarsinghDeo, "System Simulation with digital computer", PHI
- Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", TMH
- K.S Trivedi "Probability and Statistics with Reliability Queuing & Computer Sciences Applications.
- W.Feller "An Introduction to Probability Theory and its Application,Wiley Eastern Ltd .

ADVANCED DBMS

Course Code: CSE4211 **Credit Units: 04**

Course Objective:
The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:
Module I: Relational Databases
Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization
Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.
Objected Oriented and Object Relational Databases
Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases
Distributed Data Storage – Fragmentation & Replication, Location and Fragment
Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.
Advanced Transaction Processing
Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV
Multimedia databases,Databases on the Web and Semi–Structured DataCase Study: Oracle Xi

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*:**
- Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

***References*:**
- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

DISTRIBUTED OPERATING SYSTEM

Course Code:CSE4212 **Credit Units: 04**

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, 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
Modes of communication, System Process, Interrupt Handling, Handlinf Systems calls, Protection of resources &Resources Management Micro-Kernal Operating System.

Module II
Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks..
Inter process communication, Linux, IPC Mechanism, Remote Procedure calls, RPC exception handling, security issues, RPC in Heterogeneous Environment (case study Linux RPC)

Module III: Clock Synchronization
Logical clocks, Physical clocks, clock synchronization algorithms, Mutual Exclusion, Election Algorithms, Dead locks in Distributed Systems. Thrashing, Heterogeneous DSM, Resource Management (Load Balancing approach, Load Sharing approach), Process Management: process Migration, Thread.

Module IV
Overview of shared memory, consistency model, Page based Distributed Shared Memory, Shared – variable Distributed Memory, Object -based Distributed Memory.

Module V
File models, File access, File sharing, file-caching, File Replication, fault Tolerance, Network File System, (case study, 8NFS on Linux Directory Services, Security in Distributed File system.

Examination Scheme:

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

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

Text & References:

- M. Beck et al Linux Kernal, Internal Addition Wesley, 1997.
- B.W. Kernighan and R Pide, The Unix Programming Environment Prentce Hall of India-2000.
- Asilberschatz P.B Garvin Operating System Concept, John Wiley & Sons (Asia) Pte 2000.
- Cox K, "Red Hat Linux Administrator's Guide". PHI (200).

Syllabus - Third Semester

DATA WAREHOUSING AND DATA MINING

Course Code: CSE4301 **CreditUnits: 03**

Course Objective:
To demonstrate new concepts of organizing data ware house & data mining technique to drive the useful information out of the piles of data. This course will expose students to the process of extracting patterns from large data sets by combining methods from statistics and artificial intelligence with database management

Course Contents:

Module I: Data Warehousing
An Introduction to data ware housing and characteristics of a data warehouse, various aspects of data marts. Data warehouse logical design: star schemas, fact tables, dimensions, other schemas, materialized, views, Data warehouse physical design: hardware and i/o considerations, parallelism, indexes.

Module II: On Line Analytical processing
OLTP and OLAP systems, Data Modelling, OLAP Tools, web OLAP, Decision support system.Developing a Data Ware house: Architectural strategies and Organization Issues, Design Considerations, Tools for Data Warehousing,

Module III: Data Mining
Data mining approaches and methods: concept description, classification, association rules, clustering, Mining complex types of data, Research trends in data warehousing and data mining. Objectives of Data Mining the Technical context for Data Mining, machine learning, decision support and computer technology.

Module IV: Data Mining Techniques and Algorithms
Process of data mining, Algorithms, Data base segmentation or clustering, predictive Modelling, Link Analysis, Data Mining Techniques, Automatic Cluster Detection, Decision trees and Neural Networks.

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:
- "Data Mining: Concepts and Techniques", J.Han, M.Kamber, Academic Press, Morgan Kanf man Publishers, 2001.
- .Data Warehousing Fundamental for IT Professionals,PaulrajPonniah
- Data Mining Techniques ,Arun k. Pujari.

References:
- "Mastering Data Mining: The Art and Science of Customer Relationship Management", by Berry and Lin off, John Wiley and Sons, 2001.
- "Data Ware housing: Concepts, Techniques, Products and Applications", by C.S.R. Prabhu, Prentice Hall of India, 2001
- "Data Mining", by Pieter Adrians, DolfZantinge, Addison Wesley, 2000.
- "Data Mining with Microsoft SQL Server", by Seidman, Prentice Hall of India, 2001.

SOFTWARE TESTING AND QUALITY ASSURANCE

Course Code: CSE4302 **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

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

NETWORK SECURITY AND MANAGEMENT

Course Code: CSE4303 **Credit Units: 04**

Course Objective:
The objective of this course is to identify the different network security measures and to analyze each of them. To study protocols, issues related to implementation of network security.

Course Contents:
Module I
Classical Cryptography, Various types of Cipher, Cryptanalysis, Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access). Threats - Viruses, worms, Trojan horse, bombs, trap doors, spoofs, email virus, macro Viruses, remedies, Intruders, Malicious software, Firewalls, vulnerabilities & Threats, Network Denial of service attack.

Module II
Technologies - Switching Design, Switching Types - Layer 2 and 3 Switching, Spanning Tree Protocol, Redundancy in Layer 2 Switched Networks, STP Terminology and Operation, Virtual LANs – Trunks - Inter-VLAN Routing - Multilayer Switching, Switching Security and Switching Design Considerations IPv4 Routing Design.
IPv4 Address Design - Private and Public Addresses – NAT - Subnet Masks - Hierarchical IP Address Design - IPv4 Routing Protocols – Classification - Metrics - Routing Protocol Comparison - IPv4 Routing Protocol Selection.

Module III
Network Security Design, Hacking – Vulnerabilities - Design Issues - Human Issues - Implementation Issues – Threats - Reconnaissance Attacks - Access Attacks - Information Disclosure Attacks - Denial of Service Attacks - Threat Defense - Secure Communication - Network Security Best Practices - SAFE Campus Design.

Module IV
Network Security-Kerberos, X.509, some network security projects- SDNS, DISNet,
Project MAX, Secure NFS Security- E-Mail Security, IP security, Web security, Server security-security for network server, web servers, mobile technologies (java and Java script etc)

Module V
Network Management Design: ISO Network Management Standard - Protocols and Tools – SNMP – MIB – RMON - Cisco NetFlow – Syslog – CiscoWorks - Network Management Strategy - SLCs and SLAs - IP Service-Level Agreements – Content Networking Design – Case Study – Venti Systems.

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 Security, Dictergouman, John Wiley & Sons
- Craig Zacker, "The Complete Reference: Upgrading and Troubleshooting Networks", Tata McGraw-Hill, 2000.

References:
- Computer Security: Art and Science, Mathew Bishop, Addison-Wisley
- Introduction to computer Security- Mathew Bishop, Addison-Wisley
- Network security, Kaufman, Perlman and Speciner, Pearson Education
- Cryptography and Network Security, William Stallings, Pearson Education
- Diane Tiare and Catherine Paquet, "Campus Network Design Fundamentals", Pearson Education, 2006.

DATA WAREHOUSING AND DATA MINING LAB

Course Code: CSE4304 **CreditUnits: 01**

Course Contents:

Software Required: Informatica Tool, Cognos, Todd.

Assignments:

1. Write a program to implement text mining.
2. Write a program to implement web mining.
3. Write a program to develop snowflake schema.
4. Write a program to develop the tree schema with the help of binary tree.
5. Write a program to implement BFS and DFS with respect to 2-D modeling.
6. Write a program to implement the basic step of informatics tool.
7. Write a Program to implement the K-means algorithm
8. Write a Program to implement PAM K-medoids algorithm
9. Write a Program to implement AGNES hierarchical clustering
10. Do the compare between K-Means, K-Medoid, hierarchical clustering Results

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.

SOFTWARE TESTING AND QUALITY ASSURANCE LAB

Course Code:CSE4305 **Credit Units: 01**

Course Contents:

Programming Language: Rational Robot

Assignments:

- Preparing test cases and bug reports
- Test the login page
- Test the registration process
- Use of Test director and winrunner for preparing test scripts.
- Preparing Test Plan.

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.

SOFTWARE REQUIREMENT ELICITATION AND ESTIMATION

Course Code:CSE4306 **Credit Units: 03**

Course Objective:
The objective of this course is to describe the processes of requirements elicitation and analysis and to introduce a number of requirements elicitation and requirements analysis techniques .To provide a clear understanding to students how prototypes may be used in the Requirement Elicitation Process.

Course Contents:

Module I
Introduction to software life cycle, management activities in a software project, Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases,

Module II
Requirements engineering: Requirements Elicitation, Requirement Elicitation techniques, Requirement Analysis, Requirement Analysis Models, Requirement Documentation, Requirement Management, Modelling with UML: Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams.

Module III
Size Estimation: Function Point Analysis, Mask II FPA, LOC estimation, Conversion between size measures
Effort, schedule & cost estimation: Estimation factors, COCOMO, Putnam Estimation Model, Estimation by Analogy, Validating Software Estimates

Module IV
Tools: Software Estimation Tools
Industry Resources; IFPUG, UQAM-SEMRL, COSMIC, IEEE, COCOMO-II

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:

- Kishore, Swapna, "Software Requirements and Estimation", Tata McGraw Hill, 2001
- Norman E. Fenton, "Software Metrics: A Rigorous and Practical Approach", International Thomson Computer Press, 1996.
- Henderson-Sellers, "Object-Oriented Metrics, Measures of Complexity", Prentice Hall, 1996.

PATTERN RECOGNITION AND IMAGE PROCESSING

Course Code: CSE4307 **Credit Units: 03**

Course Objective:
This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop

Course Contents:

Module I: Introduction
Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation
Bayesian Decision Theory
Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifiers, discriminant functions, and decision surfaces

Module II:
Normal density:
Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound
Bayesian decision theory and context

Module III: Un-supervised learning and clustering
Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering, similarity measures, criteria function for clustering

Module IV: Image Fundamentals and Transforms
Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.

Module V: Image Segmentation and Edge Detection:
Region Operations, Crack Edge Detection,
Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,

Examination Scheme:

Components	CT	H	V/S/Q	EE
Weightage (%)	10	07	08	70

Text & References:
Text:
- "*Fundamentals of speech Recognition"*, LawerenceRabiner, Biing – Hwang JuangPearson education.
- "*Pattern classifications"*, Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
- R.C Gonzalez and R.E. Woods, "*Digital Image Processing",* Addison Wesley.

***References*:**
- "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
- A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
- "Digital Image Processing"– M. Anji Reddy, BS Publications.

ASP .NET

Course Code:CSE4308 **CreditUnits: 03**

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

Course Contents:

Module I: Introduction to .NET technologies
Features of .NET, .NET Framework, CLR, MSIL, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET. Concept of Master Page ,
Introduction to Web Technologies, Overview of HTML ,JavaScript .

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.

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,COM/COM+ 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.

SOFTWARE REQUIREMENT ELICITATION AND ESTIMATION LAB

Course Code:CSE4309 **CreditUnits: 01**

Course Objective:
To use UML in real time projects

Course Contents:
1. Draw the use case diagram of ATM machine.
2. Draw the class diagram of Web based application
3. Draw the activity diagram of Flight Reservation system
4. Draw the sequence diagram of Bank Information system.
5. Draw the state chart diagram of ATM machine
6. Draw the collaboration diagram of Research centre
7. Draw the component diagram of ATM machine
8. Draw the use deployment of ATM machine
9. Package diagram of above all case studies .
10. Case Study of Library Management system .

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.

PATTERN RECOGNITION AND IMAGE PROCESSING LAB

Course Code:CSE4310 **CreditUnits: 01**

Course Contents:

1. Study of functions in MATLAB.
2. Linear and Non-linear operations on Images.
3. Implementation of different geometric transformations (Scaling, Rotation, Translation, Shear).
4. Implementation of Identity transformation, Contrast Stretching, Threshold and Log Transformation.
5. Plotting of Histogram for Low contrast, High Contrast, Blurred Images, Black & white images and Gray Images.
6. Smoothening and Sharpening of Images using spatial filters.
7. Implementation of Fourier Transformation of different types of Images.
8. Implementation of Edge detection in different-2 images.
9. Implementation of clustering.
10 Implementation of different algorithms in pattern recognition.

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:

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

ASP.NET LAB

Course Code:CSE4311 **CreditUnits: 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.

- Create a Website to demonstrate Master Page .
- Database Connectivity (ADO.NET) concept.
- Create a simple web form to apply all validation controls.

REAL TIME OPERATING SYSTEM

Course Code:CSE4312 **CreditUnits: 03**

Course Objective:
The purpose of this course is to develop in-depth skills in Real Time Operating Systems. At the end of the course, student should be able to review concepts of Operating Systems, Real Time Models and Languages. Introduction to Real Time Kernels and case studies of various Real time OS

Course Contents:

Module I
Introduction to Real Time Systems, Prioritites, Embedded Systems, Task, Classification & Requirements, Deadlines, Soft, Hard.

Module II
Firm Real Time Systems, Introduction to Real Time Operating Systems, Basic Principles, system calls, Files, Processes, Design and implementation of processes, Communication between processes, operating system structures. Task Management, Inter Process Communication, Case Studies of Maruti II, HART OS, VRTX etc. Comparison and Study of RTOS -VxWorks and μCoS, Introduction to POSIX and OSEK standards, Principles, Polled loop systems, RTOS porting to a target.

Module III
Characterizing Real Time Systems and Task, Task Assignment & Scheduling Theory, Fixed and Dynamic Priority Scheduling, Uniprocessor (RM and EDF), Multiprocessor (Utilization Balancing, Next-fit for RM & Bin-Packing Assignment for EDF) Scheduling

Module IV
Event based, Process based, Graph models, Pettrinet models, RTOS tasks, RT scheduling, Interrupt processing, Synchronization, Control blocks, Memory requirements.

Module V
Fault, Fault Classes, Fault Tolerant Real Time System, Clocks, Clock Synchronization, Issues in Real Time Software Design.

ExaminationScheme:

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:

- Krishna, C.M, "Real Time Systems", McGraw Hill
- Jane W.S. Liu, "Real Time Systems", Pearson Education Asia
- Levi and Agarwal, "Real Time Systems", McGraw Hill
- Mathi& Joseph, "Real Time System: Specification, Validation & Analysis", PHI
- Hermann K," Real time systems-design principles for distributed embedded Applications", kluwer academic, 1995.
- Charles Crowley" operating systems- A design oriented approach" McGraw Hill.
- RAJ BUHR, DL Beily, "An introduction to real time systems" PHI, 1999.
- CM Krishna, Kang G. Shin, "Real time Systems", Mc Graw Hill, 1997.
- Raymond J.A., Donald L Baily, "An introduction to real time operating systems" PHI, 1999.

MOBILE COMPUTING

Course Code:CSE4313 **CreditUnits: 03**

Course Objective:
The objective of this subject is to make students familiar about the basic concepts mobile technology, computing and market

Course Contents:

Module I: Introduction
Wireless Networks, Wireless VS Wired Networks, Mobile Devices, Mobile Applications**,** Challenges in mobile computing, coping with uncertainties, resource poorness, bandwidth, etc. Cellular architecture, co-channel interference, frequency reuse, capacity increase by cell splitting, GSM Architecture, GSM-Air Interface, protocols, localization & calling,
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.
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

Module II: (Wireless) Medium Access Control
Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).
Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Module III: Database Issues
Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and transactional models, query processing, recovery, and quality of service issues.
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.
Context Aware Computing: Ubiquitous computing, concept of context, context aware computing and applications, middleware support.
Mobile Middleware: Service discovery, adaptation, mobile agents.

Module IV: Mobile Data Communication
W LANs (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).
Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module V: Global Mobile Satellite Systems
Mobile Satellite Systems (GEO, MEO and LEO), case studies of the IRIDIUM and GLOBALSTAR systems. GPS.
Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, Wireless sensor Network, wireless Security.

ExaminationScheme:

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 &ImrichChlamtac, 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.

NEURAL NETWORK AND FUZZY LOGIC

Course Code: CSE4314 **CreditUnits: 03**

Course Objective:
Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc.Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing.
This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Contents:

Module I
Basic neural computation models: Network and node properties. Inference and learning algorithms.
Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.

Module II
Self organizing networks: Kohonen algorithm, bi-directional associative memories.
Hopfield Networks: Hopfield network algorithm.
Adaptive resonance theory: Network and learning rules. Neural network applications.

Module III
Fuzzy Sets: Operations and properties.
Fuzzy Relations: Cardinality, Operations and properties.
Value Assignments: Cosine amplitude and max-min method.
Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.

Module IV
Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning.
Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.

Module V
Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.

ExaminationScheme:

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:

- Limin Fu. “Neural Networks in Computer Intelligence” McGraw Hill, 1995.
- Freeman J. A., and Skapura D. Mu. “Neural Networks Algorithms applications and Programming Techniques”, Addison Wesley New York, 1991.
- Timoty J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw Hill1997.
- Bart Kosho “Neural Network and Fuzzy Systems”, Prentice Hall of India,1994

AD HOC AND WIRELESS SENSOR NETWORK

Course Code: CSE4315 **CreditUnits: 03**

Course Objective:
This is an advanced networking course designed for students with computer networks background. The goal is to provide students with a broad perspective on the active research areas in wireless ad hoc and sensor networks, and in the process leads them toward exploring their research experiences. The expectation is an interesting demo and/or a short conference/workshop paper by the end of this course. This course welcomes students from different backgrounds, reflecting the multi-disciplinary nature of ad hoc and sensor networks.

Course Contents:

Module I: Introduction of ad-hoc/sensor networks
Key definitions of ad-hoc/sensor networks, Advantages of ad-hoc/sensor networks, Unique constraints and challenges, Driving Applications, Traffic Profiles , Types of Ad hoc Mobile Communications, Wireless Communications/Radio Characteristics, Mobile host movement and Movability Models, Challenges facing Ad Hoc Mobile Networks.

Module II: Ad Hoc wireless MAC protocols
Introduction, Synchronous and asynchronous MAC protocols, Problem in Ad Hoc channel access, Receiver-initiated and sender-initiated MAC protocols, Existing Ad Hoc MAC protocols, Issues in designing MAC protocols, Classifications of MAC protocols, MAC protocols, Ad Hoc Routing Protocols- Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Issues in designing routing protocols,
Classifications of Routing Protocols: Proactive Routing Protocol, Reactive Routing Protocol, Hybrid Routing Protocol, Advance Routing Protocols

Module III: Multicast routing In Ad Hoc Networks
Introduction, Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh- Based Multicast Routing Protocols, Summary of Tree-and Mesh-Based Protocols - Energy-Efficient Multicasting, Multicasting with Quality of Service Guarantees, Application Dependent Multicast Routing, Comparisons of Multicast Routing Protocols.

Module IV: Networking Sensors
Unique features, Deployment of ad-hoc/sensor network ,Sensor tasking and control, Transport layer and security protocols, Issues in Designing a Transport Layer Protocolfor Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning.

Module V: Sensor Network Platforms and Tools
Berkley Motes, Sensor network programming challenges, Embedded Operating System, Simulators Applications of Ad-Hoc/Sensor Network and Future Directions. QoS and Energy Management

Examination Scheme:

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

Text & References:

- Siva Ram Murthy and B.S. Manoj "Ad Hoc Wireless Networks: Architectures and Protocols",Pearson Education.
- C.K. Toh, "Ad Hoc Mobile Wireless Networks: Protocols and Systems", Pearson Education.
- George Aggelou, "Mobile Wireless Networks", Tata McGraw- Hill.
- Charles E. Perkins, Ad Hoc Networking, Pearson Education.

SUMMER INTERNSHIP EVALUATION

Course Code: CSE4335 **Credit Units: 06**

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 be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of 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 Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. 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. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Acknowledgements-This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.
5. Abstract and **Keywords-**This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
7. Contents-This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
8. **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.
9. **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.

10. **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

Continuous Internal Assessment	**Final Assessment**
40 Marks	60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

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

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

DISSERTATION-I

Course Code: CSE4337 **CreditUnits: 05**

GUIDELINES FOR DISSERTATION

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 DISSERTION, 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. *ClinMicrobiol 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 DISSERTATION 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**

ata, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.

- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

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

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

Syllabus - Fourth Semester

DISSERTATION-II

Course Code: CSE4437 **CreditUnits: 15**

GUIDELINES FOR DISSERTATION

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 DISSERTION, 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**

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- **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. *ClinMicrobiol 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 DISSERTATION 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**

ata, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)

- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

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

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

Has the student made a clear statement of the objective or objective(s).
If there is more than one objective, do these constitute parts of a whole?
Has the student developed an appropriate analytical framework for addressing the problem at hand.
Is this based on up-to-date developments in the topic area?
Has the student collected information / data suitable to the frameworks?
Are the techniques employed by the student to analyse the data / information appropriate and relevant?
Has the student succeeded in drawing conclusion form the analysis?
Do the conclusions relate well to the objectives of the project?
Has the student been regular in his work?
Layout of the written report.

Assessment Scheme:

Continuous Evaluation: (Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		40%
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	