KANNUR UNIVERSITY

FACULTY OF ENGINEERING

Curricula, Scheme of Examinations & Syllabus for Semesters V & VI of B.Tech. Degree Programme in Computer Science & Engineering with effect from 2007 Admissions

FIFTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6 CS 501	Engineering Mathematics IV	3	1	-	50	3	100
2K6 CS 502	Economics & Business Management	3	1	-	50	3	100
2K6 CS 503	Theoretical foundation of Computation	3	1	-	50	3	100
2K6 CS 504	Programming Language Concepts	3	1	-	50	3	100
2K6 CS 505	Operating Systems	3	1	-	50	3	100
2K6 CS 506	Software Engineering	3	1	-	50	3	100
2K6 CS 507(P)	Programming Environment Lab	-	-	3	50	3	100
2K6 CS 508(P)	Systems Lab	-	-	3	50	3	100
TOTAL		**18**	**6**	**6**	**400**	**-**	**800**

SIXTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6 CS 601	Environmental Engg: & Disaster Management	3	1	-	50	3	100
2K6 CS 602	Graph Theory & Combinatorics	3	1	-	50	3	100
2K6 CS 603	Data Base Management Systems	3	1	-	50	3	100
2K6 CS 604	Compiler Design	3	1	-	50	3	100
2K6 CS 605	Data Communication & Computer Networks	3	1	-	50	3	100
2K6 CS 606	Elective - I	3	1	-	50	3	100
2K6 CS 607(P)	Networks & DBMS Lab	-	-	3	50	3	100
2K6 CS 608(P)	Compiler Lab	-	-	3	50	3	100
TOTAL		**18**	**6**	**6**	**400**	**-**	**800**

Elective I

2K6 CS 606 (A) – Distributed Computing
2K6 CS 606 (B) - Bioinformatics
2K6 CS 606 (C) – Software Project Management
2K6 CS 606 (D) – Digital Signal Processing
2K6 CS 606 (E) - Entrepreneurship
2K6 CS 606 (F) – Advanced Mathematics

2K6 CS 501 ENGINEERING MATHEMATICS IV

3 hours lecture and 1 hour tutorial per week

Module I Probability distributions (13 hours)
Random variables-Probability distributions - binomial distribution –Poisson distribution-normal distribution –Mean, variance and Moment generating function -Poisson process - Chebyshev's theorem- Geometric Distribution-Uniform Distribution, Gamma distribution, Beta Distribution, Exponential Distribution and Hyper-Geometric Distributions.

Module II Statistical inference (13hours)
Population and Sample-Sampling Distributions of Mean and Variance-Point Estimation-Interval Estimation -Null Hypotheses and Significance tests-Hypotheses concerning one mean- Confidence Intervals of mean and variance - Estimation of Variances-Hypotheses concerning one variance-Hypotheses concerning two variance- Chi square test as test of goodness of fit.

Module III (Series solutions of differential equations (13hours)
Power series method of solving ordinary differential equations - series solution of Bessel's equation – Recurrence formula for Jn(x)-expansions for J_0 and J_1 – value of $J_{1/2}$- generating function for Jn(x)- Orthogonality of Bessel functions - Legendre's equation – series solution of Legendre's differential equation -Rodrigues formula-Legendre Polynomials – Generating function for Pn(x)- Recurrence formulae for Pn(x) -Orthogonality of Legendre polynomials

Module IV Quadratic forms and Fourier Transforms (13 hours)
Quadratic forms - Matrix associated with a quadratic form - Technique of Diagonalization using row and column transformations on the matrix - Definite, Semidefinite and Indefinite forms - their identification using the Eigen values of the matrix of the quadratic form.
Fourier Transform-Properties of Fourier Transforms-Linearity property-Change of scale property-shifting properties –Modulation property-Transform of the Derivative-simple problems- Fourier Cosine transform-Fourier Sine Transform.

Text book
Johnson RA, Miller & Freund's Probability and Statistics for Engineers, Prentice Hall of India
(For Module I and II only)

Reference Books
1. Wylie C R & Barrett L. C., Advanced Engineering Mathematics, Mc Graw Hill
2. Kreyszig E., Advanced Engineering Mathematics, John Wiley.
3. Bali N. P. & Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications
4. Grewal B. S, Higher Engineering Mathematics, Khanna Publishers

Sessional work assessment

Two tests	2 x 15 = 30
Two assignments	2 x 10 = 20
Total marks	= 50

University Examination Pattern
Q I - 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions of 15 marks each from module I with choice to answer any one.
Q III - 2 questions of 15 marks each from module II with choice to answer any one.
Q IV - 2 questions of 15 marks each from module III with choice to answer any one.
Q V - 2 questions of 15 marks each from module IV with choice to answer any one.

2K6 CS 502 ECONOMICS & BUSINESS MANAGEMENT

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Definition of economics-nature and scope f economic science-nature and scope of managerial economics-central problems of an economy-scarcity and choice-opportunity cost-objectives of business firms-forms of business-proprietorship-partnership-joint stock company-co-operative organization-state enterprise

Module II (14hours)

Consumption – wants –characteristics of wants- law of diminishing marginal utility- demand – law of demand-elasticity of demand- types of elasticity-factors determining elasticity-measurement- its significance in business-demand forecasting-methods of demand forecasting- supply – law of supply- elasticity of supply

Module III (14hours)

Production – factors of production – features of production – features of factors of production- division of labour – production function- Cobb-Douglas production function-production possibility curve-isoquants-marginal rate of technical substitution- properties of isoquants -law of variable proportions- returns to scale-isocost line-least cost combination of factors-expansion path-technical and economical efficiency-linear programming –graphical method-economics of large scale production.

Module IV (12hours)

Market structures and price determination – perfect competition-monopoly -monopolistic competition-oligopoly-kinked demand curve-money and banking-nature and functions of money-money market and capital market-commercial banks –functions-central banking functions-methods of credit control.

Text books and References

1 Varshney R.L & Maheshwari K.L , Managerial economics, S Chand & Co. Ltd..
2 Dwiivedi D.N, Managerial Economics, Vikas Publishing House Pvt Ltd
3. Dewett K.K, Modern Economic theory, S Chand & company Ltd.
4. Barthwal A.R ,Industrial Economics, New Age International Publishers
5. Benga T.R & Sharma S.C, Industrial Organization and Engineering Economics , Khanna Publishers
6. Ahuja H.L Modern Micro Economics –Theory and Applications , S Chand & Co. Ltd
7. Koutsoyiannis A , Modern Microeconomics, Macmillan Press Ltd.
8. Joel Dean, managerial Economics Prentice-Hall of India Pvt Ltd.
9. Dewett .K.K& Verma J.D,Elementary Economic Theory , S Chand & Co. Ltd.
10. Jhingan M.L., Macro Economic theory , Vrinda Publications Pvt.Ltd.

Sessional work assessment

Two tests	2 x 15 = 30
Two assignments	2 x 10 = 20
Total	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one.
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one.
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one.
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 503: THEORETICAL FOUNDATION OF COMPUTATION

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Introduction; alphabets, Strings and Languages; Automata and Grammars -Finite automata (FA) -DFA-NFA – Finite Automata with epsilon-transitions-Equivalence of DFAs and NFAs -Regular expressions (RE) -Definition, RE to FA, FA to RE, algebraic laws for RE, applications of REs. -Regular grammars and FA -Proving languages to be non-regular -Pumping Lenma – Applications. Closure properties of Regular languages -Closure under Boolean operations, reversal, homomorphism, inverse homomorphism, etc. –Myhill-Nerode theorem-DFA Minimization - Decision properties of Regular languages - Two-way finite automata, Finite automata with output.

Module II (13 hours)

Context-free Grammars (CFG) -Parse tree - Ambiguity in grammars and Languages-Applications of CFG-Pushdown Automata (PDA) -Equivalence of PDAs and CFGs -DPDAs -Definition, DPDAs and Regular Languages,-DPDA and Ambiguous grammars--CYK algorithm -Simplification of CFGs -Normal forms -CNF and GNF --Pumping lemma for CFLs,Closure properties of CFLs - Decision properties of CFL.

Module III (13 hours)

Turing Machines -Formal definition and behavior - TM as a computer of integer functions -Programming techniques for TMs -Storage in state, multiple tracks, subroutines, etc.-Computing a partial function with Turing machine-Variants of TMs –Multitape TMs, Nondeterministic TMs. -TMs with semi-infinite tapes, multistack machines.-universal Turing Machines-Equivalence of the various variants with the basic model- Models of computation and Church-Turing Thesis.

Module IV (13 hours)

Computability – Closure properties of recursive and recursively enumerable language. Undecidability- A language that is not RE – An undecidable problem that is RE – Undecidable problems about TM-Halting problem – Post Correspondence Problem – The Chomsky hierarchy – Context sensitive language and LBA –Equivalence of LBA and CSG.

Text books

1. J E Hopcroft And J D Ullman : Introduction to Automata Theory and Computation, Addison Wesley
2. John C Martin : Introduction to Languages and the Theory of Computation(3 rd Edition) , TMH

Reference books

1. H R Lewis and C H Papadimitriou : Elemnts of Theory of Computation
2. Sipser : Introduction to theory of Computation, CENAGE LEARNING Indian Edition
3. Linz P : An Introduction to Formal Languages and Automata, Narosa

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 504: PROGRAMMING LANGUAGE CONCEPTS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Preliminaries – Reasons for studying concept of programming languages- Programming Domains-Language evaluation criteria- influence on language design-language categories-Implementation methods-Programming environments – Evolution of programming languages- Describing Syntax and semantics-Formal methods of describing syntax- attribute grammars- Dynamic semantics-Names, variables-concept of binding-type checking-strong typing-type compatibility-Scope and lifetime-referencing environments-Named constants.

Module II (15 hours)

Data types-Primitive-Character strings-Array types-Associative arrays-record and union types-Pointer and reference types-Expression and assignment statements-arithmetic expressions-Overloaded operators-type conversions-relational and Boolean expressions-short circuit evaluation-assignment statements-mixed mode assignment-statement level control structures-selection and iterative statements- unconditional branching and guarded commands- subprograms-Design issues – parameter passing methods-over loaded subprograms-Implementing subprograms-blocks-implementing dynamic scope

Module III (12 hours)

Concept of Abstraction-Data abstraction-design issues-encapsulation constructs-Object oriented programming-Design issues-support for object oriented programming in C++,JAVA,C# etc- Implementation of object oriented constructs- Concurrency – Subprogram level concurrency-monitors-message passing-threads-statement level concurrency- Exception handling in JAVA & C++ -event handling with JAVA.

Module IV (12 hours)

Functional programming languages – Mathematical functions – fundamentals of functional programming languages- Introduction to COMMON LISP, ML-Application of functional languages- Comparison of functional & Imperative languages – Logic programming languages – Introduction to predicate calculus-Overview of logic programming-origins of prolog-basic elements of prolog Applications of logic programming

Text books

4. Robert W Sebesta, Concepts of programming Languages (7 edn) – Pearson Education

Reference books

1. Sethi R, Programming languages: Concepts & Constructs , Addison Wesley
2. Scott M L, Programming language Pragmatics, Morgan Kaufman

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 505: OPERATING SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Computers and Software –General System software- Resource abstraction & Sharing-Operating system strategies (Batch, Timesharing, real time, embedded etc) – Concept of Multiprogramming- Operating system organization – Basic functions-Implementation considerations-Computer organization-bootstrapping the machine-Mobile computers, Multiprocessors and parallel computers- Device Management-Device controllers & Device drivers – I/O strategies (direct I/O with polling, Interrupt driven I/O, DMA), Buffering, Disk scheduling strategies

Module II (15 hours)

Process & Threads- Implementing process & Threads – Process address space- process state transition diagram-Process manager responsibilities- concept of Linux process & thread descriptors-Process scheduler organization-different scheduling strategies(non preemptive & preemptive)- Process synchronization- critical section- semaphore & its implementation – classical synchronization problems and its solutions (Producer-consumer, readers-writers, dining philosopher)- Deadlock-prevention-avoidance-bankers algorithm-detection-reduced resource allocation graph- Inter process communication(Pipes, message passing etc)-concept of process management in Linux and widows NT.

Module III (12 hours)

Memory management- address space abstraction-address binding-memory allocation-Fixed partition & variable partition memory strategies-dynamic address binding-swapping-paging-virtual memory address translation-dynamic paging-static paging algorithms-dynamic paging algorithm-working set algorithm-segmentation-implementation-memory mapped files-concept of memory management in Linux & Windows NT/XP.

Module IV (12 hours)

File Management – Low level files and Structured files- Low level file implementation – different approaches to Block management- Structured sequential file-Indexed sequential file-different directory structures-file systems-Mounting file systems- Protection and Security-security and Policy – Authentication , authorization and cryptography- Kerberos authentication- General protection model- Acess matrix-Access control list – Capability list – Concept of File management in Linux and Windows NT.

Text books

5. Gary Nutt,Operatig Systems (3rd edn), Pearson education
6. Gary Nutt, Nebendu Chaki, and Sarmistha Neogy, Operating Systems(Third Edition), Pearson Education.

Reference books

3. Siberschatz & Galvin, Operating system concepts (7 edn), Addison Wesley
4. Crowley C., Operating Systems – A Design oriented Approach, TMH
5. Tanenbaum A. S, Modern Operating Systems, Prentice hall, Pearson Education

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 506: SOFTWARE ENGINEERING

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Introduction- The software process, Software process models-Waterfall model, RAD model, Prototyping model, Spiral model, Component based development, Aspect-oriented software development System modeling, System engineering process, System models-Data models, Object oriented model, Scenario based model, Flow oriented model, Class-based model, Behavioral model Software requirements- Functional and Non-functional requirements-SRS- Requirement Engineering Process

Module II (13 hours)

Design Engineering- Design concepts, design model, pattern based software design Architectural Design-system structuring, control models, modular decomposition, Object oriented Design, Component based design, User Interface Design

Module III (13 hours)

Software Testing- Testing process, Testing strategies- Verification and validation, Software inspection, Unit testing and Integration Testing, Validation testing, System testing Testing tactics- Software Testing Fundamentals, Black box testing, White box testing, Object-oriented testing, Clean room engineering process

Module IV (14 hours)

Project Management- Metrics for process and projects, Estimation- Project planning process, Software scope and feasibility, Resources, software project estimation, Decomposition techniques, Project scheduling, Risk Management- Risk identification, Risk projection, Risk refinement, RMMM Quality management-Product metrics, Quality-Quality control, Quality assurance, Cost of Quality, Change Management-Configuration Management, Software re-engineering, Reverse Engineering, CBSE process.

Text books

7. Pressman S. Roger, "Software Engineering", Tata Mac Graw Hill
8. Sommerville Ian, "Software Engineering 6th Addition", Addition Wesley 2002

Reference books

1. Jalot Pankaj, "An Integrated Approach to S/W Engg."Narosa Publishing House
2. Rajib Mall

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 507(P): Programming Environment Lab

3 hours practical per week

Object-oriented programming in Java/C++

1. Define a base class "Shape" and derived classes for "Rectangle", "Square", "Ellipse" and "Circle" with proper class hierarchy.
2. Implement operator and function overloading.
3. Design and implement an interface.
4. Design and implement a Generic class

Functional Programming in LISP/Scheme

1. Write a program to implement Tower of Hanoi problem for n number of disks.
2. Write a program to implement Missionaries and Cannibals problem.
3. Write a program to implement Binary Search Tree (BST) and do the following operations on BST.

   (i) Insertion of an element

   (ii) Deletion of a n element
   (iii) Display of BST
   (iv) Display of Maximum and Minimum elements of BST
4. Write a program to implement Quick Sort on both list of numbers and list of strings. If strings, sort them in lexicographic order.

Concurrent Programming in Java/ Ada

1. Design and implement a multi-threaded program.
2. Design and implement a multi-process application

Reference books

1. Robert W Sebesta, Concepts of programming Languages (7 edn) – Pearson Education
2. Sethi R, Programming languages: Concepts & Constructs, Addison Wesley
3. Scott M L, Programming language Pragmatics, Morgan Kaufman
4. Elaine Rich, Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishing Company Limited

Sessional work assessment

Laboratory practical and Record	= 35
Test	= 15
Total marks	= 50

2K6 CS 508(P): SYSTEMS LAB

3 hours practical per week

Operating systems

1. Inter-process communication using pipes, FIFO, message queues and shared memory
2. Producer-Consumer problem using mutex and condition variables
3. Producer-Consumer problem using semaphores
4. Detection and handling of signals like death of child process, user generated interrupts etc. by a process.
5. Open a directory and display its contents, size of each file, total size etc.
6. Banker's algorithm
7. Simulation of various process scheduling algorithms (Pre-emptive and non pre-emptive)
8. Simulation of various memory page replacement strategies

Reference books

1. Kay Robbins, Steve Robbins: UNIX Systems Programming- Communication, Concurrency and Threads.
2. Garry Nutt, Operating Systems

Sessional work assessment

Laboratory practical and Record	= 35
Test	= 15
Total marks	= 50

2K6CS 601 ENVIRONMENTAL ENGG: & DISASTER MANAGEMENT

3 hours lecture and 1 hour tutorial per week

MODULE I (12 HOURS)

Multidisciplinary nature of Environmental studies – Definition – scope and importance – need for public awareness
Natural resources – renewable and non-renewable resources – natural resources – forest resources - water resources
Mineral resources – food resources – energy resources – Land resources – use, overuse and misuse of these resources with appropriate case studies to substantiate – effect on the environment – role of individual in conservation of natural resources – equitable use of resources for sustainable lifestyle.

MODULE II (12 HOURS)

Ecosystem – concept – structure and function – producers, consumers & decomposers – energy flow in the ecosystem- Ecological successive food chains - food webs (all in brief)
Ecological pyramids – introduction, types and characteristic features, structure and function of forest, grassland, desert and acquatic ecosystems (ponds, lakes, streams, rivers, oceans and estuaries) Biodiversity and its conservation – Introduction – definition : genetic species and ecosystem diversity – Biogeographical classification of India – value of biodiversity – consumptive and productive use, social, ethical, aesthetic and option values – biodiversity at global, national and local levels –India as a mega-diversity nation – hot spots of biodiversity – threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

MODULE III (13 HOURS)

Environmental Pollution – Definition – causes - effects and control measures of : Air Pollution – water Pollution – soil Pollution – marine Pollution – noise Pollution – thermal Pollution – Nuclear hazards .
Solid waste management – causes, effects and control measures of urban and industrial wastes – Role of an individual in preventing Pollution – Environmental Protection Act – Prevention and control of air and water Pollution – Wildlife Protection Act – Forest Conservation Act – Issues involved in Enforcement of Environmental Legislation – Public awareness.
Disaster Management – Principles of disaster management – nature and extent of disasters – natural disasters , hazards, risks and vulnerabilities – man-made disasters – chemical, industrial, nuclear and fire. – preparedness and mitigation measures for various hazards – financing relief expenditure – legal aspects - post disaster relief – voluntary agencies and community participation at various stages of disaster management – rehabilitation programmes.

MODULE IV (10 HOURS)

Social Issues and the Environment – From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting , watershed management – resettlement and rehabilitation of people ; its problems and concerns, case studies – environmental ethics : Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies – waste land reclamation – consumerism and waste products.
Human population and the environment – Population growth, variations among nations – population explosion – Family welfare programmes – Environment and human health – Pollution hazards, sanitation and health – Human rights for a clean environment – value education – HIV/AIDS – social concern – Women and Child welfare – role of Information Technology in environment and human health – Case studies.

FIELD WORK (5 HOURS)

- Visit to a local area to document environmental assets – river / forest / grassland / hill / mountain

- Visit to local polluted site – urban / rural / industrial / agricultural
- Study of common plants, insects , birds
- Study of simple ecosystems – pond, river, hill slopes, etc.

Text book

1. Clarke. R.S. Marine Pollution. Clanderson Oress Oxford.`
2. Mhaskar A.K. Matter Hazardous. Techno-Science Publications.
3. Townsend. C., Harper. J. and Michael Begon, Essential of Ecology. Blackwell Science.
4. S. Deswal & A . Deswal, A Basic Course in Environmental Studies, Dhanpat Rai & Co
5. Environmental Studies – Dr. B . S. Chauhan, University Science Press.
6. Kurien Joseph & R. Nagendran, Essentials of Environmental Studies, Pearson Education.
7. Trivedi. R.K. and Goel. P.K. Introduction to air pollution. Techno-Science Publications.

Reference Books

1. Agarwal.K.C. Environmental biology. Nidi Publ.Ltd. Bikaner.
2. Bharucha erach, Biodiversity of India, Mapin Publishing Pvt.Ltd.,.
3. Brunner,R.C.. Hazardous Waste Incineration. McGraw Hill Inc..
4. Cunningham W.P. , Cooper T.H., Gorhani E. & Hepworth M.T. Environmental Encyclopedia ,Jaico Publ.House ,.
5. De A.K. Environmental Chemistry.Wiley Eastern Ltd.
6. Hawkins R.E. Encyclopediaof Indian Natural History, Bombay Natural History Society ,.
7. Heywood V.H. & Watson R.T.. Global Biodiversity Assessment. Cambridge Univ. Press.
8. Jadhav H. & Bhosale V.M.. Environmental Protection and Laws. Himalaya Pub. House,
9. Odum E.P. Fundamentals of Ecology W.B. Saunders Co..
10. Rao M.N. & Datta A.K. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd..
11. Sharma B.K.. Environmental Chemistry Goel Publ. House, Meerut
12. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol.I & II.Enviro Media.
13. Wagner K.D. Environmental Management. W.B. Saunders Co.

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

2K6 CS 602: GRAPH THEORY & COMBINATORICS

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction to graphs-definitions and examples-subgraphs-complements-isomorphism-vertex degree-Euler trails and circuits-.Planar Graphs-Kuratowski's theorem(without proof).Graph coloring and chromatic polynomials

Module II (13 hours)

Trees-Definitions and properties-examples-Weighted Trees-Dijkstra's shortest path algorithm-Spanning trees - Kruskal and Prim's algorithms.

Module III (13 hours)

Fundamental principles of counting-The rules of sum and product -permutations and combinations-binomial theorem-principle of inclusion and exclusion-derangements.-Rook polynomials

Module IV (14 hours)

Generating functions-definitions and examples-calculational and techniques.-partitions of integers-exponential generating functions-recurrence relations-first order linear recurrence relation-second order linear homogeneous recurrence relation with constant coefficients-Non homogeneous recurrence relation-method of generating function

Text Books

1. Grimaldi R P ,"Discrete and Combinatorial Mathematics".4 th Edn Pearson education Asia

Reference books

1. Joe L Mott Abraham Kandel Theodore P Baker,"Discrete Mathematics for Computer Scientist and Mathematicians ,2 nd Edn PHI
2.Rose K H '"Discrete Mathematics and its Applications",6th Edn McGrawHill
3.Kolman Busby Ross ,"Discrete Mathematical Structures",PHI
4.Corman ,Leserson and Rivest,"Introduction to Algorithms",PHI
5. Fred Buckley and Frank Harry, “Distance in graphs”, Addison Wesley

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 603: DATABASE MANAGEMENT SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Introduction - Characteristics of Database approach - Advantages of using DBMS approach - Data models - schemas and instances - Three-schema architecture and data independence - Database languages and interfaces - The database system environment - Centralized and client-server architectures - Classification of Database Management systems.

Entity-Relationship Model - Entity Types, Entity Sets, Attributes and Keys - Relationship types, Relationship Sets, Roles and Structural Constraints - Weak Entity Types - Refining the ER Design - ER Diagrams and Naming Conventions - Example of Other Notation: UML Class Diagrams

Module II (16 hours)

Relational Model and Relational Algebra - Relational Model Concepts - Constraints - Relational Database Schemas – Relational Algebra: Unary Operations - Set Theoretic operations - Binary Operations - Aggregate functions and grouping – Outer Join and Outer Union - Examples of Queries - The Tuple Relational Calculus - The Domain Relational Calculus

SQL - Data Definition and Data Types - Specifying constraints - Schema change statements - Basic queries – Aggregate functions and grouping - Insert, Delete and Update statements - Assertions and Triggers - Views

Database Design - Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys (Up to BCNF) - Properties of Relational Decompositions - Algorithms for Relational Database Schema Design - The Database Design and Implementation Process - Use of UML Diagrams in database design.

Module III (12 hours)

Disk Storage, Basic File Structures, and Hashing - Secondary Storage Devices – Placing File Records on Disk - Operations on Files - Heap Files - Sorted Files - Hashing Techniques - Parallelizing Disk Access Using RAID Technology - New Storage Systems

Indexing Structures for Files - Types of Single-Level Ordered Indexes - Multilevel Indexes - Dynamic Multilevel Indexes Using B-Trees and B+ Trees - Indexes on Multiple Keys

Module IV (14 hours)

Transaction Management - Transaction and System Concepts – ACID Properties - Schedules - Characterizing Schedules Based on Recoverability and Serializability - Transaction Support in SQL

Concurrency Control Techniques - Locking Techniques - Timestamp Ordering - Multiversion Concurrency Control - Optimistic Concurrency Control - Using Locks for Concurrency Control in Indexes

Database Recovery Techniques - Recovery Concepts - Recovery Techniques Based on Deferred and Immediate Updates - Shadow Paging - Recovery in Multidatabase Systems - Backup and Recovery from Catastrophic Failures.

Text books

1. R. Elmasri and S. B. Navathe: Fundamentals of Database Systems, 5th Edition, Addison-Wesley, 2007

Reference books

1. A. Silberschatz, H. F. Korth and S. Sudarshan: Database System Concepts, 5/E, Mc-Graw Hill, 2006.
2. Database systems, a practical approach to design implementation and management – Thomas Connolly and Carolyn Begg, Pearson Education,
3. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, McGraw-Hill
4.C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, Pearson education
5. Jeffrey D Ullman: Principles of Database Systems, Galgotia Publications

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 604: COMPILER DESIGN

3 hours lecture and 1 hour tutorial per week

Module 1 (12Hrs)

Introduction to compilers:-Phases of a compiler-Analysis and synthesis phases-Lexical analysis and its role-Review of finite automation and Regular Expressions-Specification of tokens using regular expressions-Implementing lexical analyzer using finite automation-Design of lexical analyzer using LEX

Module 2 (14 Hrs)

Syntax analyzer-Role of syntax analyzer-Review of context free grammar-derivation and parse trees-Basic parsing approaches-Top down parsing-Recursive Descent parsing –LL(1) parsing-Bottom up parsing-Shift reduce parsing-Operator precedence parsing-LR parsing-Simple LR, Canonical LR and LALR parsers- Design of syntax analyzer using YACC

Module 3 (15 Hrs)

Semantic analysis-Need for semantic analysis-Syntax directed definitions-S attributed definitions- L- attributed definitions-Translation schemes-Type system and Type checking-Design of a simple type checker

Storage Management:-Memory allocation strategies (static, stack and heap allocations)-Memory allocation in block structured languages-Accessing local and non local data-Array allocation and access-Procedure calls-Parameter passing methods-Runtime stack and storage management

Synthesis phase:-Intermediate Code Generation (ICG)-Need for ICG-IC Formats-3 Address code-Triples and quadruples

Module 4(14 Hrs)

Code optimization:-Need for code optimizer-Basic blocks and program flow graph-Machne dependent and machine independent optimizations-Optimization transformations-Local and global optimizations Code Generation-Basic issues in code generation-Data descriptors-Expression trees-Generating target code from expression trees-Symbol table handling-Symbol table requirements and organization. Error handling-Types of errors-Compile time errors and recovery-Runtime errors-Runtime Error Handling

Text books

1.Aho A Ravi Sethi and J D Ullman, Compilers Principles Techniques and Tools,Addison Wesley

Reference books

1. Kenneth C Louden, “Compiler Construction Principles and Practice”, Cenage Learning Indian Edition
2.D M Dhamdhare, System programming and operating system,TMH
3.Tremblay and Sorenson,The theory and practice of Compiler writing,TMH
3Allen T Hollub , Compiler design in C ,PHI

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any

2K6 CS 605: DATA COMMUNICATION & COMPUTER NETWORKS

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Line Coding – Modems – RS232 Interfacing sequences-Modulation-Multiplexing-TDM FDM WDM OFDM

Module II (16 hours)

Data link layer services - Error detection and correction – Parity – LRC – CRC – Hamming code .HDLC. - Multiple Access Protocols - Link Layer addressing - Hub and Switches -PPP. LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - FDDI - SONET – Bridges.

Module III (13 hours)

Network layer: Introduction - Virtual circuit and datagram networks - Router - Internet Protocol -Forwarding and addressing in the Internet - Routing Algorithms -LS -DV -Hierarchial routing -Routing in the Internet -Broadcast and Multicast routing.

Module IV (14 hours)

Transport layer : Introduction and services-multiplexing and demultiplexing -Connectionless transport UDP - Principles of Reliable data transfer - Connection oriented transport TCP - Principles of Congestion Control - TCP congestion control. Application Layer -Principles -HTTP –FTP -SMTP -DNS.

Text books

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.
2. Kurose and Ross, "Computer Networking", Third Edition,Pearson

Reference books

1. Crowley C.,Operating Systems - A Design Oriented Approach, TMH
2. Tanenbaum A S, Computer Networks, PHI
3. William Stallings, **“**Data and Computer Communication, Pearson EducationI

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 606 (A): DISTRIBUTED COMPUTING

3 hours lecture and 1 hour tutorial per week

Module I (16 hours)

Characterization of Distributed Systems: Introduction, Examples of distributed Systems,Issues in Distributes Operating Systems, Resource sharing and the Web Challenges. **System Models:** Architectural models, Fundamental Models **Theoretical Foundation for Distributed System**: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection. **Distributed Mutual Exclusion**: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Module II (14 hours)

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. **Agreement Protocols**: Introduction, System models, classification of Agreement Problem-Interactive consistency Problem, Applications of Agreement algorithms.

Module III (12 hours)

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. **Transactions and Concurrency Control**: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

Module IV (12 hours)

Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. **Distributed shared memory** – Design and Implementation issues, consistency models..**CORBA Case Study**: CORBA RMI, CORBA services.

Text books

1. Mukesh Singhal And Niranjan G Shivaratri, "Advanced Concept in Operating Systems",Tata McGraw Hill.
2. Coulouris, Dollimore, Kindberg: "Distributed System: Concepts and Design", Pearson Education

Reference books

1. Tanenbaum S , "Distributed Operating Systems",Pearson Education.
2. P K Sinha, ""Distributed System: Concepts and Design", PHI

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 606 (B) BIOINFORMATICS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

The Central Dogma – Killer Application – Parallel Universes – Watson's Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications.

Module II (16 hours)

Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks: Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

Search Process – Technologies – Searching And Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation

Module III (16 hours)

Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.

Module IV (10 hours)

Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration And Communication – Standards – Issues – Case Study.

Reference books

1. Bryan Bergeron, Bio Informatics Computing , Prentice Hall, 2003.
2. T.K. Affward, D.J. Parry Smith, Introduction To Bio Informatics, Pearson Education, 2001.
3. Pierre Baldi, Soren Brunak, Bio Informatics – The Machine Learning Approach, 2nd Edition, First East West Press, 2003

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 606(C): SOFTWARE PROJECT MANAGEMENT

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Introduction - Importance of software project management, Problems with Software Projects Stages of Project - The Feasibility Study, Planning, Project Execution, Project and Product Life Cycles , The Stakeholder of Project , The Role of Project Manager, Project Management Framework , Software Tools for Project Management

Project Planning- Integration Management, Project Plan Development, Plan Execution, Scope Management, Methods for Selecting Projects , Project Charter, Scope Statement, Work Breakdown Structure, Main Steps in Project Planning , Use of Software to Assist in Project Planning Activities

Module II (16 hours)

Project Scheduling : Time Management- Importance of Project Schedules, Schedules and Activities , Sequencing and Scheduling Activity Project Network Diagrams- Network Planning Models , Duration Estimating and Schedule Development, Critical Path Analysis, Program Evaluation and Review Technique (PERT) Use of Software to Assist in Project Scheduling

Project Cost Management-Importance and Principles of Project Cost Management, Resource Planning , Cost Estimating- Types of Cost Estimates, Expert Judgment , Estimating by Analogy , COCOMO Model, Cost Budgeting, Cost Control , Use of Software to assist in Cost Management.

Module III (12 hours)

Project Quality Management- Quality of Information Technology Projects, Stages of Software Quality Management, Quality Planning , Quality Assurance , Quality Control Quality Standards- Tools and Techniques For Quality Control

Project Human Resources Management- Keys to Managing People , Organizational Planning- Issues in Project Staff Acquisition and Team Development , Project Communication Management - Communications Planning, Information Distribution, Performance Reporting,.

Module IV (14 hours)

Project Risk Management - The Importance of Project Risk Management, Common Sources of Risk in IT projects, Risk Identification, Risk Quantification, Risk Response Development and Control

Project Procurement Management- Importance of Project Procurement Management, Procurement Planning, Solicitation, Source Selection, Contract Administration, Contract Close-out, Pr**oject Management Process Groups-** Introduction to Project Management Process Groups Project Initiation, Project Planning, Project Executing, Project Controlling and Configuration Management , Project Closing.

Reference books

1. Software Project Management" Bob Hughes and Mike Cotterell, Third Edition, Tata McGraw-Hill.
2. "Information Technology Project Management" Kathy Schwalbe, International Student Edition, THOMSON Course Technology, 2003
3. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002
4. Software Project Management, A Concise Study, S.A. Kelkar, Revised Edition, Prentice-Hall India, 2003
5. Walker Royce "Software Project Management – A Unified Framework ", Pearson Education, 2004
6. Ramesh Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 606 (D): DIGITAL SIGNAL PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Review of signals and systems. Introduction - advantages and limitations of Digital Signal Processing. Infinite Impulse Response (IIR) Filters - Signal Flowgraph- Basic Network structure for IIR filter- Direct- Cascade- Parallel Forms. Design of IIR Digital filters from analog filters- Butterworth design- Chebyshev design- design based on numerical solutions of differential equations- Impulse Invariant Transformation.

Module II (16 hours)

Finite Impulse Response (FIR) Filters: Linear phase FIR filters- Frequency response of linear phase FIR filters - Location of the zeros of linear phase FIR filters. Realization of FIR- cascade - lattice design-Fourier Series method- using windows-rectangular- triangular or barlett windows- hanning- hamming- Blackman- Kaiser windows.

Module III (13 hours)

Discrete fourier Transform: Properties-Circular convolution- Linear Convolution using DFT- relation between Z-Transform and DFT- Fast Fourier Transform; decimation – in time and Frequency - FFT algorithms – General Computation using Radix 2 algorithm.

Module IV (14 hours)

Finite word length effects in digital filters: Introduction- Number Representation - Fixed Point- Sign-Magnitude - One's-complement- Two's - complement forms -Addition of two fixed point numbers- Multiplication in Fixed Point arithmetic - Floating point numbers- Block floating point numbers- quantization - truncation- rounding - effects due to truncation and rounding- Input quantization error - Product quantization error - Co-efficient quantization error- zero-input limit cycle Oscillations - Overflow limit cycle Oscillations - Scaling- Quantization in Floating Point realization IIR digital filters - Finite Word Length Effects in FIR Digital Filters- Quantization effects in the Computation of the DFT- quantization errors in FFT algorithms.

Reference books

1. Ifechor-, Digital signal processing, Pearson edn.
2. Oppenhiem ,Desecrate time signal processing , Pearson edn.
3. Oppenhiem and Sheffer ,Digital signal processing , PHI
4. Johny R Johnson ,Introduction to Digital signal processing
5. Proakis and Manolakis, Digital signal processing
6. P Ramesh Babu ,Digital signal processing:,Scitech Publications.

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 606 (E) ENTERPRENEURSHIP

3 hours lecture and 1 hour tutorial per week

Module I (20 hours)

Entrepreneurial perspectives - understanding of entrepreneurship process - entrepreneurial decision process - entrepreneurship and economic development - characteristics of entrepreneur - Entrepreneurial competencies - managerial functions for enterprise

Module II (10 hours)

Process of business opportunity identification and evaluation - industrial policy- environment - market survey and market assessment - project report preparation – study of feasibility and Viability of a project - assessment of risk in the industry

Module III (12 hours)

Process and strategies for starting a venture - stages of small business growth – entrepreneurship in -international environment - entrepreneurship – achievement - motivation - time management creativity and innovation - structure of the enterprise - planning, implementation and growth

Module IV (10 hours)

Technology acquisition for small units - formalities to be completed for setting up a small scale unit - forms of organizations for small scale units - financing of project and working capital-venture capital and other equity assistance available - break even analysis and economic ratios technology transfer and business incubation

Reference books

1. Harold Koontz and Heinz Weihrich: Essentials of Management, TMH International
2. Robert D Hirich and Michael Peters: Enterpreneurship, Mc Graw Hill
3. Rao T., Deshpande M. V, P. Mehta, M. S. Nadakami: Developing Enterpreneurship, a Handbook Learning System
4. D. Kurado and R M. Hodgelts: Enterpreneurship, a Contemporary Approach, The Dryden Press
5. Dr. Patel V. G.: Seven Business Crisis, TMH
6. Rao C. R.: Finance for Small Scale Industries

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 CS 606 (F) – ADVANCED MATHEMATICS

3 hours lecture and 1 hour tutorial per week

Module I : (10 hours)

Linear Programming I : Systems of linear equations and inequalities – Convex sets – Convex functions – Formulations of linear Programming problems – Theory of simplex methods – simplex algorithm – Charnes Mmethod – Two phase method – Duality in linear programming – dual simplex method.

Module II: (10 hours)

Linear Programming II : Sensitivity analysis – Parametric Programming – Bounded variable problems – Transportation problems – Development of the method – Integrality property – Degeneracy – Unbalanced problems – Assignment problem – Development of the Hungarian method – Routing problems.

Module III: (10 hours)

Nonlinear Programming : Mathematical preliminaries of non-linear programming – Gradient and Hessian – Unimodal functions – Convex and Concave functions – Role of convexity – Unconstrained optimization – Fibnonacci search – Golden section search – Optimal gradient method – Classical optimization – Langrange multiplier method – Kuhn-Tucker conditions – Quadratic programming – Separable convex programming.

Module IV: (9 hours)

Dynamic Programming & Game Theory : Nature of Dynamic programming problem – Bellman's optimality principle – Cargo loading problem – Replacement problems – Multistage production planning and allocation problems – Rectangular games – Two person zero sum games – Pure and mixed strategies – 2 x m and m x 2 games – Relation between theory of games and linear programming.

Text books and References

1. Bazarra M. S., Jarvis J. J. & Sherall H. D., 'Linear Programming and Network Problems' John Wiley.
2. Bazarra M. S., Sherall H. D & Shetty C. M., 'Nonlinear Programming Theory and Algorithms' John Wiley.
3. Hadley G. 'Linear Programming' Narosa.
4. Hillier. F. S. & Liebermann G. J. 'Introduction to Operations Research' Mc Graw Hill. 5. Taha H.A. 'Operation Research, An Introduction' PHI.

Sessional work assessment

Two tests	2 x 15 = 30
Two assignments	2 x 10 = 20
Total	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 CS 607(P) – NETWORKS & DBMS LAB

3 hours practical per week

1. Study and configuration of NIC cards.
2. Implementation of client server model using TCP protocol.
3. Implementation of client server model using UDP protocol.
4. Implementation of client server model using Multicast server.
5. Implementation of POP3 protocol.
6. Implementation of SMTP protocol.
7. File transfer-using socket.
8. DNS – Tracing the path and find the root/name servers
9. Dynamic Host Configuration Protocol – To study about dynamic allocation of IP addresses.
10. Web server installation and configuration.
11. Mail server configuration.
12. Setting up multiple virtual hosts in a single domain.
13. Simulation of Medium access control protocols-Go back N, Selective repeat, sliding window
14. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
    - Shortest path routing
    - Flooding
    - Link State
    - Hierarchical

Database Management Systems

Recommended Software: Mysql /Oracle latest version

1. DDL statements in SQL
2. DML statements in SQL
3. Simple Queries using SELECT command on a given database.
4. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSECT and Constraints.
5. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING
6. Creation and dropping of Views
7. High level language extension with cursors.
8. High level language extension with triggers.
9. Procedures and Functions.

Reference books

1. Stevens W. Richard, "Unix Network Programming", PHI
2. James F. Kurose & Ross, "Computer Network, Third Edition", Pearson Education
3. Comer D.E., "Internetworking with TCP/IP, Volume 1, II & III, PHI
4. Elmasr, Navathe, *'Fundamentals of Database Systems'*, 4/e, Pearson Education
5. Reghu Ramakrishnan, *Databse Management Systems*, McGrawHill

Sessional work assessment

Laboratory practical and Record	= 35
Test	= 15
Total marks	= 50

2K6 CS 608(P): COMPILER LAB

3 hours practical per week

1. Design of a Lexical Analyzer using Finite Automation (including Symbol table)
   (The program should be designed for a specific number of keywords, identifiers, numbers, operators, punctuators etc. Finite automata should be designed for each type of token)
2. Design of lexical analyzer using LEX
3. Design of recursive descent and LL (1) parsers (including syntax tree)
   (The programme should be designed for a subset of PL features (For example Arithmetic expressions with operators +, -, *, /, ↑ etc)
4. Implementation of Operator precedence Parsing (including syntax tree)
5. Design of parser for arithmetic expressions using YACC
6. Design of a simple type checker (For eg for the primitive types of C)
7. Generation of IC for arithmetic expressions
8. Simple code optimization strategies (For example Constant folding, Loop invariant elimination, common sub expression elimination etc)
9. Design of a code generator for arithmetic expressions using Expression tree
   (The program should take a set of IC as the input and produce the target code for some machine such as Intel 8086 Microprocessor)
10. Writing a simple Compiler for a subset of Language features

Reference books

6. Sethi R, Programming languages: Concepts & Constructs , Addison wesley
7. Scott M L, Programming language Pragmatics, Morgan Kaufman

Sessional work assessment

Laboratory practical and record	= 35
Test	= 15
Total	= 50