KANNUR UNIVERSITY

FACULTY OF ENGINEERING

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

SEVENTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hours	Marks
2K6 CS 701	Internet and Mobile Communication System Technologies	3	1	-	50	3	100
2K6 CS 702	Design and Analysis of Algorithms	3	1	-	50	3	100
2K6 CS 703	Computer Graphics and Multimedia	3	1	-	50	3	100
2K6 CS 704	Internet and Web Programming with Java	3	1	-	50	3	100
2K6 CS 705	Elective II	3	1	-	50	3	100
2K6 CS 706(P)	Graphics and Multimedia Lab	-	-	3	50	3	100
2K6 CS 707(P)	Internet and Web Programming Lab	-	-	3	50	3	100
2K6 CS 708(P)	Mini Project	-	-	4	50	-	-
2K6 CS709(P)	Physical Education, Health & Fitness	-	-	-	50	-	-
TOTAL		15	5	10	450	-	700

Elective II

2K6 CS 705 (A) Advanced Database Systems
2K6 CS 705 (B) Simulation and Modeling
2K6 CS 705 (C) Embedded Systems
2K6 CS 705 (D) VLSI Design
2K6 CS 705 (E) Stochastic Process
2K6 CS 705 (F) Computational Complexity
2K6 CS 705 (G) Digital Signal Processing
2K6 CS 705 (H) Information Storage Management

EIGHTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hours	Marks
2K6 CS 801	Operations Research	3	1	-	50	3	100
2K6 CS 802	Cryptography and Network Security	3	1	-	50	3	100
2K6 CS 803	Artificial Intelligence	3	1	-	50	3	100
2K6 CS 804	Advanced Computer Architecture	3	1	-	50	3	100
2K6 CS 805	Elective III	3	1	-	50	3	100
2K6 CS 806(P)	Seminar	-	-	4	50	-	-
2K6 CS 807(P)	Project & Industrial Training	-	-	6	100	-	-
2K6 CS 808(P)	Viva Voce	-	-	-	-	-	100
TOTAL		15	5	10	400	-	600
Aggregate marks for 8 semesters = 8400					3000		5400

Elective III

2K6 CS 805 (A) Advanced Topics in Algorithms
2K6 CS 805 (B) Image Processing
2K6 CS 805 (C) Neural networks and Fuzzy Logic
2K6 CS 805 (D) Management Information Systems
2K6 CS 805 (E) Quantum Computations
2K6 CS 805 (F) Data Mining and Warehousing
2K6 CS 805 (G) Advanced Mobile Communication Systems
2K6 CS 805 (H) Natural Language Processing

2K6CS 701 INTERNET AND MOBILE COMMUNICATION SYSTEM TECHNOLOGIES

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Computer Networks and the Internet-What is Internet-Network edge-network core-ISPs and internet backbones-Delay and loss in packet switched networks. Layered architecture-principles of application layer protocols-DNS-Socket programming with TCP/UDP-multimedia network-Examples of multimedia applications-audio and video compression-accessing audio and video through a web server-sending multimedia from a streaming server to a helper application-RTSP-RTP-RTCP-RSVP.

Module II (12 hours)

Wireless transmission: Frequencies for radio Transmission-signals-Antennas-Signal propagation-Spread spectrum-Cellular Systems-Specialized MAC:SDMA-FDMA-TDMA-CDMA-Comparison of S/F/T/CDMA.

Module III (12 hours)

Telecommunication systems-GSM-Mobile services-System Architecture-Radio interface-Protocols-localization and calling-handover-Security- Wireless LAN-Infra red Vs Radio transmission-Infra Structure and Ad-hoc networks-IEEE 802.11-Hyper LAN-Bluetooth.

Module IV (12 hours)

Mobile internet-mobile IP network layer, mobile transport layer: IP and Mobile IP Network Layers Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol. Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP – layer Transmission for Mobile Networks- WAP-WML

Text books

1. James F Kurose, Computer Networking-A Top Down approach featuring Internet, Third dition, Pearson Education
2. Schiller.J, Mobile Communication, Second Edition, Pearson Education

Reference books

1. William Stallings, Wireless Communication Network, Second Edition, Pearson Education.
2. Behrouz A Forouzan, Data Communications and Networking, Fourth Edition , Tata Mc Graw Hill T

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

2K6CS 702 DESIGN AND ANALYSIS OF ALGORITHMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Role of algorithms in computing – RAM model – growth of functions – asymptotic notations (Big-Oh, Little-Oh, Big omega, Little omega, Theta)- solution to recurrences – substitution method-recursion tree-master theorem (proof not expected)-Analysis of sorting algorithms – merge sort, heap sort, quick sort-Analysis of string matching algorithms -KMP algorithm. Amortized Analysis –Aggregate –Accounting – Potential Methods

Module II (14 hours)

Different approaches to algorithm design: **Divide and conquer** – Strassens matrix multiplication –Median Finding-**Greedy method** – Huffman code-Minimum cost spanning tree-Kruskals and Prims algorithm-**Dynamic programming** –Optimal binary search tree– Chain matrix multiplication **Back tracking** – Queens problem–**Branch and bound**-assignment problem-TSP

Module III (12 hours)

Complexity: complexity classes – P,NP,Co-NP, NP-hard and NPC problems – cooks theorm (proof not expected) – NP completeness reductions for clique – vertex cover – subset sum – Hamiltonian cycle – TSP-approximation algorithms – vertex cover – TSP – set covering and subset sum

Module IV (14 hours)

Randomized algorithms: Some complexity classes randomized algorithm for n-Queen , Quick sort-Probabilistic algorithms: pseudo random number generation methods - Monte Carlo algorithms - probabilistic counting - verifying matrix multiplication - primality testing - miller rabin test - integer factorization - Dixon's integer factorization algorithm -Pollard's rho heuristic amplification of stochastic advantage - Les Vegas algorithms.

Text books

1. Corman T H, Lieserson C E & Rivest R L, Introduction to Algorithms, PHI
2. Motwani R & Raghavan P, Randomized algorithms, Cambridge university press
3. Gilles Brassard, Paul Bratley, "Fundamentals of Algorithms", PHI

Reference books

1. Basse S, Computer Algorithms : Introduction to design and analysis, Addison Wesley
2. S K Basu , Design methods and analysis of algorithms, PHI
3. Berman and Paul, "Algorithms",Cenage Learning Indian Edition

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

2K6CS 703 COMPUTER GRAPHICS AND MULTIMEDIA

3 hours lecture and 1-hour tutorial per week

Module I (12 hours)

Introduction to Computer Graphics. Raster Graphics - Features, raster algorithms including primitives like lines, circles, filling, clipping in 2D, etc. Geometric transformations in 2D - coordinate transformations and their matrix representation, the window to viewport transformation. Transformations in 3D, viewing in 3D –Input devices, Interaction techniques.

Module II (14 hours)

Solid modeling -Regularized Boolean set operations-Primitive instancing – sweep representation – Boundary representation. **Visible surface determination** – Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal –z-Buffer algorithm – List priority algorithm – scan line algorithms.

Representing Curves and surfaces – polygon meshes – parametric cubic curves-Hermite curves-Bezier curves –B-Splines. Parametric bicubic surfaces – Hermite surfaces – Bezier surfaces – B-Spline surfaces.

Module III (12 hours)

Introduction to Multimedia – Media and Data Streams - Properties of multimedia systems – Characterizing data streams – Characterizing continuous media datastreams. **Audio Technology** – Audio representation —Music –speech -MIDI Vs digital audio-audio file formats-wav-ogg-au etc. Graphics and Images –Video Technology – Animation –basic concepts.

Module IV (14 hours)

Data compression –Storage space –coding requirements –Classification of coding – Basic compression Techniques – JPEG –H.261 – MPEG –DVI. **Multimedia Applications**-Media Integration-Media Communication-Media Consumption-Media Entertainment-Future Directions.

Text books

1. James D Foley, Van Dam A, Steven and Hughes, “Computer Graphics”, Pearson Education
2. Ralf Steinmetz and Klara Nahrstedt, “Multimedia Fundamentals”, Pearson Education

Reference books

1. Donald Hearn and M.Pauline Baker, “Computer Graphics”, Pearson Education.
3. Newmann W and Sprull, “Principles of Interactive Computer Graphics”, TMH.
4. Koegel Buford J F, “Multimedia Systems”, Addison Wesley.
5. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI.

Sessional work assessment

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

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
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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

2K6CS 704 INTERNET AND WEB PROGRAMMING WITH JAVA

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Working with User Interfaces – JAVA AWT Package, Window fundamentals, Basic User Interface Components (Labels, buttons, Check boxes, Radio buttons, choice Menu or Choice Lists, Text fields, Text areas, scrolling list, scroll bars, panels and frames), Layouts (Flow, Grid, Border, Card). Event-driven programming-Event driven programs, Event handling process, Java's event types.

JAVA Swings- Comparison between Swing and AWT, Java swing packages, Swing basic containers, Swing components, event handling using Java swing, using dialogs, Joptionpane class, input dialog boxes**,** Timers and Sliders, Tables, Borders for components.

Module II (14 hours)

JAVA database connectivity- JDBC/ODBC bridge, JAVA.SQL package, Connecting to remote data base, Data manipulation and Data navigation

JAVA Servlets – Introduction- Servlet API, Lifecycle of Java Servlet, Creating Servlets, Running servlets, Cookie class. **Networking with java**- Java.net package, Implementation of client-server application using TCP/IP and UDP.

Module III (12 hours)

Introduction to HTML- HTML tags, Frames and forms, Java Script- Introduction to scripting, control statements, Functions, Arrays, Objects.

DHTML – Object model and Collections, Event model, Filters and Transitions, Data binding with tabular data control. **XML** – XML vocabularies, Document Object Model, SAX, Simple Object Access Protocol (SOAP), Extensible Style sheet Language(XSL)

Module IV (14 hours)

Server side scripting Languages- **JSP**- Introduction to JSP, JSP Architecture, Scripting components, Standard actions, JSP with JDBC – case study of a simple online application.

PHP – Introduction (variables, control statements etc), String processing and regular expression, Form processing and business logic, Connecting to a database, Cookies, Dynamic content in PHP-case study of an online application

Text books

1. Deitel & Deitel, JAVA : How to Program, Pearson education , 7e
2. Deitel & Deitel, Internet and World Wide Web How to Program, Pearson education, 3e
3. Ivan BayRoss, Web Enabled Commercial Application using Java 2, bpb publication

Reference books

1. David Flanagan , Java Script The Definitive Guide, O'relly, 5e
2. Hans Bergsten, Java Server Pages, O'relly, 3e
3. David Sclar, Learning PHP5, O'relly

Sessional work assessment

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

University examination pattern

Q I - 8 short 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 ques

2K6CS 705(A) ADVANCED DATABASE SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Object-Based Databases - Complex Data Types - Structured Types and Inheritance in SQL - Table Inheritance - Array and Multiset Types in SQL - Object-Identity and Reference Types in SQL - Implementing O-R Features - Persistent Programming Languages - Object-Oriented versus Object-Relational models

Module II (13 hours)

Data Analysis and Mining - Decision-Support Systems - Data Analysis and OLAP - Data Warehousing - Data Mining. Information Retrieval - Relevance Ranking Using Terms - Relevance Using Hyperlinks - Synonyms, Homonyms and Ontologies - Indexing of Documents - Measuring Retrieval Effectiveness - Web Search Engines - Information Retrieval and Structured Data.

Module III (13 hours)

Database-System Architectures – Centralized, Client–Server and Server System Architectures – Parallel and Distributed Systems. Parallel Databases - I/O Parallelism – Interquery, Intraquery, Intraoperation and Interoperation Parallelism - Design of Parallel Systems. Distributed Databases - Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transactions - Commit Protocols - Concurrency Control in Distributed Databases - Distributed Query Processing - Heterogeneous Distributed Databases.

Module IV (13 hours)

Advanced Data Types and New Applications - Time in Databases - Spatial and Geographic Data - Multimedia Databases - Mobility and Personal Databases. Advanced Transaction Processing - Transaction-Processing Monitors - Transactional Workflows - E-Commerce - Main-Memory Databases - Real-Time Transaction Systems - Long-Duration Transactions - Transaction Management in Multidatabases.

Text books

1.Database System Concepts, 5/E, A. Silberschatz, H. F. Korth and S. Sudarshan, Mc-Graw Hill

Reference books

1. R. Elmasri and S. B. Navathe: Fundamentals of Database Systems, 5th Edition, Addison-Wesley
2. Database Management Systems, 3/E, Raghu Ramakrishnan and J. Gehrke, Mc-Graw Hill

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

2K6CS 705(B) SIMULATION AND MODELING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction: When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. Simulation examples: Simulation of queuing systems; Simulation of inventory systems; Other examples of simulation. **General principles, simulation software:** Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing. Simulation in Java; Simulation in GPSS.

Module II (12 hours)

Statistical models in simulation: Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions. **Queuing models:** Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues.

Module III (13 hours)

Random-number generation, random-variate generation: Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers. Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties. **Input modeling:** Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models

Module IV (12 hours)

Output analysis for a single model: Types of simulations with respect to output analysis; Stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations. **Verification and validation of simulation models, optimization:** Model building, verification and validation; Verification of simulation models; Calibration and validation of models. Optimization via Simulation.

Text books

1. **Discrete-Event System Simulation** – Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol, 4th Edition, Pearson Education, 2007.

Reference books

1. Discrete – Event Simulation: A First Course – Lawrence M. Leemis, Stephen K. Park, Pearson Education/ Prentice-Hall India, 2006.
2. Simulation – Sheldon M. Ross, 4th Edition, Elsevier, 2006.
3. Simulation Modeling and Analysis – Averill M. Law, 4th Edition, Tata McGraw-Hill, 2007.

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

2K6CS 705(C) EMBEDDED SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Introduction to embedded systems: Embedded systems; Processor embedded into a system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded System-on-Chip (SoC) and use of VLSI circuit design technology; Complex systems design and processors; Design process in embedded system. **Devices:** Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer. I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports.

Module II (13 hours)

Communication buses for device networks: Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols. **Device drivers and interrupts service mechanism**: Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing mechanism; Multiple interrupts; Context and the periods for context-switching, interrupt latency and deadline; Classification of processors' interrupt service mechanism from context-saving angle; Direct memory access; Device drivers programming.

Module III (13 hours)

Program modeling concepts, processes, threads, and tasks: Program models; DFG models; State machine programming models for event controlled program flow; Modeling of multiprocessor systems. Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks. **Real-time operating systems:** Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/ O sub-systems management; Interrupt routines in RTOS environment and handling of interrupt source calls.

Module IV (12 hours)

Real-time operating systems: Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues. of simulation models; Calibration and validation of models. Optimization via Simulation. EMBEDDED SOFTWARE DEVELOPMENT, TOOLS: Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools.

Text books

1 Embedded Systems Architecture: Programming and Design – Rajkamal, 2nd Edition, Tata McGraw Hill, 2008.

Reference books

1 Computers as Components: Principles of Embedded Computer System Design – Wayne Wolf, Elsevier.
2. Embedded Systems Architecture – Tammy Noergaard, Elsevier.
3. Embedded Systems Design – Steve Heath, 2nd Edition, Elsevier.
4. Embedded/Real-Time Systems: Concepts, Design and Programming: The Ultimate Reference – Dr. K.V.K.K. Prasad, Dreamtech Press
5 Embedded C – Michael J.Point, 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

2K6CS 705(D) VLSI DESIGN

3 hours lecture and 1 hour tutorial per week

Module I (16 hours)
Introduction to MOS technology-IC technology-MOC and VLSI NMOS and CMOS fabrication-thermal aspects-MOS circuits tub ties and latch up-wire paarsitic-design rules and layouts-multilayer CMOS process-layout diagrams-stick diagrams-hierarchical stick diagrams-layout design analysis tools.

Module II (12 hours)
Logic gates-review of combinational logic circuits-basic gate layouts-delay-power consumption-speed power product-wires and delay-combinational logic networks-layout methods-network delay-cross talk-power optimization-switch logic networks.

Module III (13 hours)
Sequential machines-latches and flip-flops-sequential system design-subsystem design-pipelining-data paths-adders-ALU-ROM-RAM-FPGA-PLA-multipliers.

Module IV (13 hours)
Floor planning-methods-floor plan of a 4 bit processor-off chip connections-architecture design-register transfer design-architecture for low power-architecture testing-cad systems and algorithms- simulation-layout synthesis.

Reference books

1. Puck nell D A & Eshraghm K, "Basic VLSI Design Systems and Circuits".
2. Mead C , Conway L, "Introduction to VLSI System " Addison Wesley
3. Wayne wolf, "Modern VLSI Design"

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

2K6CS 705(E) STOCHASTIC PROCESS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)
Markov chains and Poisson processes (a brief revision) - continuous time Markov chains - definition -transition probability function - Chapman - Kolmogorov equations - rate matrix - Kolmogorov forward and backward equations - computing the transition probabilities - limiting probabilities - pure birth process - birth and death process - M/ M/ 1 queue

Module II (12 hours)
Renewal theory and its applications - the renewal process N(t) - distribution of N(t) - renewal function - renewal equation - limit theorems and their applications - elementary renewal theorem (without proof) - applications of renewal theorem - central limit theorem of renewal processes (without proof) - renewal reward processes - regenerative processes - delayed renewal processes - alternating renewal processes.

Module III (14 hours)
Queuing theory I: introduction - preliminaries - cost equations - Little's formula - steady state probability - exponential models - single server exponential queuing system - single server exponential - system having finite capacity - a queuing system with bulk service - network of queues - open systems - closed systems - the system M/G/1 - preliminaries - work and cost identity - applications of work to M/G/1 - busy periods - discussion of M/D/1 model and $M/E_k/1$ model.

Module IV (12 hours)
Queuing theory II: variations on the M/G/1 - the M/G/1 with random sized batch arrivals - priority queues - the model G/M/1 - the G/M/1 busy and idle periods - multi server queues - Erlang loss system - the M/M/k queue -the G/M/k queue - the M/G/k queue - $M/G/\infty$ queue.

Reference books

1 Ross S.M., Introduction to Probability Models, Sixth edition, Harcourt Asia Pvt. Ltd. and academic Press.
2. Medhi J., Stochastic Processes, Wiley Eastern Ltd.

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

2K6CS 705(F) COMPUTATIONAL COMPLEXITY

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)
Review of Complexity Classes, NP and NP Completeness, Space Complexity, Hierarchies, Circuit satisfiability, Karp Lipton Theorem.

Module II (13 hours)
Randomized Computation, PTMs, Examples, Important BPP Results, Randomized Reductions, Counting Complexity, Permanent's and Valiant's Theorem

Module III (12 hours)
Review of Interactive Proofs, Lower bounds: Randomized Decision Trees, Yao's minimax lemma, Communication Complexity, Multiparty Communication Complexity

Module IV (13 hours)
Advanced Topics: Selected topics from Average case Complexity, Levin's theory, Polynomial time samplability, random walks, expander graphs, derandomization, Error Correcting Codes, PCP and Hardness of Approximation, Quantum Computation

Reference books

1 Papadimtriou C. H.., Computational Complexity, Addison Wesley, First Edition, 1993.
2.` Motwani R, Randomized Algorithms, Cambridge University Press, 1995.
3. Vazirani V., Approximation Algorithms, Springer, First Edition, 2004.
4 Mitzenmacher M and Upfal E., Probability and Computing, Randomized Algorithms and Probabilistic Analysis, Cambridge University Press, 2005.
Arora S and Boaz B, Computational Complexity, (Web Draft) http://www.princeton.edu/theory/complexity

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

2K6CS 705(G) DIGITAL SIGNAL PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Discrete time signals and systems - discrete signal sequences - linear shift invariant systems - discrete signals - stability and causality - difference equations - frequency domain representation - Fourier transform and its properties - relationship between system representation, review of Z-transforms.

Module II (15 hours)

Discrete Fourier transform - representation of discrete Fourier series -properties of discrete Fourier series - periodic convolution - DFT -properties of DFT - computation of DFT - circular convolution - linear convolution using DFT -FFTs - DIT-FFT and DIF-FFT -FFT algorithm for composite N.

Module III (13 hours)

Design of digital filters - IIR and FIR filters - low pass analog filter design - Butterworth and Chebyshev filters - design examples – bilinear transformation and impulse invariant techniques - FIR filter design – linear phase characteristics - window method.

Module IV (12 hours)

Realization of digital filters - discrete form I and II -cascade and Parallel form - finite word length effects in digital filters - quantizer characteristics- saturation overflow - quantization in implementing systems - zero input limit cycles - introduction to DSP processors.

Reference books

1 Prokis & Manolalus, Digital Signal Processing, Principles, Algorithm & Applications, Prentice Hall
2. Oppenheirn & Schafer, Discrete Time Signal Processing, Prentice Hall .
3. Ludeman L. C., Fundamentals of Digital Signal Processing, Harper and Row Publishers.
4 Van Valkenburg M E, Annalog Filter Design, Holt Saunders.
5. Terrel T J & Shark L K, Digital Signal Processing, MacMillan

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

2K6CS 705(H) INFORMATION STORAGE MANAGEMENT

3 hours lecture and 1 hour tutorial per week

Module I (13Hrs)
Storage Systems: Review the amount of information being created and understand the value of information to a business - Identify Data Center infrastructure elements and their requirements - Understand role of ILM strategy - List physical and logical components of host, connectivity, and storage - Detail the disk drive architecture and performance - Describe the concept of RAID and different RAID levels (RAID 0, 1, 3, 5, 0+1/1+0, and 6) - Define Intelligent Storage System (ISS) and its components - Implementation of ISS as high-end and midrange storage arrays.

Module II (13 Hrs)
Storage Networking Technologies and Virtualization: Describe the implementation of DAS and overview of SCSI - Define and detail the architecture, components, and topologies of FC-SAN, NAS, and IP-SAN - Understand the object based storage system CAS and its application as long-term archiving solution - Describe block-level and file-level storage virtualization technologies and processes - Overview of emerging technologies such as cloud storage and virtual provisioning

Module III (13 Hrs)
Business Continuity: Understand the concept of information availability and its measurement - Describe the causes and consequences of downtime- Define RTO, and RPO - Identify single points of failure in a storage infrastructure and solutions for its mitigation - Describe the backup/recovery purposes and considerations - Discuss architecture and different backup/Recovery topologies - Describe local replication technologies and their operation - Describe remote replication technologies and their operation.

Module IV (13 Hrs)
Storage Security and Management: Define information security - List the critical security attributes for information systems - Define storage security domains - List and analyze the common threats in each domain - Identify key parameters and components to monitor in a storage infrastructure - List key management activities and examples - Define storage management standards and initiative.

Text books
1. EMC Corporation, Information Storage and Management, Wiley India, 9788126521470

Reference books

1.. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill , Osborne, 2003
2. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001
3. Additional resource material on www.emc.com/resource-library/resource-library.esp

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

2K6CS 706(P) GRAPHICS AND MULTIMEDIA LAB

1. Implement Bresenham's algorithms for line, circle and ellipse drawing.
2. Perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. Implement Cohen-Sutherland 2D clipping and window-viewport mapping
4. Perform 3D Transformations such as translation, rotation and scaling.
5. Visualize projections of 3D images.
6. Convert between color models.
7. Implement text compression algorithm
8. Implement image compression algorithm
9. Perform animation using any Animation software
10. Perform basic operations on image using any image editing software

Text books

1. James D Foley, Van Dam A, Steven and Hughes, "Computer Graphics", Pearson Education
2. Ralf Steinmetz and Klara Nahrstedt, "Multimedia Fundamentals", Pearson Education

Reference books

1. Donald Hearn and M.Pauline Baker, "Computer Graphics", Pearson Education.
3. Newmann W and Sprull, "Principles of Interactive Computer Graphics", TMH.
4. Koegel Buford J F, "Multimedia Systems", Addison Wesley.
5. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI.

Sessional work assessment

Laboratory practical and record - 35 marks
Tests – 15 marks
Total – 50 marks

2K6CS 707(P) INTERNET AND WEB PROGRAMMING LAB

Servlets , JDBC & Networking

1. Write a program to create a authentication form which validates the Login ID and Password keyed in by the user and returns an appropriate page generated by a servlet code.
2. Write a program to create a feedback form, which validates the email-id and Comment, entered in the form and stores this data into the database. On clicking the button "Read the Guest book" the entries in the database is displayed in the form of a table. This table should be generated by a servlet code.
3. Write simple client-server program using TCP/IP and UDP [client can create an applet which contain a text field and a button. User enters a port number and presses the button labeled say "Connect". The date and time obtained from server is then displayed].
4. Write a program to create a simple chat application where multiple clients can chat with each other.
5.

Java scipt, JSP/PHP

1. Write a function distance that calculates the distance between two points. All values and return values should be floating point values. Incorporate this into a script that enables the user to enter the coordinates of points through an XHTML form.
2. Write functions for linear search and binary search and incorporate in the script as above.
3. Write a script that inputs a line of text , tokenize it with string method split and outputs the tokens in reverse order.
4. Write script for validating data entered in the form.
5. Write web server application using JSP/PHP to insert the data entered through forms into a database and to access and display the details.
6. Write a small online web application using PHP/JSP.

NB: These are sample programs. Programs of similar kind can be done for better understanding.

Text books

1. Deitel & Deitel, JAVA : How to Program, Pearson education , 7e
2. Deitel & Deitel, Internet and World Wide Web How to Program, Pearson education, 3e
3. Ivan BayRoss, Web Enabled Commercial Application using Java 2, bpb publication

Reference books

1. David Flanagan , Java Script The Definitive Guide, O'relly, 5e
2. Hans Bergsten, Java Server Pages, O'relly, 3e
3. David Sclar, Learning PHP5, O'relly

Sessional work assessment

Laboratory practical and record - 35 marks
Tests – 15 marks
Total – 50 marks

2K6 CS 708(P): MINI PROJECT

4 hours practical per week

Each student group (not more than 5 members in a group) is expected to develop a complete software product using the software engineering techniques- the product is to be deployed and should have user manual – a detailed report also to be submitted- the student may be assessed individually and in groups.

Sessional work assessment

Design & Development - 20 marks
Testing and Installation – 20 marks
Report-10 marks
Total Marks – 50 marks

2K6 CS 709(P): PHYSICAL EDUCATION, HEALTH & FITNESS

Introductory Lectures:

Unit 1: Health and fitness: Modern concept of health and fitness, meaning, scope, need and importance of health, fitness and wellness.

Unit II: Exercise and fitness: Means and methods of developing fitness. Importance of physical activities and exercises in developing and maintaining good health, Physical fitness and well being.

Unit III : Sports and Physical education: Meaning and scope, role and importance of sports and games in the development of physical fitness and personality. Social values of sports. Rules of major games.

Practical Sessions:

(All classes will be conducted after the normal working hours of the college)

50 sessions of minimum 1 hour duration each are envisaged (including Theory and Practical). The student can opt for one of the following activities in line with the specific programme / schedule announced by the faculty.

Athletics, Badminton, Basketball, Cricket, Football, General fitness, Hockey, Kabadi, Table Tennis, Ball Badminton, Archery, Volley ball, Yoga (not all activities may be offered in a particular semester. More disciplines will be offered based on the availability of infrastructure and expertise).

In addition, health and fitness assessment such as height, Weight, Resting Pulse rate and blood Pressure will be carried out.

Objective :

1. Basically to inculcate awareness of health, general fitness and attitude to voluntary physical involvement.
2. To promote learning of basic skills in sports activities and secondarily to pave the way for mastering some of the skills through continued future involvement.

Scheme of assessment:

The student will be continuously assessed on his performance on the field of play. There will not be minimum mark for pass or fail. Total 50 marks will be given assessing their attendance, regularity, punctuality and performance for 50 hours of activity from 1st semester to 7th semester.

2K6 CS 801: OPERATIONS RESEARCH

3 hours lecture and 1 hour tutorial per week

Module I: Linear algebra (13 hours)

Vectors - vector space and Euclidean space - vector operations - matrix operations - unit vector - sum vector - linear dependence - bases - spanning set - rank - simultaneous equations - basic solutions - point sets - lines and hyper planes - linear inequalities - convex sets - extreme points - fundamental theorem of linear programming

Module II: Linear programming (13 hours)

Statement of the LP problem - slack and surplus variables - basic feasible solutions - reduction of a feasible solution to basic feasible solution - artificial variables - optimality conditions - unbounded solutions - Charnes' M method - two phase method - degeneracy - duality

Module III: Transportation, assignment and game problems (13 hours)

Transportation problem - coefficient matrix and its properties - basic set of column vectors - linear combination of basic vectors - tableau format - stepping stone algorithm - UV method - inequality constraints - degeneracy in transportation problems - assignment problem as a maximally degenerate transportation problem - Köning's method - rectangular zero sum games - von Neuman's theorem - saddle points - pure and mixed strategies - formulation of the primal and dual LP problem for fixed strategies - dominance - graphical solutions

Module IV: Queuing theory (13 hours)

Basic structure of queuing models - exponential and Poisson distributions - birth and death processes - queuing models based on Poisson inputs and exponential service times - basic model with constant arrival rate and service rate - finite queue - limited source queue models involving non-exponential distributions - single service model with Poisson arrival and any service time distribution - Poisson arrival with constant service time - Poisson arrival and Erlang service times - priority disciplines - dynamic programming - Bellman's principle of optimality - formulation and solution of simple problems

Text books

1. Riggs J.L., Economic Decision Models for Engineers and Managers, McGraw Hill International Students Edition
2. Weist & Levy, A Management Guide to PERT & CPM, Prentice Hall of India
3. Starr & Miller, Inventory Control - Theory & Practice, Prentice Hall of India
4. Samuel Eilon, Production Planning & Control, Universal Book Corporation
5. Francis & White, Facility Layout & Location, Prentice Hall Inc.

Reference books

1. Hillier & Lieberman, *Introduction to Operations Research*, Holden Day Inc.
2. Biegel, *Production Control,* Prentice Hall of India
3. James Moore, *Plant Layout & Design*, The Macmillan Company

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

2K6CS 802 CRYPTOGRAPHY AND NETWORK SECURITY

3 hours lecture and 1 hour tutorial per week

Module 1 (14Hrs)
Divisibility - The division algorithms- gcd, lcm, primes- Fundamental theorem of arithmetic- Euler function, Congruence- Complete residue system- Reduced residue system- Euler theorem- Fermatt's little theorem- Wilson's theorem- The Chinese reminder theorem- Quadratic Residues - Legendre symbol

Module II (12 Hrs)
Security goals – Attacks – Services and Mechanisms – Techniques – Symmetric key encryption – Introduction – Substitution and Transposition ciphers – Stream and block ciphers –Modern symmetric key ciphers-DES-Structure, Analysis ,Security-AES- Introduction, AES Ciphers .

Module III (12 Hrs)
Asymmetric key Cryptography – Introduction – RSA cryptosystem – Rabin cryptosystem – Elgamal Cryptosystem – Elliptic Curve Cryptosystem
Message Integrity – Message Authentication – Hash Functions – SHA 512 – Digital Signature – Digital Signature Schemes –Entity authentication , Introduction.

Module IV (12 Hrs)
E mail Security – PGP & S/MIME – Transport layer Security – SSL & TLS – Network layer security – IP Sec

Text books
1. An Introduction to the theory of numbers. Ivan Niven, Herbert S Zuckerman, Hugh L Montgomery- Wiely Student Edition
2. Cryptography and Network Security, Behrouz A. Forouzan, Tata McGraw-Hill

Reference books 1.
1 Elementary Theory of Numbers- C Y Hsuing - Allied publishers Tom M Apostol Introduction to analytic Number Theory - Springer International Student Edition
2.Niven I., Zuckerman H.S. and Montgomery H. L., An Introduction to the Theory of Numbers, John Wiley and Sons.
3.Stallings W., Cryptography and Network Security: Principles and Practice, Pearson Education Asia.
4.Mano W., Modern Cryptography: Theory & Practice, Pearson Education. D. A. Burton,
5.Elementary Number Theory, 6/e, Tata McGraw Hill. Delfs H. and Knebel H., Introduction to Cryptography: Principles and Applications, Springer.

Sessional work assessment

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

University examination pattern

Q I - 8 short 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

2K6CS 803 ARTIFICIAL INTELLIGENCE

3 hours lecture and 1-hour tutorial per week

Module I (13 Hours)

Artificial Intelligence: History and Applications, Production Systems, Structures and Strategies for state space search- Data driven and goal driven search, Depth First and Breadth First Search, DFS with Iterative Deepening, Heuristic Search- Best First Search, A* Algorithm, AO* Algorithm, Constraint Satisfaction, Using heuristics in games- Minimax Search, Alpha Beta Procedure.

Module II (13 Hours)

Knowledge representation - Prepositional calculus, Predicate Calculus, Theorem proving by Resolution, Answer Extraction, AI Representational Schemes- Semantic Nets, Conceptual Dependency, Scripts, Frames, Introduction to Agent based problem solving.

Module III (12 Hours)

Machine Learning- Symbol based and Connectionist, Social and Emergent models of learning, The Genetic Algorithm- Genetic Programming, Overview of Expert System Technology- Rule based Expert Systems,

Module IV (12 Hours)

Languages and Programming Techniques for AI- Introduction to PROLOG and LISP, Search strategies and Logic Programming in LISP, Production System examples in PROLOG.

Text books

1. George F Luger, Artificial Intelligence- Structures and Strategies for Complex Problem Solving, 4/e, 2002, Pearson Education
2. E. Rich, K.Knight, Artificial Intelligence, 2/e, Tata McGraw Hill

Reference books

1. S Russel, P Norvig, Artificial Intelligence- A Modern Approach, 2/e, Pearson Education, 2002.
3. Winston. P. H, LISP, Addison Wesley .
4. Ivan Bratko, Prolog Programming for Artificial Intelligence, 3/e, Addison Wesley, 2000

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

2K6CS 804 : ADVANCED COMPUTER ARCHITECTURE

3 hours lecture and 1 hour tutorial per week

Module I (15 hours)

Fundamentals - task of a computer designer - trends in technology usage and cost - performance measurement - quantitative principles of computer design - *instruction set architectures* - classification - addressing and operations - encoding an instruction set - role of compilers - *case study* - the DLX architecture - *pipelining* - pipeline for DLX - pipeline hazards - data and control hazards - implementation difficulties - pipelining with multi-cycle operations

Module II (12 hours)

Instruction level parallelism - concepts and challenges - dynamic scheduling - dynamic hardware prediction - multiple issue of instructions - compiler and hardware support for ILP - *vector processing* - vector architecture - vector length and stride - compiler vectorization - enhancing vector performance

Module III (13 hours)

Memory hierarchy design - reducing cache misses and miss penalty, reducing hit time - main memory - virtual memory and its protection - *case study* - protection in the Intel Pentium - crosscutting issues - *I/O systems* - performance measures - reliability and availability - designing an I/O system - case study - Unix file system performance

Module IV (12 hours)

Interconnection networks - simple networks - connecting more than two computers - practical issues - *multiprocessors* - introduction - application domains - centralized-shared memory and distributed-shared memory architectures - synchronization - models of memory consistency

Text book

Hennesy J.L. & Pattersen D.A., *Computer Architecture: A Quantitative approach*, 2/e, Harcourt Asia Pte Ltd. (Morgan Kaufman)

Reference books

1. Pattersen D.A. & Hennesy J.L., *Computer Organisation and Design: The Hardware/ Software Interface*, 2/e, Harcourt Asia Pte Ltd (Morgan Kaufman)
2. Hwang K., *Advanced Computer Architecture: Parallelism, Scalability and Programmability*, McGraw Hill
3. Hwang & Briggs, *Computer Architecture and Parallel Processing*. McGrawHill.

Sessional work assessment

Assignments	2x10 = 20
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 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

2K6CS 805(A) ADVANCED TOPICS IN ALGORITHMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Balanced binary search trees – **AVL Trees** – Height of an AVL Tree, Insertion Procedure, Deletion Procedure. **Red Black Trees** – Properties of Red Black Trees, Rotations, Insertion and Deletion procedures. **B-Trees**- Definition, Basic operations on B-Tree, Deleting a key from B-Tree. **Binomial Heaps**- Binomial Trees and Binomial Heaps, Operations on Binomial Heaps. **Fibonacci Heaps**- Structure of Fibonacci Heaps, Mergeable Heap operations, Decreasing a key and Deleting a node, Bounding the maximum degree.

Module II (12 hours)

Flow Networks – Properties of Flow Networks, Ford-Fulkerson method, Edmonds-Karp method, Maximum Bipartite Matching, Push Relabel algorithm, The Relabel to Font Algorithm. **Solving Systems of Linear Equations** – Overview of LUP decomposition, Forward and Back Substitution, Computing an LU Decomposition, Computing LUP decomposition.

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Module III (14 hours)

Linear Programming - Overview of Linear Programming, Standard and Slack forms, Converting linear programs into slack forms, The Simplex Algorithm, Initial basic feasible solution, Fundamental theorem of Linear Programming. Polynomials and FFT – Representation of Polynomials, DFT and FFT, divide and conquer FFT algorithm, efficient parallel FFT algorithm.

Module IV (12 hours)

Pattern Matching Algorithms – Finite Automata based Pattern Matching, Rabin Karp method, The Boyer Moore heuristic, Longest Common Subsequence. Computational Geometry – Line Segment Properties, Segments intersection problem, Finding Convex Hull, Graham Scan method, Jarvis's March, Finding Closest pair of points.

Reference books

1 Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithms*, Prentice Hall of India
2. Basse S., *Computer Algorithms – Introduction to Design and Analysis*, Addison Wesley
3. Dexter C. Kozen, The Design and Analysis of Algorithms, Springer verlag N.Y, 1992

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

2K6CS 805(B) IMAGE PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)
Introduction - digital image representation - fundamental steps in image processing - elements of digital image processing systems - digital image fundamentals - elements of visual perception - a simple image model - sampling and quantization - basic relationship between pixels - image geometry - image transforms - introduction to Fourier transform - discrete Fourier transform - some properties of 2-fourier transform (DFT) - the FFT - other separable image transforms - hotelling transform

Module II (13 hours)
Image enhancement - point processing - spatial filtering - frequency domain - color image processing - image restoration - degradation model - diagonalization of circulant and block circulant matrices - inverse filtering - least mean square filter

Module III (12 hours)
Image compression - image compression models - elements of information theory - error-free compression - lossy compression - image compression standards

Module IV (12 hours)
Image reconstruction from projections - basics of projection - parallel beam and fan beam projection - method of generating projections - Fourier slice theorem - filtered back projection algorithms - testing back projection algorithms

Reference books

1. Rafael C., Gonzalez & Richard E. Woods, Digital Image Processing, Addison Wesley, New Delhi
2. Rosenfeld A. & Kak A.C., Digital Picture Processing, Academic Press
3. Jain A.K, Fundamentals of Digital Image Processing, Prentice Hall, Englewood Cliffs, N.J.
4. Schalkoff R. J., Digital Image Processing and Computer Vision, John Wiley and Sons, New York
5. Pratt W.K., Digital Image Processing, 2nd edition, John Wiley and Sons, New York

Sessional work assessment

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

University examination pattern

Q I - 8 short 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

2K6CS 805(C) NEURAL NETWORKS AND FUZZY LOGIC

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction to artificial neural networks-biological neurons-Mc Culloch and Pitts models of neurons-types of activation function-network architectures-knowledge representation-learning process-error-correction learning-supervised learning-unsupervised learning-single unit mappings and the perceptrons- perceptrons convergence theorem (without proof)-method of steepest descent-least mean square algorithms-adaline /Medaline units-multiplayer perceptrons-derivation of the back-propagation algorithm.

Module II (13 hours)

Radial basis and recurrent neural networks-RBF network structure-Covers Theorem and the separability of patterns-RBF learning strategies-K-means and LMS algorithms-comparison of RBF and MLP networks-recurrent networks-Hopfield networks-energy function-spurious states-error performance-stimulated annealing-the Boltzman machine-Boltzman learning rule-the mean field theory machine-MFT learning algorithm-applications of neural network-the XOR problem-traveling salesman problem-image compression using MLPs-character retrieval using Hopfield networks.

Module III (13 hours)

Fuzzy logic-fuzzy sets-properties-operations on fuzzy sets-fuzzy relations-operations of fuzzy relations-the extension principle-fuzzy measures-membership functions-fuzzification and defuzzification methods-fuzzy controllers-Mamdani and Sugeno types-design parameters-choice of membership functions- fuzzification and defuzzification methods-applications.

Module IV (13 hours)

Introduction to genetic algorithm and hybrid systems-genetic algorithms-natural evolution-properties-classification-GA features-coding-selection-reproduction-crossover and mutation operations basic GA and structure. Introduction to hybrid systems-concept of neuro-fuzzy and nuero-genetic systems.

Reference books

1. Simon Haykins, "Neural Network – A Comprehensive Foundation" Macmillan College, Proc, Con-Inc
2.Zurada J M, "Introduction to Artificial neural Systems", Jaico Publishers
3. Driankov D,Hellendoom H & Reinfrank M, "An Introduction to Fuzzy control", Narosa Publishing House.
4. Thimothy J Rose,"Fuzzy Logic with engineering Applications" TMH
5. Bart Kosko , "Neural Network and Fuzzy Systems", PHI
6. David E Goldberg, "Genetic Algorithms in Search Optimization and Machine Learning", Addison Wesley.
7. Suran Goonatilake & Sukhdev Khebbal, "Intelligent Hybrid Systems",John Wiley Sons

Sessional work assessment

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

University examination pattern

Q I - 8 short 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

2K6CS 805(D) MANAGEMENT INFORMATION SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12Hrs)
Information systems – functions of management – levels of management – framework for information systems – systems approach – systems concepts – systems and their environment – effects of system approach in information systems design – using systems approach in problem solving – strategic uses of information technology.

Module II (10 Hrs)
An overview of computer hardware and software components – file and database management systems – introduction to network components – topologies and types – remote access – the reasons for managers to implement networks – distributed systems – the internet and office
communications

Module III (14 Hrs)
Applications of information systems to functional – tactical and strategic areas of management, decision support systems and expert systems .

Module IV (16 Hrs)
Information systems planning – critical success factor – business system planning – ends /means analysis – organizing the information systems plan – systems analysis and design – alternative applications development approaches – organization of data processing – security and ethical issues of information systems .

Text books
1. Robert Schultheis & Mary summer , "Management Information System – The Manager's View" ,TMH.

Reference books

1. Landon K C & Landon J P, "Management Information Systems – Organization and Technology",4th Edition TMH.
2. Sadagopan s, "Management Information Systems", PHI
3. Basandra S K ," Management Information Systems", Wheeler Publishing.
4. Alter S, "Information Systems – A Management Perspective" 3/e Addison Wesley

Sessional work assessment

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

University examination pattern
Q I - 8 short 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

2K6CS 805(E) QUANTUM COMPUTATION

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)
Review of Linear Algebra. The postulates of quantum mechanics. Review of Theory of Finite Dimensional Hilbert Spaces and Tensor Products.

Module II (12 hours)
Models of computation – Turing machines. Quantifying resources. Computational complexity and the various complexity classes. Models for Quantum Computation. Qubits. Single and multiple qubit gates. Quantum circuits. Bell states. Single qubit operations. Controlled operations and measurement. Universal quantum gates.

Module III (14 hours)
Quantum Algorithms – Quantum search algorithm - geometric visualization and performance. Quantum search as a quantum simulation. Speeding up the solution of NP Complete problems. Quantum search as an unstructured database. Grover's and Shor's Algorithms.

Module IV (12 hours)
Introduction to Quantum Coding Theory. Quantum error correction. The Shor code. Discretization of errors, Independent error models, Degenerate Codes. The quantum Hamming bound. Constructing quantum codes – Classical linear codes, Shannon entropy and Von Neuman Entropy.

Reference books

1 Nielsen M.A. and I.L. Chauang, Quantum Computation and Quantum Information, Cambridge University Press, 2002.
2. Gruska, J. Quantum Computing, McGraw Hill, 1999.
3. Halmos, P. R. Finite Dimensional Vector Spaces, Van Nostrand, 1958

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

2K6CS 805(F) DATA MINING AND DATA WAREHOUSING

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Fundamentals of Data Mining-What is data mining, Data mining strategies(Mining Frequent pattern, Association, classification & prediction, cluster analysis)-classification of data mining systems-major issues in data mining-Data preprocessing-Data mining applications.

Data warehouse & OLAP technology- What is data warehouse, Multi dimensional data model, star, snowflakes and fact constellations, OLAP operations in Multidimensional data model- Data warehouse architecture-A three tier data warehouse architecture-Data warehouse back-end tools and utilities-types of OLAP servers.

Module II (13 hours)

Mining Frequent patterns- Frequent item sets, closed item sets and association rules, APRIORI algorithm for finding frequent item sets, Generating association rule from frequent item. Classification and Prediction-Issues regarding classification and prediction, classification by decision tree Induction, Bayesian classification, Rule based classification, SVM, k-Nearest neighbor classifiers. Prediction-Linear regression, Nonlinear regression.

Module III (13 hours)

Cluster analysis- What is cluster analysis, Type of data in cluster analysis-Categorization of major clustering Methods-classical partitioning methods- K-means and K-Medoids, Hierarchical methods-BIRCH (Balanced Iterative Reducing and Clustering using Hierarchies)- Introduction about Density based methods, Grid based methods model based methods and outlier analysis.

Module IV (12 hours)

Introduction about Mining data streams, mining time series data, spatial data, multimedia data, text data and web (Concepts only).

Introduction about WEKA Data mining tool- introduction, installation, WEKA data file format, Data visualization, Data filtering, selecting attributes, Data mining with WEKA, APRIORI algorithm through WEKA, clustering through WEKA, regression analysis through WEKA

Text books

1. Data Mining – Concepts and Techniques – Jiawei Han & Michaline Kamber Elsevier, second edition .
2. Data Mining: Methods and Techniques, ABM Shawkath Ali, Saleh A Wasimi, Cengage Learning India edn. (for WEKA data mining tool)

Reference books

1. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson Education
2. Data Mining Techniques – Arun K Pujari, University Press

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

2K6CS 805(G) ADVANCED MOBILE COMMUNICATION SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)
Introduction : Technical Background, Transmission Fundamentals, Communication Networks, Protocols and TCP/IP Suite . Wireless Communication Technology Antennas and Propagation Signal, Encoding Techniques, Spread Spectrum Coding and Error Control . Wireless Networking Satellite Communications, Cellular Transmission Principles, Cordless Systems and Wireless Local Loop Mobile IP and Wireless access protocol

Module II (13 hours)
Wireless LANs : Wireless LAN Technology, IEEE 802, 11 Wireless LAN standards. System Architecture for CDMA. Network and Data Link Layers of CDMA. Signaling Applications in CDMA System. Voice Applications in CDMA System.

Module III (12 hours)
RF Engineering and Facilities : Wireless Data, Cellular Communication Fundamentals, GSM Architecture and Interfaces. Radio . Link Features in GSM, GSM Logical Channels and Frame Structure. Speech Coding in GSM (Messages, Services and Call Flows in GSM).

Module IV (12 hours)
Wireless Sensor Networks : Overview/Architectures; Data Dissemination/Data Gathering; MAC Protocols; Sensor Management; Localization.

Reference books

1. Applications of CDMA in Wireless/Personal Communications - by V K Garg, K Smolik
2. Principles and Applications of GSM – by V K Garg Prentice Hall
3. Wireless Communication and Networks - by Stallings
4. Mobile Communication Schiller Prentice Hall
5. Mobile Communication - by Lee, Pearson
6. Related IEEE/IEE 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

2K6CS 805(H) NATURAL LANGUAGE PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)
Introduction to Natural Language Processing- The Study of Language- Applications of Natural Language Understanding- Evaluating Language Understanding Systems- Different Levels of language analysis- Representation and understanding- The Organization of Natural Language Understanding Systems Linguistic background.

Module II (12 hours)
Grammars and parsing, Top down and Bottom up parsers, Transition Network Grammars, Feature systems and augmented grammars, Morphological analysis and the lexicon, Parsing with features, Augmented Transition Networks.

Module III (12 hours)
Grammars for natural language, Movement phenomenon in language, Handling questions in context free grammars, Hold mechanisms in ATNs, Gap threading, Human preferences in parsing, Shift reduce parsers, Deterministic parsers, Statistical methods for Ambiguity resolution.

Module IV (15 hours)
Semantic Interpretation, word senses and ambiguity, Basic logical form language, Encoding ambiguity in logical from, Thematic roles, Linking syntax and semantics, Recent trends in NLP.

Text books

1. James Allen, Natural Language Understanding, Second Edition, 2003, Pearson Education

Reference books

1. D Juraffsky, J H Martin, Speech and Language Processing, Pearson Education
2. Tomek Strzalkowski " Natural Language Information Retrieval ", Kluwer academic Publishers, 1999
3. Ron Cole, J.Mariani, et.al "Survey of the State of the Art in Human Language Technology", Cambridge University Press, 1997

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 806(P) SEMINAR

4 hours per week

Each student is expected to give a seminar on a topic of current relevance in Computer Science and engineering –they have to refer published papers from standard journals-the seminar report must not be the reproduction of the original paper

Sessional work assessment	
Presentation	= 30 marks
Report	= 10 marks
Discussion	= 10 marks
Total marks	= 50 marks

2K6 CS 807(P) PROJECT & INDUSTRIAL TRAINING

6 hours practical per week

Each student group consisting of not more than four members is expected to develop a complete product- the design and development of which may include hardware and /or software- the students will present and demonstrate the project work before the committee - a detailed report is also to be submitted - sixty percent of total marks will be awarded by the guide and the remaining forty percent will be awarded by the evaluation committee. An industrial training of minimum one week should be carried out to have an industrial exposure to the students. A report on Industrial visit should be submitted also.

Sessional work assessment	
Design and Development	= 30 marks
Presentation & Demonstration	= 35 marks
Project Report	= 10 marks
Industrial visit Report	= 25 marks
Total marks	= 100 marks

2K6 CS 808 (P) : VIVA VOCE

There is only University examination for Viva Voce. Examiners will be appointed by the university for conducting the viva voce. The viva voce exam will be based on the subjects studied for the B.Tech course, mini project, project & Industrial training and seminar reports of the student - the relative weightages would be as follows

Sessional work assessment

Subjects	: 30
Mini project	: 20
Project & Industrial Training	: 30
Seminar	: 20
Total marks	: 100