

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD.**

**B. TECH. INFORMATION TECHNOLOGY**

IV YEAR	COURSE STRUCTURE			I Semester
Code	Subject	T	P	C
	Multimedia and Application Development	4+1*	0	4
	Embedded Systems	4+1 *	0	4
	Network Programming	4+1*	0	4
	Mobile Computing	4+1 *	0	4
	<b>ELECTIVE - I :</b>	4+1*	0	4
	Information Retrieval Systems			
	Information Security			
	Virtual Reality			
	Human Computer Interaction			
	<b>ELECTIVE - II :</b>	4+1*	0	4
	Software Project Management			
	Advanced computing concepts			
	Image Processing			
	Network Programming lab	0	3	2
	Multimedia and Application Development Lab	0	3	2
	<b>Total</b>	<b>30</b>	<b>6</b>	<b>28</b>

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**B. TECH. INFORMATION TECHNOLOGY**

IV YEAR	COURSE STRUCTURE			II Semester
Code	Subject	T	P	C
	Management Science	4+1*	0	4
	<b>ELECTIVE - III :</b>	4+1*	0	4
	Multimedia Databases			
	Network Management Systems			
	Biometrics			
	<b>ELECTIVE – IV :</b>	4+1*	0	4
	Bio-informatics			
	Design Patterns			
	Pattern Recognition			
	Industry Oriented Mini Project	0	0	2
	Seminar	0	0	2
	Project Work	0	0	10
	Comprehensive Viva	0	0	2
	<b>Total</b>	<b>15</b>	<b>–</b>	<b>28</b>

**Note :** All End Examinations (Theory and Practical) are of three hours duration.

\* - Tutorial      T – Theory      P – Practical      C - Credits

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**IV Year B.Tech. IT I-Sem**

<b>T</b>	<b>P</b>	<b>C</b>
<b>4+1*</b>	<b>0</b>	<b>4</b>

**MULTIMEDIA AND APPLICATION DEVELOPMENT**

**UNIT-I**

Fundamental concepts in Text and Image: Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

**UNIT-II**

Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

**UNIT-III**

**Action Script I** : ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class

**UNIT-IV**

**Action Script II** : Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces, Packages, Exceptions.

**UNIT-V**

**Application Development** : An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses.

**UNIT VI**

**Multimedia data compression:** Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**UNIT VII**

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

**UNIT-VIII**

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications : Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand(MOD).

**TEXT BOOKS:**

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.

**REFERENCE BOOKS:**

1. Digital Multimedia, Nigel Chapman and Jenny Chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communications Technology, Steve Heath, Elsevier(Focal Press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia Basics by Weixel Thomson.
6. Multimedia Technology and Applications, David Hilman, Galgotia.

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**EMBEDDED SYSTEMS**

**Unit - I**

**Embedded Computing** : Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples. **(Chapter I from Text Book 1, Wolf).**

**Unit - II**

**The 8051 Architecture** : Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. **(Chapter 3 from Text Book 2, Ayala).**

**Unit - III**

**Basic Assembly Language Programming Concepts** : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. **(Chapters 4,5 and 6 from Text Book 2, Ayala).**

**Unit - IV**

Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts. **(Chapter 7 and 8 from Text Book 2, Ayala)**

**Unit - V**

**Applications** : Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication. **(Chapter 10 and 11 from Text Book 2, Ayala).**

**Unit - VI**

**Introduction to Real – Time Operating Systems** : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. **(Chapter 6 and 7 from Text Book 3, Simon).**

**Unit - VII**

**Basic Design Using a Real-Time Operating System** : Principles, Semaphores and Queues, HardReal-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System. **(Chapter 8,9,10 & 11 from Text Book 3, Simon).**

**Unit - VIII**

**Introduction to advanced architectures** : ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller. **(Chapter 8 from Text Book 1, Wolf).**

**TEXT BOOKS :**

1. Computers and Components, Wayne Wolf, Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.

**REFERENCES :**

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

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**NETWORK PROGRAMMING**

**UNIT-I**

**Introduction to Network Programming:** OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

**UNIT-II**

**Sockets** : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

**UNIT-III**

**TCP client server** : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

**UNIT-IV**

**I/O Multiplexing and socket options:** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

**UNIT-V**

**Elementary UDP sockets:** Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

**UNIT-VI**

**Elementary name and Address conversions:** DNS, gethost by Name function, Resolver option, Function and IPV6 support, unname function, other networking information.

**UNIT-VII**

**IPC** : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.

**UNIT-VIII**

**Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

**Text Book:**

1. UNIX Network Programming, Vol. I, Sockets API, 2<sup>nd</sup> Edition. - W.Richard Stevens, Pearson Edn. Asia.
1. UNIX Network Programming, 1<sup>st</sup> Edition, - W.Richard Stevens. PHI.

**REFERENCES:**

1. UNIX SYSTEMS PROGRAMMING USING C++ T CHAN, PHI.
2. UNIX for programmers and Users, 3<sup>RD</sup> Edition, GRAHAM GLASS, KING ABLES, Pearson Education.
3. Advanced UNIX programming, 2<sup>nd</sup> edition, M J Rochkind pearson education.

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**MOBILE COMPUTING**

**UNIT - I**

**Introduction to Mobile Communications and Computing** : Mobile Computing (MC) : Introduction to MC, novel applications, limitations, and architecture.

**GSM** : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**UNIT - II**

**(Wireless) Medium Access Control** : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**UNIT - III**

**Mobile Network Layer** : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**UNIT - IV**

**Mobile Transport Layer** : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT - V**

**Database Issues** : Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

**UNIT - VI**

**Data Dissemination**: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

**UNIT - VII**

**Mobile Ad hoc Networks (MANETs)**: Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**UNIT - VIII**

**Protocols and Tools** : Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

**TEXT BOOKS :**

1. **Jochen Schiller**, "Mobile Communications", *Addison-Wesley*. (Chapters 4,7,9,10,11), second edition, 2004.
2. **Stojmenovic and Cacete**, "Handbook of Wireless Networks and Mobile Computing", *Wiley*, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

**REFERENCES :**

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", *Springer*, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", *Wiley DreamTech*, 2003.

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INFORMATION RETRIEVAL SYSTEMS  
(ELECTIVE - I)

**UNIT-I**

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

**UNIT-II**

**Information Retrieval System Capabilities:** Search, Browse, Miscellaneous

**UNIT-III**

**Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

**UNIT-IV**

**Data Structures:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

**UNIT-V**

**Automatic Indexing:** Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

**UNIT-VI**

**Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

**UNIT-VII**

**User Search Techniques:** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext.

**Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

**UNIT-VIII**

**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems.

**Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

**TEXTBOOK :**

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.

**REFERENCES :**

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval By Yates Pearson Education.
3. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.

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**INFORMATION SECURITY  
(ELECTIVE - I)**

**UNIT - I**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**UNIT - II**

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

**UNIT - III**

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

**UNIT - IV**

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT - V**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT - VI**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT - VII**

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats.

**UNIT - VIII**

Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

**TEXT BOOKS :**

1. Network Security Essentials (Applications and Standards) by William Stallings  
Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest  
Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve  
W.Manzuik and Ryan Permech, wiley Dreamtech,

**REFERENCES :**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie  
Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

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**VIRTUAL REALITY  
(ELECTIVE - I)**

**UNIT-I**

**Introduction** : The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. (1.1, 1.3 and 1.5 of Text Book (1))

**UNIT - II**

**Input Devices** : (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces. (2.1, 2.2 and 2.3 of Text Book (1)).

**UNIT - III**

**Output Devices**: Graphics displays, sound displays & haptic feedback. (3.1,3.2 & 3.3 of Text Book (1))

**UNIT - IV**

**Modeling** : Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management. (5.1, 5.2 and 5.3, 5.4 and 5.5 of Text Book (1)).

**UNIT - V**

**Human Factors**: Methodology and terminology, user performance studies, VR health and safety issues. (7.1, 7.2 and 7.3 of Text Book (1)).

**UNIT - VI**

**Applications**: Medical applications, military applications, robotics applications. (8.1, 8.3 and 9.2 of Text Book (1)).

**UNIT - VII**

**VR Programming-I** : Introducing Java 3D, loading and manipulating external models, using a lathe to make shapes. (Chapters 14, 16 and 17 of Text Book (2))

**UNIT - VIII**

**VR Programming-II** : 3D Sprites, animated 3D sprites, particle systems. (Chapters 18, 19 and 21 of Text Book (2))

**TEXT BOOKS :**

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,
2. Killer Game Programming in Java, Andrew Davison, Oreilly-SPD, 2005.

**REFERENCES :**

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier(Morgan Kaufmann).
2. 3D Modeling and surfacing, Bill Fleming, Elsevier(Morgan Kauffman).
3. 3D Game Engine Design, David H.Eberly, Elsevier.
4. Virtual Reality Systems, John Vince, Pearson Education.

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HUMAN COMPUTER INTERACTION  
(ELECTIVE - I)

**UNIT - I**

**Introduction** : Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

**UNIT - II**

**The graphical user interface** – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

**UNIT - III**

**Design process** – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

**UNIT - IV**

**Screen Designing** : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

**UNIT - V**

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

**UNIT - VI**

Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

**UNIT - VII**

Software tools – Specification methods, interface – Building Tools.

**UNIT - VIII**

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

**TEXT BOOKS :**

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

**REFERENCES :**

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.
2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

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**SOFTWARE PROJECT MANAGEMENT  
(ELECTIVE II)**

**UNIT - I**

**Conventional Software Management** : The waterfall model, conventional software Management performance.

**Evolution of Software Economics** : Software Economics, pragmatic software cost estimation.

**UNIT - II**

**Improving Software Economics** : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**The old way and the new** : The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**UNIT - III**

**Life cycle phases** : Engineering and production stages, inception, Elaboration, construction, transition phases.

**Artifacts of the process** : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**UNIT - IV**

**Model based software architectures** : A Management perspective and technical perspective.

**Work Flows of the process** : Software process workflows, Iteration workflows,

**UNIT - V**

**Checkpoints of the process** : Major mile stones, Minor Milestones, Periodic status assessments.

**Iterative Process Planning** : Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

**UNIT - VI**

**Project Organizations and Responsibilities** : Line-of-Business Organizations, Project Organizations, evolution of Organizations.

**Process Automation** : Automation Building blocks, The Project Environment.

**UNIT - VII**

**Project Control and Process instrumentation** : The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

**Tailoring the Process** : Process discriminants.

**UNIT - VIII**

**Future Software Project Management** : Modern Project Profiles, Next generation Software economics, modern process transitions.

**Case Study**: The command Center Processing and Display system- Replacement (CCPDS-R)

**TEXT BOOK :**

1. Software Project Management, Walker Royce: Pearson Education, 2005.

**REFERENCES :**

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

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**ADVANCED COMPUTING CONCEPTS  
(ELECTIVE - II)**

**UNIT I**

**Grid Computing** : Data & Computational Grids, Grid Architectures and its relations to various Distributed Technologies

**UNIT II**

Autonomic Computing, Examples of the Grid Computing Efforts (IBM).

**UNIT III**

Cluster setup & its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging systems.

**UNIT IV**

Process scheduling, Load sharing and Balancing; Distributed shared memory, parallel I/O .

**UNIT - V**

Example cluster System - Beowlf; Cluster Operating systems: COMPaS and NanOS

**UNIT - VI**

Pervasive Computing concepts & Scenarios; Hardware & Software; Human - machine interface.

**UNIT - VII**

Device connectivity; Java for Pervasive devices; Application examples

**UNIT - VIII**

Classical Vs Quantum logic gates ;One ,two & three QUbit Quantum gates; Fredkin & Toffoli gates ; Quantum circuits; Quantum algorithms.

**TEXT BOOK :**

1. J. Joseph & C. Fellenstein:' Grid Computing ', Pearson Education.
2. J.Burkhardt et .al :'Pervasive computing' Pearson Education
3. Marivesar:'Approaching quantum computing ', Pearson Education.

**REFERENCES :**

1. Raj Kumar Buyya:'High performance cluster computing', Pearson Education.
2. Neilsen & Chung L:'Quantum computing and Quantum Information', Cambridge University Press.
3. A networking approach to Grid Computing , Minoli, Wiley.

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**IMAGE PROCESSING  
(ELECTIVE - II)**

**UNIT - I**

**Introduction** : Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels (p.nos. 15-17, 21- 44, 50-69).

**UNIT - II**

**Image enhancement in the spatial domain** : Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods ( p.nos 76-141).

**UNIT - III**

**Image restoration** : A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function (p.nos 147-167, 220-243, 256-276).

**UNIT - IV**

**Color Image Processing** : Color fundamentals, color models, pseudo color image processing, basics of full-color image processing, color transforms, smoothing and sharpening, color segmentation (p.nos: 282-339).

**UNIT - V**

**Image Compression** : Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards (p.nos: 409-467, 492-510).

**UNIT - VI**

**Morphological Image Processing** : Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms (p.nos:519-550).

**UNIT - VII**

**Image Segmentation** : Detection of discontinuous, edge linking and boundary detection, thresholding, region-based segmentation (p.nos: 567-617).

**UNIT - VIII**

**Object Recognition** : Patterns and patterns classes, recognition based on decision-theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching (p.nos: 693-735).

**TEXT BOOK :**

1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.

**REFERENCES :**

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003.
4. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
5. Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.
6. Digital Image Processing, William K. Prat, Wiley Third Edition
7. Digital Image Processing, Jahne, Springer.

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**T P C  
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**NETWORK PROGRAMMING LAB**

**Objectives:**

- To teach students various forms of IPC through Unix and socket Programming

**Recommended Systems/Software Requirements:**

- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space LAN Connected
- Any flavour of Unix / Linux

**Week1.**

Implement the following forms of IPC.

- a)Pipes
- b)FIFO

**Week2.**

Implement file transfer using Message Queue form of IPC

**Week3.**

Write a programme to create an integer variable using shared memory concept and increment the variable simultaneously by two processes. Use senphores to avoid race conditions

**Week4.**

Design TCP iterative Client and server application to reverse the given input sentence

**Week5.**

Design TCP iterative Client and server application to reverse the given input sentence

**Week6.**

Design TCP client and server application to transfer file

**Week7.**

Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"

**Week8.**

Design a TCP concurrent server to echo given set of sentences using poll functions

**Week9.**

Design UDP Client and server application to reverse the given input sentence

**Week10**

Design UDP Client server to transfer a file

**Week11**

Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.

**Week12**

Design a RPC application to add and subtract a given pair of integers

**Reference Book:**

- 1.Advance Unix Programming Richard Stevens, Second Edition Pearson Education
2. Advance Unix Programming, N.B. Venkateswarlu, BS Publication.

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**MULTIMEDIA AND APPLICATION DEVELOPMENT LAB**

1. Assigning Actions to an Object, and a Button
  2. Creating Loops
  3. Generation Random Numbers
  4. Creating a Function, Calling a Function
  5. Detecting the Player Version
  6. Detecting the Operating System
  7. Checking the System language
  8. Detecting Display Settings
  9. Tinting a Movie Clip's Color
  10. Controlling a Movie Clip's Color with Sliders
  11. Drawing a Circle
  12. Drawing a Rectangle
  13. Filling a Shape with a Gradient
  14. Scripting Masks
  15. Converting Angle Measurements
  16. Calculating the Distance Between the Two Points
  17. Formatting Currency Amount
  18. Converting Between Units of Measurement
  19. Determining Points Along a Circle
  20. Sorting or Reversing an Array
  21. Implementing a Custom Sort
  22. Creating a Text Field
  23. Making a Password Inputfield
- All the above programs are to be done in Flash MX 2004.

**REFERENCES :**

1. Action Script Cookbook, Joey Lott, SPD-Oreilly.
2. Flash MX Action Script for designers, Doug Sahlin, Dreamtech Wiley.
3. Flash MX Professional 2004 Unleashed, David Vogeeler and Matthew Pizzi, Pearson Education.

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**MANAGEMENT SCIENCE**

**Unit - I**

**Introduction to Management:** Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

**Unit - II**

**Designing Organisational Structures :** Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

**Unit - III**

**Operations Management :** Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

**Unit -IV**

**a) Materials Management:** Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

**b) Marketing:** Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle, Channels of distribution

**Unit - V**

**Human Resources Management (HRM) :** Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs.PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

**Unit - VI**

**Project Management (PERT/CPM) :** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

**Unit - VII**

**Strategic Management :** Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**Unit - VIII**

**Contemporary Management Practices :** Basic concepts of MIS, End User Computing, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

**TEXT BOOKS :**

1. Aryasri : *Management Science*, TMH, 2004.
2. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2004.

**REFERENCES :**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2005
2. Koontz & Wehrich: Essentials of Management, 6/e, TMH, 2005
3. Thomas N.Duening & John M.Ivancevich Management — Principles and Guidelines, Biztantra,2003.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, *Personnel Management*, Himalaya, 25/e, 2005
6. Samuel C.Certo: *Modern Management*, 9/e, PHI, 2005
7. Schermerhorn, Capling, Poole & Wiesner: *Management*, Wiley, 2002.
8. Parnell: Strategic Management, Biztantra,2003.
9. Lawrence R Jauch, R.Gupta &William F.Glueck:Business Policy and Strategic Management, Frank Bros.2005.
10. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

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**MULTIMEDIA DATABASES  
(ELECTIVE - III)**

**UNIT-I**

**Introduction** : An introduction to Object-oriented Databases; Multidimensional Data Structures: k-d Trees, Point Quadrees, The MX-Quadtree, R-Trees, comparison of Different Data Structures

**UNIT-II**

**Image Databases** : Raw Images, Compressed Image Representations, Image Processing: Segmentation, Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations, Representing Image DBs with R-Trees, Retrieving Images By Spatial Layout, Implementations

**UNIT-III**

**Text/Document Databases** : Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques

**UNIT-IV**

**Video Databases** : Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards

**Audio Databases** : A General Model of Audio Data, Capturing Audio Content through Discrete Transformation, Indexing Audio Data

**UNIT-V**

**Multimedia Databases** : Design and Architecture of a Multimedia Database, Organizing Multimedia Data Based on The Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSS with Enhanced Inverted Indices, Query Relaxation/Expansion

**Unit-VI**

Creating Distributed Multimedia Presentations : Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints.

**Unit-VII**

Spatial Concepts and Data Models: Models of spatial information, Design extending the ER model with spatial concepts, Extending the ER model pictograms, Object oriented data model with UML.

**Unit-VIII**

Spatial Query Languages: Extending the SQL for spatial data, Examples of queries that emphasis spatial data, Object relational schema examples queries.

**TEXT BOOKS :**

1. Principles of Multimedia Database Systems, V.S. Subrahmanian, Elseveir(Morgan Kauffman).
2. Spatial Databases, Shashi Shekhar, Sanjiv Chawla, Pearson Education.

**REFERENCES :**

1. Multimedia Databases: An object relational approach, Lynne Dunckley, Pearson Education.
2. Multimedia Database Systems, Prabhakaram, Springer.

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**NETWORK MANAGEMENT SYSTEMS  
(ELECTIVE - III)**

**UNIT-I**

**Data communications and Network Management Overview** : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

**UNIT-II**

**SNMPV1 Network Management** : Organization and Information and Information Models.

**Managed network**: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.

**UNIT-III**

**SNMPv1 Network Management** : Communication and Functional Models.

The SNMP Communication Model, Functional model

**UNIT-IV**

**SNMP Management: SNMPv2** : Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility With SNMPv1

**UNIT-V**

**SNMP Management: RMON** : What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON

**UNIT-VI**

**Telecommunications Management Network** : Why TMN?, Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.

**UNIT-VII**

**Network Management Tools and Systems** : Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

**UNIT-VIII**

**Web-Based Management** : NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network: , Future Directions

**TEXT BOOK :**

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

**REFERENCES :**

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
3. Distributed Network Management, Paul, John Wiley.

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**BIOMETRICS  
(ELECTIVE - III)**

**UNIT I**

Introduction – Benefits of biometric security – Verification and identification – Basic working of biometric matching – Accuracy – False match rate – False non-match rate – Failure to enroll rate – Derived metrics – Layered biometric solutions.

**UNIT II**

Finger scan – Features – Components – Operation (Steps) – Competing finger Scan technologies – Strength and weakness. Types of algorithms used for interpretation.

**UNIT III**

Facial Scan - Features – Components – Operation (Steps) – Competing facial Scan technologies – Strength and weakness.

**UNIT IV**

Iris Scan - Features – Components – Operation (Steps) – Competing iris Scan technologies – Strength and weakness.

**UNIT V**

Voice Scan - Features – Components – Operation (Steps) – Competing voice Scan (facial) technologies – Strength and weakness.

**UNIT VI**

Other physiological biometrics – Hand scan – Retina scan – AFIS (Automatic Finger Print Identification Systems) – Behavioral Biometrics – Signature scan- keystroke scan.

**UNIT VII**

Biometrics Application – Biometric Solution Matrix – Bio privacy – Comparison of privacy factor in different biometrics technologies – Designing privacy sympathetic biometric systems. Biometric standards – (BioAPI , BAPI) – Biometric middleware

**UNIT VIII**

Biometrics for Network Security. Statistical measures of Biometrics. Biometric Transactions.

**TEXT BOOKS :**

1. Biometrics – Identity Verification in a Networked World – Samir Nanavati, Michael Thieme, Raj Nanavati, WILEY- Dream Tech
2. Biometrics for Network Security- Paul Reid, Pearson Education.

**REFERENCE:**

1. Biometrics- The Ultimate Reference- John D. Woodward, Jr. Wiley Dreamtech.

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**BIOINFORMATICS  
(ELECTIVE-IV)**

**UNIT-I**

**Introduction to Bioinformatics:** Scope of Bioinformatics, Elementary commands and protocols, ftp, telnet, http. Primer on information theory.

**UNIT-II**

**Introduction to Homology :** Introduction to Homology (with special mention to Charles Darwin, Sir Richard Owen, Willie Henning, Alfred Russel Wallace).

**UNIT-III**

**Special Topics In Bioinformatics :** DNA mapping and sequencing, Map alignment, Large scale sequencing methods Shotgun and Sanger method.

**UNIT-IV**

**Sequencing Alignment and Dynamic Programming :** Heuristic Alignment algorithms. Global sequence alignments-Neddleman-Wunsch Algorithm Smith-Waterman Algorithm-Local sequence alignments (Amino acid substitution Matrices (PAM, BLOSUM).

**UNIT-V**

**Primary Database and their Use :** Introduction to Biological databases, Organization and management of databases. Searching and retrieval of information from the World Wide Web. Structure databases-PDB (Protein Data Bank), Molecular Modeling Databases (MMDB). Primary Databases NCBL,EMBL, DDBJ.

**UNIT-VI**

**Secondary Databases :** Introduction to Secondary Databases Organization and management of databases Swissprot, PIR,KEGG

**UNIT-VII**

**Bio Chemical Data Bases :** Introduction to BioChemical databases-organization and Management of databases. KEGG, EXGESCY, BRENDA, WIT.

**UNIT-VIII**

**Evolutionary Trees and Phylogeny :** Multiple sequence alignment and phylogenetic analysis.

**TEXT BOOKS :**

1. Bioinformatics Basics. Applications in Biological Science and Medicine by Hooman H. Rashidi and Lukas K.Buehler CAC Press 2000.
2. Algorithms on Strings Trees and Sequences Dan Gusfield. Cambridge University Press 1997.

**REFERENCES :**

1. Bioinformatics: A Machine Learning Approach P. Baldi. S. Brunak, MIT Press 1988.
2. Bioinformatics. David Mount, 2000. CSH Publications
3. Developing Bioinformatics Skills. Cynthia Gibbs & Per Jamberk
4. Genomics and Proteomics-Functional and Computational aspects. Springer Publications. Editor-Sandor Suhai.
5. Bioinformatics- Methods and Protocols-Human Press. Stephen Misener, Stephen A. Krawetz.
6. Computational Biochemistry – C.Stan ,TSAI WILEY Publications.
7. Bioinformatics – A Practical guide to the Analysis of Genes and Proteins – ANDREAS D.BAXEVANIS, B.F. FRANCIS OUELLETTE.
8. Bioinformatics – Principles and Applications – Harshawardhan P.Bal TATA MEGRAW HILL.

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**DESIGN PATTERNS**  
(ELECTIVE-IV)

**UNIT –I**

**Introduction** : What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

**UNIT-II**

**A Case Study : Designing a Document Editor** : Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary .

**UNIT-III**

**Creational Patterns** : Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT-IV**

**Structural Pattern Part-I** : Adapter, Bridge, Composite.

**UNIT-V**

**Structural Pattern Part-II** : Decorator, açade, Flyweight, Proxy.

**UNIT-VI**

**Behavioral Patterns Part-I** : Chain of Responsibility, Command, Interpreter, Iterator.

**UNIT-VII**

**Behavioral Patterns Part-II** : Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

**UNIT-VIII**

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

**TEXT BOOK :**

1. Design Patterns By Erich Gamma, Pearson Education

**REFERENCES :**

1. Pattern's in JAVA Vol-I By Mark Grand ,Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand ,Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-sp
5. Design Patterns Explained By Alan Shalloway,Pearson Education.

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**PATTERN RECOGNITION  
(ELECTIVE - IV)**

**UNIT - I**

**Introduction** : Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation (Text book-1, p.nos: 1-17).

**UNIT - II**

**Bayesian Decision Theory** : Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces (Text book-1, p.nos: 20-27, 29-31).

**UNIT-III**

**Normal density** : Univariate and multivariate density, discriminant functions for the normal density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context (Text book-1, p.nos: 31-45, 51-54, 62-63).

**UNIT-IV**

**Maximum likelihood and Bayesian parameter estimation** : Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case (Text book-1, p.nos: 84-97).

**UNIT-V**

**Un-supervised learning and clustering** : Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering – similarity measures, criteria function for clustering (Text book-1, p.nos: 517 – 526, 537 – 546).

**UNIT-VI**

**Component analyses** : Principal component analysis, non-linear component analysis; Low dimensional representations and multi dimensional scaling (Text book-1, p.nos: 568-570, 573 – 576, 580-581).

**UNIT-VII**

**Discrete Hidden Markov Models** : Introduction, Discrete-time markov process, extensions to hidden Markov models, three basic problems for HMMs. (Text book -2, p.nos: 321 – 344)

**UNIT-VIII**

**Continuous hidden Markov models** : Observation densities, training and testing with continuous HMMs, types of HMMs. (Text book-2, p.nos: 348 – 352)

**TEXT BOOKS :**

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Fundamentals of speech Recognition, Lawrence Rabiner, Biing – Hwang Juang Pearson education.

**REFERENCE :**

1. Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004