

## **MASTER OF TECHNOLOGY COURSE IN INFORMATION TECHNOLOGY**

### **DISTRIBUTED COMPUTING – MIT-21**

Theory Paper – 100 Marks

Sessional – 50 Marks

Introduction to the distributed systems, Pros and Cons of distributed Processing, distributed databases, distributed Resources, distributed Networks management. Design Considerations; Communication line loading , Partitioning and Allocation, Network Data Base design Consideration .data Communications distributed Networks-Uylessd, Black.

Fundamental of Network and distributed Operating System, Remote Service Robustness Design issues, distributed file system , Naming and Transparency, Remote file Access, File replication , Distributed coordination ; Event ordering, Mutual exclusion , Atomicity , concurrency control, Deadlock handling, various algorithms.

Distributed shared Memory ; Architecture, Design & Implementation issues, Granularity, structure, replacement strategy , Thrashing synchronization : clock synchronization, Event Ordering, Mutual Exclusion Process Management: Process Migration Threads. Case studies: Amoeba, V-System , Mach, Chorus.

#### **BOOKS :**

- 1 Computer Networks: Tanenbaum.
- 2 Data Communication and Distributed Networks : Black.
- 3 Distributed Operating System: Sinha
- 4 Internetworking with TCP/IP : Comer.
- 5 Data Communications, Computer Networks and Open Systems : Hallsall.
- 6 Data Communications : Stalling.

## **COMPUTATIONAL MATHEMATICS – MIT-11**

Theory Paper – 100 Marks

Sessional – 50 Marks

Real Analysis : Functional of several variables, continuity; partial derivatives; Taylor's theorem, applications to stationary value problems; Lagrange multipliers; directional derivatives, the operators div, curl, grad; Jacobians, Jacobian theorems; double, triple, line and surface integral; theorems of Gauss and Stokes: applications.

Algebra: n-Dvectors, vector spaces, linear dependence . Determinants and matrices of order n-Rank, eigen values, quadric forms, applications.

Basic MATLAB function and applications. Fuzzy Set Theory and application to communication problems, Fuzzy MATLAB tools.

DFT,FFT and MATLAB tools for wavelet transform.

**ELECTIVE – III – MIT-24**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**OBJECT ORIENTED MODELING & DESIGN**

Overview of Object Oriented concepts :

Need for Object Oriented Programming, characterization of Object oriented languages

Object Oriented Design : Objects structure concepts, methodology for object oriented design(Booch,& chen & chen) ,Design modelling, system design life cycle

Object oriented programming : an overview of C++ programming ,loops and decisions, structures and functions, objects and classes , array and pointers, Inheritance , virtual functions files and stream

Object oriented data bases :relational V\s object oriented dat bases .the architecture of OO databases ,query languages for OO databases ,Gemstone\O2\orion

**Distributed Object Oriented Systems** : object management group, CORDA

Books ;

1. Object Oriented s\w development by Mc. Gregor and Sykes DA ,Van Nostrand Pub
2. OOP in C++ by Lafore ,Galgotia Pub
3. The C++ programming Language by Stroustrup B,Addison Wesley
4. Introduction to OOP by Witt,K.V. ,galgotia Pub.
5. Object Data management by Cattel R., Addison.Wesely
6. Modern Database System by Kim W,ACM Press,Addison Wesley
7. OOP by Blschek G,Springer Verlag.

**ELECTIVE –V – MIT-32**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**NETWORK SECURITY AND CRYPTOGRAPHY**

Basic concepts: Information Systems reviewed; Batch Systems ; On-line Systems ;Wide Area Networks(WAN), Metropolitan Area Networks(MAN),Local Area Networks (LANs: applications types)  
Security defined ; Roles.

Models: Characteristics of security models , Reference monitor concept, Formal Security Models – Harrison- Piazzo model, Ulman Model, Bell La-Fadila Model, Object-oriented Model, Clares Willson, Chines Wall Model,etc.

Information Flow , Role based access control. Covert channels, Security mechanisms in Operating Systems.

Policy Paradigm: Meta policies.  
Implementing a security model , formal specifications and verification methodologies. Targets; Facility , Hardware , Software ,Applications, Data Communications, Procedures (Administrative ), Personnel.

Threats to Security: Areas of vulnerability, Physical Security, Data Security, Systems Security, Computer System Security, Communication Security, Personnel Security  
Threat Perpetration: Sources. Manmade, accidental. Threat prevention measures. Identity verification , Cryptography. Disaster recovery and Contingency Plan , Security Management , The future of Computer Security.

**Books :**

1. Security & Protection in Information Systems by Grissonnanche, North Holland
2. Cryptography and Data Security by Denning, Addison Wesley.
3. Computer Security Management by Frocht, Boyal & Frasev.
4. Security architecture for open Distributed systems by Muflic, JohnWiley.
5. Network Security by Kacifman & Perlman, PHI.
6. [Http//www.Theory.les.MIT.edu/Rivest](http://www.Theory.les.MIT.edu/Rivest)

**ELECTIVE –II – MIT-15**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**ARTIFICIAL INTELLIGENCE & FUZZY LOGIC**

**Game Playing:** Overview, Minimax search procedure, adding Alfa-Beta cutoffs, Additional Refinements ,Iterative Deepening, References on specific Games

**Planning :** Overview. An Example Domain components of a planning system Goal Stack planning, nonlinear planning using constraint posting hierarchical planning, reactive systems

**Other Planning Techniques**

**Understanding:** what is understanding? What makes understanding hard? Understanding as constraint satisfaction

**Natural Language Processing:** Introduction ,Syntactic Processing. semantic analysis, Discourse and pragmatic processing

**Parallel in distributed AI:** Psychological Modeling, parallelism in Reasoning Systems, distributed Reasoning systems.

**Learning:** rote learning, learning by taking advice ,learning in problem solving, learning from examples , explanation based, discovery, analogy, formal learning theory, neural net learning and genetic learning.

**Connectionist Models :**Introduction, learning in neural networks, applications of neural network, Recurrent networks, distributed Representations, Connectionist AI and symbolic AI ,case studies, of NNs in pattern recognition, Image processing, Computer vision etc.

**Common Sense:** Qualitative Physics, Common Sense, ontologies ,memory organization,case based reasoning.

**Fuzzy Logic:** Introduction, Fuzzy Set Theory, Fuzzy Set Relations, statistical decision making, Introduction to Fuzzy Logic Controllers, various Fuzzyfication and Defuzzification methods.

Some case studies of FLCs in diagnosis, control, human activities, Robots ,Image recognition, Data bases, information retrieval expert system for damage assessment. Introduction to Neuro-Fuzzy systems and its applications in real world computing.

Overview of evolutionary Algorithms and its applications in search and optimization areas.

**BOOKS**

- 1.Artificial Intelligence –E.Rich, K. Knight,TMH
- 2.Fuzzy Systems Theory and its Application– Terano,K.Asai,M.Sugeno,
- 3.Introduction to Nerual Networks-Wassermann,van Nostrand,Reinhold.
4. Fuzzy Sets and Fuzzy Logic-G.Klir and B Yuan ,PHI
- 5.Artificial Inteligence,an Engineering approach –R.I Sehal ,Koli,Me Graw hill
- 6.Hand Book of evolutionary Algorithms-Oxford University press.

**ELECTIVE – I – MIT-14**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**COMPUTER AIDED DESIGN**

**Introduction:**

The nature and role of design, the nature of CAD, type of CAD system, concept of integrated CAD benefits of CAD, the price of CAD, system, origin of CAD, applications of CAD.

**Computer aided design system hardware:**

Introduction graphics input devices as light pens, analog devices, keyboard devices etc. graphics display devices as CRT displays, plasma panel display etc. graphics output devices as pen plotters, electrostatic plotters other, graphics output devices and modes of their operation , CAD system configuration .

**Computer aided design system software:**

Introduction operating system, the overlay graphics systems, graphics database handling and structure, operating features, symbols, macros, editing facility, data selection , graphics transformation plotting, graphics standards as GKS and CORE, GKS 3-D and PHIGS, IGIS others graphics standards.

**Transformation systems:**

Display, windowing and clipping, two dimensional transformation, three dimensional transformation, linear transformation, display files of three dimensional data, visualization of three dimensional data, eye co-ordinator system, joystick function, distortion.

**Use of micro computers in CAD system:**

Microcomputer systems, CAD system based on microcomputers, choice of microcomputer system by considering microprocessor, primary memory, backup storage, communication system, software for CAD system.

Computer aided design of filters, printed & integrated circuits.

**ADVANCED COMPUTER ARCHITECTURE- MIT-23**

Theory Paper – 100 Marks

Sessional – 50 Marks

Flynn's & Handler's Classification of parallel computing structures. Pipelined & Vector Processors. Data & control hazards and method to resolve them. SIMD multiprocessor structures. Interconnection networks. Parallel algorithms for array processors. Search algorithms, MIMD multiprocessor Systems, Scheduling and load balancing in multiprocessor systems, Multiprocessing control and algorithms.

Books Recommended:

1. "Computer Architecture and Organisation"- John Hays, Mc. Graw-Hill.
2. "Computer Architecture and Parallel Processing"-Hwang and Briggs, Mc. Graw-Hill book company.

**ELECTIVE –II – MIT-15**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**NEURAL NETWORK**

Unit 1

Ann Definition, Taxonomy of neural net classifiers for fixed patterns, Mc-Culloch & Pitts Model, structure and working of human brain & comparison with basic ANN model, single layer network. Perceptron training algorithm, linear separability, Hebb's learning rule, Widrow & Holf's learning rule / Delta rule, ADALINE, MADALINE, Comparison of ANN with human brain and AI characteristics and application of ANN.

Unit II

Multilayer perception, problem with linear activation function, different activation functions like sigmoidal/squashing function, linear threshold function, hyperbolic tangent and Gaussian function. Rumelhart's error back propagation algorithm (EBPA) with proof, momentum, limitations, characteristics and Application of EBPA, case study : NETTALK, two dimensional pattern recognition etc.

Unit III

Fast training of MLP : EBP using direct solution methods (EBPVDS) , DR symmetric Gaussian Elimination Method (DRSGE) , Random MBD ( Minimum Bit distance) Gram-Schmidt methods (RMGS), case study: Function approximations, Pattern recognition and vowel recognition. Counter Propagation Network: Network Structure, functioning in Normal & Training mode, characteristics of CPN.

Unit IV

Deterministic v/s statistical training, Boltzman training, Cauchy training, Artificial specification methods. Hopfield /recurrent network, configuration, stability constraints, Associative memory characteristics, limitations and applications Hopfield v/s boltzman machine. Competitive learning : concepts, weight change, example 7 characteristics, lateral inhibition : concepts & examples.

Unit V

Kohonen self-organizing feature map resemblance with human brain, feature map algorithm- how  $\alpha$  and  $d$  changes with time, examples and properties. Adaptive

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Resonance Theory(ART): Architecture, classification, implementation & training.  
Optical neural network, Cognitron and Neocognitron.

## **ADVANCED SOFTWARE ENGINEERING- MIT-22**

Theory Paper – 100 Marks

Sessional – 50 Marks

Introduction ,Software life –cycle models, software requirements specification, formal requirement, specification-axiomatic and algebraic specification,  
Function –oriented software design ,object oriented design, UML, coding and unit testing, data design architectural styles & pattern architectural design ,assessment of alternate ,architectural design ,mapping data flow into software architecture Modeling component level design, S\W reuse, Software quality & testing—SEI CMM and ISO-9001,software reliability and fault –tolerance, computer aided software engg.(CASE), Web Engg.. Formal Methods ,clean room software Engg, component based development ,software reengg,.

**Laboratory** :Development of requirements specification ,Function oriented design using SA\SD, Object Oriented design using UML test case design implementation using JAVA and TESTING

### **Text/ References**

Presman R.S.,3<sup>rd</sup> Edition,Software engg.-A practitioners Approach ,Mc Graw,Hill,International,Eddition 1992

Jalote,P.1<sup>st</sup> Eddition ,2<sup>nd</sup> Eddition is Shortly due from Springer verlag.AN Integrated Approach to software engg,Narossa,1991

S/W Testing techniques ,boris,beizer,2ndEddition,Van Nostrand reinhold  
Measuring S\w reuse –principles practices and economid models ,J.S.Poutin Eddition Wesley

**ELECTIVE – I – MIT-14**

Theory Paper – 100 Marks

Sessional – 50 Marks

**ADVANCED DBMS**

Overview of Database Management, Conceptual Database Design, Logical Database Design, Physical Database Design, Query Processing, Transaction processing, Crash recovery, Concurrency control, , Distributed Database, client/server database. Integrity security and repositories. Emerging Database trends, Design and database administration skills based on near-real life applications.

**BOOKS:**

1. Fundamentals of Database Systems(IIInd ed.) R.Elmasri, S. Navathe, Benjamin Cummings, 1994.
2. An introduction to Data Base systems, Volume I ( V th Ed.) , C.J.Date, Addison Wesley 1994.
3. Principles of Database Systems (IIInd ed.) J.D.Ullman, Galotia Pub. 1994.
4. Client/server Strategies, Vaakevitch David, Galotia Pub. 1990.

**COMPUTER GRAPHICS AND ANIMATION**

Transformation and Projections. Bresenham's line drawing algorithm, Homogenous coordinate system(2D & 3D), transformation matrices for translation, scaling, rotation,, shear rotation about an arbitrary axis(3D), parallel projection, perspective projection, clipping, Sutherland cohen algorithm, cyrusbeck algorithm curves & surfaces, Development of Bresenham's algorithm to draw octant of a circle, Bezier curves, B-spline curves, solid modeling, Hidden surface removal, shading, introduction to multimedia, Non Temporal media, Audio, Video, Graphics animation..

**Books recommended**

1. Multimedia Systems Design, P.K.Andleigh & K.Thakrar, Prentice Hall PTR,1996(TB1)
2. Multimedia Computing, Communication & Applications, Ralf Steinmetz and Klara Nashtedt. Prentice Hall.1995(TB2)
3. Multimedia Systems, Ed. By John F.K Buford, Addison-Wesley Pub.Co.1994.

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**ELECTIVE – III – MIT-24**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**PARALLEL COMPUTING**

Parallel processing, Parallel computer structure, designing of parallel algorithms, analyzing algorithms, general principles of parallel computing, Parallel sorting algorithms, Batcher's bitonic sort. Bitonic sort using the perfect shuffle, parallel bubble sort, add-even transport sort, Tree sort, quick sort, sorting on the CRCW, CRFW, EREW models, searching a sorted sequence, CREW, CRCW, & EREW searching, searching on a random sequence EREW, ERCW, CREW & CRCW searching on the tree, mesh .a network for merging ,merging on the CRFW, ERFW models, computing Fourier Transforms, Computing the DFT in parallel, a parallel FFT algorithm .

**BOOKS:**

1. " Design and Analysis of Prallel Algorithm by Salim & Akl, PIII(International Editions)
2. "Design Efficient Algorithm for Parallel Computers by Michel J.Quinn. Mc Graw Hill, I nternational Editions.

**COMPUTER AIDED SIMULATION & MODELING.**

**System & models:**

The concept of a system, system environment, stochastic activities, continuous and discreet system, system modeling, type of models, stastic physical models, dynamic physical models, stastic mathematical models, dynamic, mathematical models, principals used in muddling, simulation of a pare pursuit problem simulation of an inventory problem.

**Simulation of continuous system:-**

Continuous system models, differential equations, analog computers, analog methods, hybrid computers, digital analog simulations continuous system simulation languages, CSMP III hybrid simulation, feedback system, simulation of an interactive system, real time simulation.

**Discrete system simulation:-**

Probability concepts in simulation, random number generations and their testing stochastic variable generation, fixed time - step vs. event-to event model.

**Simulation of queuing systems :**

Arrival pattern, poisson arrival pattern, the exponential distribution, the hyper-exponential distribution, service times, simulation of a single-server queue, the normal distribution, measures of queues.

**Simulation languages**

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Continuous and discrete simulation languages, block structured continuous simulation languages, GPSS, SIMSCRIPT, SIMULA, factor in selection of a discrete simulation language.

### **ELECTIVE – I – MIT-14**

Theory Paper – 100 Marks  
Sessional – 50 Marks

### **VLSI DESIGN**

Unit I:-

Review of Logic Design fundamentals:- Combinational Logic, k-maps, designing with NOR and NAND gates. Hazards in combinational Networks. Mealy sequential network design. Moore sequential network design, synchronous design, machine design.

Introduction to VHDL:- VHDL description and combinational network. Modeling flip flops multiplexes using VHDL processes. Compilation and simulation VHDL code . Modeling sequential machines , variables, signals and constants , arrays, VHDL operator functions and procedures, packages and libraries .

Unit II :-

Attributes, multivolume logic and signal resolutions, IEEE 1164 standard logic , generics , generate statements, synthesis of VHDL codes, synthesis examples, files and TEXTIO.

Unit III:-

Designing with programmable logic devices ROM, PLA's, PAL's , PLD's, designing with programmable gate arrays . FPGA's , CPLD's,( Complex programmable logic devices) Floating point arithmetic multiplication and other operations.

Unit IV:-

Hardware testing and design:- Combinational logic testing , sequential logic testing , scan testing , boundary scan, built-in self test.

Unit V:-

Design examples and case studies :- USART design, micro- controller design, design of microcontroller CPU, Filter design etc.

BOOKS:-

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1. VHDL Primer by Bhaskar
2. Digital System design using VHDL by Charles Roth
3. Modern VLSI Design system on silicon by Wayne Walf.

### **ELECTIVE – III – MIT-24**

Theory Paper – 100 Marks  
Sessional – 50 Marks

### **DIGITAL IMAGE PROCESSING**

#### Unit 1

Introduction, Image processing system: Image process , digitizer, display & recording devices

Digital image Fundamentals: Image model, relationship between pixels imaging geometry.

#### Unit 2

Manipulation on images, image transformation: Introduction to fast fourier transformation, walsh transformation, hadmard transformation, hotelling transformation, hough transformation

Image Enhancement: Spatial domain method, frequency domain method, histogram, modification.

Image smoothing : Neighbourhood averaging, median filtering, low pass filters average of multiple images.

Image sharpening by differentiation technique high pass filtering.

#### Unit 3

Image Restoration:

Degradation model for continuous function, effect of diagnalization on the degradation models, algebraic approach to restoration. East mean square filter, interactive restoration, gray level interpolation.

#### Unit 4

Image Encoding & segmentation:

Encoding: Mapping, quantize, coder.

Segmentation: Detection of discontinuation by point detection, line detection edge detection.

Edge linking & boundary detection: Local analysis , global by Hough transform & global by graph theoretic techniques.

Thresholding: Definitation, global thresholding

Filtering : Median, gradient.

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Unit 5

Simple method of representation

Signatures, boundary segments, skeleton of a region.

Polynomial approximation.

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**ELECTIVE – II – MIT-15**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**GEOGRAPHICAL INFORMATION SYSTEMS**

Principle of GIS, Data Acquisition, Spatial Data Bases, data structures and algorithms for GIS, spatial data, manipulation and analysis, query processor, visualization, spatial decision support system, use of a typical GIS package. GIS system architecture, GIS design and implementation, application

Text/References

Star, J. and ESTES, J., Geographical information system-an introduction, Prentice Hall, NJ., 1990

De Meres, M.N., Fundamentals of Geographical Information Systems, John Wiley & Sons, Inc., NY, 1997

Laurini, R., Thompson, D., Fundamentals of Spatial Information Systems, Academic Press London, 1994

Maguire, D.J., Goodchild, M.F. and Rhind, D.M. Ed., Geographical Information Systems: Principle and Application, Longman Group, U.K., 1991.

## **EMBEDDED SYSTEM-MIT-13**

Theory Paper – 100 Marks

Sessional – 50 Marks

### **Unit1:-**

Hardware fundamentals:-Gates, timing diagram, memory, microprocessor, buses, DMA.

#### **Interrupts:-**

Microprocessor architecture, interrupts basics, Interrupt latency, shared data problem.

System partitioning, building the architectural model, Input and output processing,

Hardware and software portioning, timing requirement.

### **Unit 2:-**

Microprocessor selection, Microprocessor versus micro-control analysis CISC versus

RISC study of major embedded Microprocessor architecture memory system design .

system optimization architecture for embedded software:- round robin, found robin with

interrupts. Function-queuescheduling and real time operating system.

### **Unit 3:-**

Real time operating system:- tasks and task states. Task and data. Semaphores and

shared data operating system service:- inter task communication . timer service.

Memeory management . events and interaction between interrupt routines and real time

operating system . software selection issues. Selection an RTOS. RTOS performance

metrice . RTOS scalability and tool support compiler selection

### **Unit 4:-**

Embedded system design using real time operating system : encapsulating semaphores

and queues.hard real time scheduling consideration saving memory space.

### **Unit 5:-**

Development tools and debugging :-hosh and target machines. Linker/location. Target

system tasting. Instruction set. Asset macro. Establishing a software development

environment C runtime environment embedded debuggers Cross- development methods

embedded file formats . readers creating object files- the build process loading software

on to remote targets.

1. an embedded software primer by david E.simon ISBN

2. embedded system design by Arnold S.berger

**ELECTIVE – IV – MIT-25**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**E-BUSINESS: CONCEPTS, TOOLS & APPLICATION**

Basics of Electronics commerce, Characteristics of Electronics products, Digital cash and payment systems, Financial Services, Information Markets, Product choices, Internet, Infrastructure and pricing, Intranets, Firewalls Security Issues, Authentication and non repudiation of transactions, Distributed Application Architecture for Electronics commerce. Customer front end design production and supply- chain work flow in e-commerce.

Concepts & Principles of e-governance issues, features and security in e-governance.

Books

1. Koisur David: Electronic Commerce, Microsoft
2. Bajaj & Nag: Electronic Commerce, TIIM.
3. Ravi Kalakota: Frontiers of Electronic Commerce, AW.
4. <http://www.egov.doe.gov.in>
5. Web Commerce Technology By Addison Wesley
6. Designing Systems for Internet Commerce by Treese & Stilwart.
7. Applied Cryptography By Sedu & Schneir
8. Network Security by Koffman & Pearman

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**ELECTIVE – IV – MIT-25**

Theory Paper – 100 Marks

Sessional – 50 Marks

**NATURAL LANGUAGE PROCESSING**

Introduction; Goals of natural language processing and computational Linguistics. Finite state automata and transducers, Morphology.

Parsing: Context free Grammers, Generalized phrase structure Grammer, Earley Parsing Algorithm. Transformational grammer, computational models and knowledge representations, semantics; Interpretation, time, tense, lexical semantics , machine translations, Natural Language Interfaces, Natural Language Generators..

**BOOKS:**

1. Allen James , Natural Language Understanding, 2<sup>nd</sup> ed. Benjamin/ Cumming, 1995.
2. Grosz, Sparck-Jones Webber readings in Natural language Processing, Morgan Kufmann, 1986.
- 3 . Winograd T., Language as a Cognitive, process, Addison Wesley, 1972.
4. Marcus M., a Theory of Syntactic Recognition for natural language, MIT press, 1980.

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**ELECTIVE – IV – MIT-25**

Theory Paper – 100 Marks

Sessional – 50 Marks

**ROBOTICS AND COMPUTER VISION**

Basic components of robotics system, Kinematics and manipulators, selection of Co-ordinate frames, Homogeneous transformation, solution of kinematics equations, Lagrangian equations and manipulator dynamics, Control design, Languages for Robots and Applications.

3D-vision, Perspective vision, CCD camera study, real time processing, Segmentation using Genetic Algorithm: Adaptive algorithm for indoor scene, and outdoor scene. Interpretation of pictures, shape recognition, dynamics scene analysis. Introduction to AGV, clustering and non supervised learning method.

**BOOKS:**

1. "Digital Image Processing And Computer Vision"-R.Schalkoff, Wiley.
2. "Computer Vision"-D.H.Ballard and C.M.Brown, Prentice Hall.
3. "Introduction to Robotics"-Craig, J.J, Addison Wesley.
4. "Robot Vision"-Horn B., MIT Press.
5. "Robotics"-Lee, Mc Graw Hill.

**ELECTIVE – II – MIT-15**

Theory Paper – 100 Marks

Sessional – 50 Marks

**ADVANCED COMMUNICATION**

Digital PAM. binary PAM formats, line coding. band limited digital PAM systems. Nyquist pulse shaping, equalization, synchronization techniques. bit and frame synchronization. Coded pulse modulation. voice digitization rate (VDR) of PCM, DPCM. DM. ADM. CVSD. log PCM, their performance: comparison, VDR reduction by speech coding. VOCODERS. noise performance of PCM and DM, Digital multiplexes. AT & T and CCITT hierarchies. quasi-synchronous multiplexes.

Digital CW modulation, BPSK. DPSK, DEPSK. QPSK, M'ary PSK, QASK. BFSK. M~ Doubinary encoding. QPR coherent and non-coherent systems. error probabilities in ;~! PSK, DPSK. FSK, QPSK, 16 QAM. MSK, QPR and bit. Matched correlation and optimum filters and symbol error rate. Spread Spectrum techniques: DS. CDMA, FH. PN sequence, Power requirement. PN-C sequence code. and Walsh's code.

ISDN & Value added communication system simulation & Analysis using MATLAB & Simulink Application using communication toolboxes.

**Suggested Text Books and References:**

- 1 Digital Communication By Haykins Mc Graw Hillint Editio".
2. Modern Digital & Analog Communication. By B P Lathi.. Willey Eatern Ltd. 2000.
3. Communication. Systems by A B Carlson. Tata Mc Graw Hill. 2000.

## SOFTWARE PROJECT MANAGEMENT – MIT-31

Theory Paper – 100 Marks

Sessional – 50 Marks

### UNIT - 1

Managing software projects Software product, process and project management CMM, KPAs .For project management, software process Improvement, resources management, team work and structure, training, project metric, documentation, project management. For conventional and object oriented software projects, software project, knowledge based management

### UNIT 2

Project planning

Project planning infrastructure, process planning feasibility analysis cost and efforts estimation, models and technique, risk analysis and RAMM plan, project scheduling and tracking plan .SQA and quality planning ,SCM activities and plan , project management plan.

### UNIT 3

PROJECT EXECUTION AND CLOSURE

Data collection, measurement , reviews, monitoring and control , status reporting , process input and output synchronization, deliverables , milestone recording and their analysis , defect analysis and prevention , audits

Project closure analysis and reporting.

### UNIT 4

Project management for special classes of software project - Using CASE tools, CASE, re-engineering ,reverse ,forward engineering Client/server software engineering , web engineering , outsourcing , software project management standards

References:

1. Hughes and cotterell, software project management, 3e ,tata mcGRaw-hill pub. Cob. Ltd
2. Stephen r. schach ,”object –oriented and classical software engineering””5<sup>th</sup> edition, tata Mc graw-hill pub. Co.Ltd.
3. Dr panmkaj jalote , “software project management “” pearson publication
4. Dr. pankaj jalhote ,CMMin practice ,prearson publication
5. R. pressmen , software engineering 5<sup>th</sup> edition Mcgraw Hill publication
6. lan Somerville , software engineering , 5<sup>th</sup> edition ,AWL publication

**ELECTIVE – V - MIT-32**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**BIOINFORMATICS**

**Bioinformatics – an overview**

Introduction, objectives of bioinformatics, kind of data used, information molecules, basic structures of nucleic acids, DNA ,RNA, DNA sequencing and polymerise chain reaction(PCR), proteins structure, functions, protein folding and characterization.

**Biological Databases**

Introduction, types of databases, nucleotide and protein sequence database, major bioinformatics databases, Introduction to biostatics, data integration, data analysis. Operating systems (LINUX, UNIX), HTML, XML, CML, BSML, etc.,.

**Sequence analysis**

Models for sequence analysis, methods for alignment (Dot matrices), methods for optimal alignment (gap penalties and storing matrices), tools for sequence alignment – Fasts, BLAST, PSI –blast, Multiple Sequence Alignment(MSA) – tool and applications.

**Phylogenetic analysis**

Phylogenetic trees, distance matrix (MD) and character based methods, gene prediction tools , gene mapping, DNA sequencing, algorithms for alignment of sequencing fragments , DNA micro arrays.

**Proteomics**

Proteomics analysis, tools for proteome analysis, different structural proteins, protein classification, methods of structure prediction (known folds and unknown folds), protein function prediction, metabolic pathways , gene networks their properties and analysis.

**BOOKS RECOMMENDED**

1. Introduction to bioinformatics : Attwood.
2. Bioinformatics sequence and genome analysis – David W. Mount
3. Bioinformatics- concept, skills and applications – S.C.Rastogi

4. Recent advances in Bioinformatics- Irfan K. Khan.  
**ELECTIVE – V - MIT-32**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**DATA MINING AND ITS APPLICATIONS**

1. Introduction:

Data mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining. DM techniques, Mining problems. Issues and Challenges in DM, DM Application areas.

2. Association Rules & Clustering Techniques:

Introduction, Various association algorithms like Apriori, Partition, Pineer search etc., Generalized association rules. Clustering paradigms: Partitioning algorithms like K-Medoid, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms , STIRR, ROCK,CACTUS.

3. Other DM techniques and Web Mining:

Application of Neural Network, AI, Fuzzy Logic and Generic algorithm. Decision tree in DM. Web Mining. Web content mining ,Web structure Mining. Web usage Mining.

4. Temporal and Spatial DM:

Temporal association rules, Sequence mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis. Spatial Mining ,Spatial Mining tasks. Spatial clustering , Spatial Trends.

5. Data Mining of Image and Video: A Case study.

Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

**Books suggested:**

1. Data Mining Techniques :Arun K.Pujari : University Press.
2. Data Mining : Adriaans & Zantinge : Pearson education.
3. Mastering Data Mining: Berry Linoff : Wiley.
4. Data Mining : Dunham : Pearson education.

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**ELECTIVE – IV – MIT-25**

Theory Paper – 100 Marks

Sessional – 50 Marks

**WIRELESS & MOBILE COMPUTING**

Unit 1:

Introduction to wireless, cellular, Digital , PCs mobile radio, speech coding for wireless system and application PCM, DPCM, DM, Vocoder & linear Predictive coding. Performance comparison.

Unit II:-

Media access control, Telecom system satellite system, broadcast system.

Unit III:-

Wireless LAN: IEEE802-11 Hiper LAN, Bluetooth, Adhoc Network: Characteristics , performance issue , routing in mobile host.

Unit IV:-

Network Issues: Mobile IP, DHCP< mobile transport layer, Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, selective transmission, transaction oriented TCP.

Unit V:-

Application Issue: Wireless Application control Dynamic DNS , File system synchronization protocol, context aware application security, analysis of existing wireless network.

References:

- 1.J. Schiller Mobile commm., Addison Wiley;
2. William C.Y. Lee, Mobile comm., design Fundamentals. John Wiley.
3. Dr. Kamilo Feher , wireless digital comm.. , PHI
4. Mark Caempa, Design & Implementation Of wireless LAN's , Thomson Learning.

## Advanced software engg-MIT-22

Theory Paper – 100 Marks

Sessional – 50 Marks

Introduction ,Software life –cycle models, software requirements specification, formal requirement, specification-axiomatic and algebraic specification,  
Function –oriented software design ,object oriented design,UML,coding and unit testing,data design architectural styles & pattern architectural design ,assessment of alternate ,architectural design ,mapping data flow into software architecture Modeling component level design,S/W reuse,Software quality & testing—SEI CMM and ISO-9001,software reliability and fault –tolerance,computer aided software engg.(CASE), Web Engg.. Formal Methods ,clean room software Engg,component based development ,software reengg,.

**Laboratory** :Development of requirements specification ,Function oriented design using SA\SD,Object Oriented design using UML test case design implementation using JAVA and TESTING

Text\References

Presman R.S.,3<sup>rd</sup> Edition,Software engg.-A practitioners Approach ,Mc Graw,Hill,International,Edition 1992

Jalote,P.1<sup>st</sup> Edition ,2<sup>nd</sup> Edition is Shortly due from Springer verlag.AN Integrated Approach to software engg,Narossa,1991

S/W Testing techniques ,boris,beizer,2<sup>nd</sup> Edition,Van Nostrand reinhold

Measuring S/w reuse –principles practices and economic models ,J.S.Poutin Edition Wesley

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## **Computer Networks and Web Technology- MIT-12**

Theory Paper – 100 Marks

Sessional – 50 Marks

### **Course Contents:**

Introduction, history and development of computer networks, networks topologies.

Physical Layer: theoretical basis, transmission media, analog transmission, digital transmission, switching.

MAC layer: Aloha protocols, local area networks -- Ethernet, token ring, FDDI. Data link layer: sliding window protocols.

Network layer: routing algorithms, congestion control algorithms, internetworking -- bridges and routers.

Transport layer. Session, presentation, and application Layers. Use of TCP/IP protocol suite as running example.

Introduction to X.25, ISO protocols.

Today the Internet is being used for myriad of applications - electronic publishing, electronic commerce, distance education, collaborative working, etc. This course intends to investigate the underlying principles and practices that support these applications.

Introduction to computer networks; Content preparation - HTML, DHTML, VRML, SGML, XML and other markup schemes; Images - compression, formats; Audio - compression, formats; Content Delivery - protocols - HTTP and variants, Internet servers, proxy servers; Search engines; Data on the web; Content Display - browsers, plugins, helper applications; Interactivity - Java, Active-X; Component technologies, Javabeans, CORBA; Security, Electronic payment systems, Firewalls, Encryption, Watermarks; Performance, Benchmarking the Web.

### **Books and References:**

S. Tannenbaum. *Computer Networks* , 2nd Edition, Prentice-Hall, 1988.

D. E. Comer. *Internetworking with TCP-IP: Principles, Protocols and Architecture* , Vol I, 2nd Edition, Prentice Hall, 1991.

D. E. Comer and D. L. Stevens. *Internetworking with TCP-IP: Design, Implementation, and Internals* , Vol II, Prentice Hall, 1990.

D. Bertsekas and R. Gallagar. *Data Networks* , 2nd Edition, Prentice Hall, 1992.

W. R. Stevens. *UNIX Network Programming* , Prentice Hall, 1990.

### **Websites:**

[www.w3.org](http://www.w3.org) ; [www.ietf.org](http://www.ietf.org); [www.omg.org](http://www.omg.org) ;[www.xml.org](http://www.xml.org) ;

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[www.microsoft.com/com](http://www.microsoft.com/com); java.sun.com ; Research papers.

### **ELECTIVE – IV – MIT-25**

Theory Paper – 100 Marks

Sessional – 50 Marks

### **ROBOTICS AND COMPUTER VISION**

Basic components of robotics system, Kinematics and manipulators, selection of Co-ordinate frames, Homogeneous transformation, solution of kinematics equations, Lagrangian equations and manipulator dynamics, Control design, Languages for Robots and Applications.

3D-vision, Perspective vision, CCD camera study, real time processing, Segmentation using Genetic Algorithm: Adaptive algorithm for indoor scene, and outdoor scene. Interpretation of pictures, shape recognition, dynamics scene analysis. Introduction to AGV, clustering and non supervised learning method.

#### **BOOKS:**

6. "Digital Image Processing And Computer Vision"-R.Schalkoff, Wiley.
7. "Computer Vision"-D.H.Ballard and C.M.Brown, Prentice Hall.
8. "Introduction to Robotics"-Craig, J.J, Addison Wesley.
9. "Robot Vision"-Horn B., MIT Press.
10. "Robotics"-Lee, Mc Graw Hill.

**ELECTIVE – III – MIT-24**

Theory Paper – 100 Marks  
Sessional – 50 Marks

***Software Architecture & Design***

**Course Contents:**

Complex software systems require abstraction and analysis at an architectural level of abstraction. In this course we study, typical software system structures (architectural styles), techniques for designing and implementing these structures, models for characterizing and reasoning about architectures, and tools architectural modelling. Role of architecture in Software engineering; Enterprise Architectures, Zachman's Framework; Architectural Styles, Design Patterns; Architecture Description Languages; Product-line architectures; Component based development

**Books and References:**

Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Miachel Stal, Douglas Schmidt. *Pattern Oriented Software Architecture*, Volumes 1 &2  
Len Bass, Paul Clements, Rick Katzman, Ken Bass *Software Architecture in Practice*.  
George T. Heineman, William T. Councill. *Component Based Software Engineering*  
Kurt Wallnau, Scott Hissam and Robert Seacord. *Building Systems from Commercial Components*.  
Source material available on the Internet.

**ELECTIVE – V – MIT-32**

Theory Paper – 100 Marks  
Sessional – 50 Marks

## **Sensor Network**

### **Environmental Sensor network**

1. Monitoring Sensor network –RFIR Technology.
2. Sensor network application – Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network evolution .
3. Wireless Sensor Network – Architecture.
4. Embedded Network Technology – Micro sensors , microprocessoer power and stage , microradios.;
5. Sensor Network Challenges – Miniaturization, power management, scalability, remote management, usability, standardization, security.  
System Challenges- Tiny OS, Network sensor platforms

**ELECTIVE – V – MIT-32**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**E-GOVERNANCE**

Basic of Electronic Governance, Characteristics of Electronic Products, Digital Cash and Payment Systems. Financial Services, Information Markets, Product Choices.

Internet Infrastructure and pricing. Intranets, Firewalls Security Issues. Authentication and non-repudiation of transactions.

Distributed Application Architecture for Electric Commerce. Customer Front-end Design. Production and Supply-chain work flow in e-commerce.

**BOOKS:**

Kalakota, R. and Whinston A.B., Electronic Commerce: A Manager's Guide Addison-Wesley, 1997

Kalakota, R., Whinston A. B., Frontiers of Electronic Commerce, Addison Wesley, 1996.

Cronin, M., Doing business on the Internet: How the Electronic Highway is transforming American Companies, Van Nostrand Reinhold , 1993.

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**ELECTIVE – IV- MIT-25**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**IPR & Cyber Laws:**

Intellectual Property:- WIPO ( World intellectual Property Organization), International Tread related aspects Intellectual Property Rights Agreement, Intellectual Property right related to –literary, artistic, scientific & industrial design rights.

Commercial & industrial Design rights

Information as Property

Cyber Laws :- cyber laws in India, patent laws, Laws of Com: E-bussiness, IP, IT & piracy laws, internal laws, IT act2000, Laws of Indian cyber space.

The Menace Of cyber crimes, Cyber Hacking, liability of internet service providers for copyright, Cyber Ethics.

Reference :- [WWW.wipo.int/clea/en/wo/wo029en.htm](http://WWW.wipo.int/clea/en/wo/wo029en.htm)

**ELECTIVE – I- MIT-14**

Theory Paper – 100 Marks  
Sessional – 50 Marks

**UNIX INTERVALS AND SHELL PROGRAMMING**

**Unit 1**

Introduction to the kernel: Architecture of the Unix, the buffer cache. Internal representation of files:-inode, accessing blocks, releasing blocks, structure of regular files, conversion of a path name to an inode, inode assignment to a new file, allocation of disk-block.

**Unit 2**

System calls for the file systems: OPEN, READ,WRITE,CLOSE,PIPES : the pipe system call, opening a named pipes, reading and writing pipes,closing pipes DUP,Mounting and Un-Mounting file system,LINK, UNLINK. System call for TIME and CLOCK.

**Unit 3**

The structure of processes : process states and transitions, layout of system memory, the context of a process, saving the context of the process,manipulation of the process address space.

Process Control : process creation, signals,process termination, awaiting process termination, the user-id of a process, changing the size of the process, the system BOOT and INIT process.

**Unit 4**

Shell Programming : Study of different types of Shell like C shell, Bourne Shell etc. Shellvariable, Shell script, Shell Command. Looping and Making choices: For Loop,While and Until, Passing arguments to scripts. Programming in different shells.

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**Unit 5**

Inter Process Communication: Process Tracing, Network communication  
Sockets Multiprocessor System : Problem of multiprocessor systems, Solution with  
Master and slave Processor, Solution with semaphores. Study of distributed Unix  
System.

**BOOKS:**

1. The design of Unix Operating System by Maurice J Bach.
2. Advanced Unix-A Programmer Guide by Stephen Prata.

**ELECTIVE – V- MIT-32**

Theory Paper – 100 Marks

Sessional – 50 Marks

**HUMAN COMPUTER INTERACTION**

Interaction between computation and the physical world. Input and output devices in their various forms – devices such as keyboards and printer, robotic sensors and effectors.

Interaction between computation and biological world – Sensor for biological substances and process and effectors that can intervene in them.

Interaction between computation and people – traditional discipline of human computer interaction, authorization process that entitle people to access computational resources.

Computer to Computer Interaction – Networking, Parallel / Distributed Computing/ Grid Computing / Utility Computing.

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**ADAPTIVE COMPUTING – MIT - 25**

Theory Paper – 100 Marks

Sessional – 50 Marks

Introduction to adaptive computing & adaptive Software like ubiquitous computing, autonomic computing.

Different approaches to implementing software adaptation, parameter adaptation, composition adaptation.

Middleware & Adaptation, Layer decomposing for middleware.

Computational reflection, component based designing. Meta object protocol. Middleware & other factors.

Composing : types, Static & Dynamic.

Key challenges : Assurance Security, Interpretability, Decision Making.