

SCHEME OF EXAMINATION

&

SYLLABI

for

MASTER OF COMPUTER APPLICATIONS (SOFTWARE ENGINEERING)

Offered by

School of Information Technology



Guru Gobind Singh Indraprastha University
Kashmere Gate, Delhi-6 [INDIA]
www.ipu.ac.in

Master of Computer Applications (Software Engineering)

FIRST SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
IT – 601	Information Technology	3	1	4
IT – 603	Computer Architecture	3	1	4
IT – 605	Programming and Data Structure	3	1	4
BA – 607	Discrete Mathematics	3	1	4
BA – 609	Mathematics – I	3	1	4
PRACTICALS				
IT – 651	Computer Lab – I	0	6	3
IT – 653	Computer Lab – II	0	2	1
IT – 655*	Term Paper-I	0	4	2
	TOTAL	15	17	26

*NUES

Master of Computer Applications (Software Engineering)

SECOND SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
IT – 602	Software Engineering	3	1	4
IT – 604	Database Management Systems	3	1	4
IT – 606	Algorithm Analysis and Design	3	1	4
MS – 608	Organizational Behaviour	3	1	4
BA – 610	Mathematics – II	3	1	4
PRACTICALS				
IT – 652	Computer Lab – III	0	4	2
IT – 654	Computer Lab – IV	0	4	2
IT – 656*	Term Paper-II	0	4	2
	TOTAL	15	17	26

*NUES

Master of Computer Applications (Software Engineering)

THIRD SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
IT – 701	Object Oriented Programming	2	0	2
IT – 703	Front End Design Tools	2	0	2
IT – 705	Web Site Design	2	0	2
PRACTICALS				
IT – 751	Computer Lab – V	0	2	1
IT – 753	Computer Lab – VI	0	6	3
IT – 755	Project Report	0	20	10
IT – 757*	Seminar and Progress Reports	0	4	2
	TOTAL	6	32	22

***NUES**

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports. The student will have to submit a report on the project work / Development work done.

Master of Computer Applications (Software Engineering)

FOURTH SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
IT – 702	Computer Networks	3	1	4
IT – 704	Operating Systems	3	1	4
IT – 706	Object Oriented Software Engineering	3	1	4
IT – 708	Java Programming	3	1	4
ELECTIVES (Select any two)				
IT – 710	Fuzzy Sets & Logic	3	1	4
IT – 712	Artificial Intelligence	3	1	4
IT – 714	Digital Signal Processing	3	1	4
IT – 716	Functional & Logic Programming	3	1	4
IT – 718	Data Warehousing & Data Mining	3	1	4
IT – 720	Microprocessors	3	1	4
IT – 722	Computer Graphics	3	1	4
PRACTICALS				
IT – 752	Computer Lab – VII	0	4	2
IT – 754	Computer Lab – VIII	0	4	2
	TOTAL	18	14	28

Master of Computer Applications (Software Engineering)

FIFTH SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
IT – 801	Software Verification, Validation & Testing	3	1	4
IT – 803	Linux & X-Windows Programming	3	1	4
IT – 805	Advanced Computer Networks	3	1	4
IT – 807	Multimedia Applications	3	1	4
ELECTIVES (Select any two)				
IT – 809	Digital Image Processing	3	1	4
IT – 811	Advanced Computer Architecture	3	1	4
IT – 813	Compiler Construction	3	1	4
IT – 815	Software Project Management	3	1	4
IT – 817	Software Quality Management	3	1	4
IT – 819	TCP/IP	3	1	4
IT – 821	Neural Networks	3	1	4
IT – 823	Simulation & Modeling	3	1	4
MS – 825	Cognitive Psychology	3	1	4
MS – 827	Transactional Analysis	3	1	4
PRACTICALS				
IT – 851	Computer Lab – IX	0	4	2
IT – 853	Computer Lab – X	0	4	2
	TOTAL	18	14	28

Master of Computer Applications (Software Engineering)

SIXTH SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
IT – 852	Dissertation	0	30	25
IT – 854*	Seminar and Progress Reports	0	10	5
	TOTAL	0	40	30

*NUES

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

Note:

1. The total number of the credits of the MSE programme = 160.
2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn the minimum of 150 credits.

Code No. : IT 601
Paper : Information Technology

L T
3 1

Computers, capabilities, types of computers, computer anatomy, functional, block diagrams, CPU purpose of registers in CPU, Microprocessors, CISC & RISC Processors, Functions of I/O devices, VDU, storage devices, Areas of applications in information technology.

Unit II: (Qualitative treatment only)

Introduction to flow charts and algorithms, Machine language, instructions, stored program, concept of assembly language, assembler, high level language, compiler, operating systems, types of OS, typical instructions of DOS/UNIX, GUI-Windows 98/NT

Unit III:

Introduction to signals and basic communication processes, trigonometric and exponential fourier series, representation of periodic functions by fourier series, fourier transforms, impulse functions, concept of convolution in time domain and frequency domain, noise, types of noise, S/N ratio, noise figure.

Unit IV:

Internet & world wide web, IT today, word processing and desk top publishing, spread sheet and data base applications, multimedia, Introduction to Telecommunication, communication network architecture, structure of telecommunication networks, transmission media, modulation, multiplexing, modems, ISDN, Elementary ideas of wireless services: TDMA, FDMA, CDMA, WLL.

Text:

1. A. Leon and M. Leon, "Fundamentals of Information Technology", Vikas Publishing House.
2. Norton Peter, "Introduction to Computers", 2/e McGraw Hill.
3. Simon Haykins, "Communication Systems", John Wiley and Sons
4. James Martin, "Telecommunications and the compute", PHI, India .

References:

1. A. Leon and M. Leon, "Introduction to Computers", Vikas Publishing HOuse
2. Rajaraman V., "Fundamentals of Computers", PHI
3. Sanders D. H., "Computers Today", McGraw Hill.
4. Rappaport Theodore, "Wireless communications", Pearson Education, India.

Code No: IT 603
Paper : Computer Architecture

L **T**
3 **1**

Digital Logic Circuits: Logic gates , boolean algebra, K-maps , combinational circuits, flip-flops, sequential circuits.

Digital Components: Integrated circuits, multiplexers, encoders, demultiplexers, decoders, shift registers, binary counters, memory units.

Data Representation: Binary numbers, binary codes, fixed point representation, floating point representation, error detection codes.

Register Transfer and Microoperation: Register transfer language, register transfer, bus and memory transfer, arithmetic microoperations, logic microoperations, shift microoperations.

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input- output and interrupts ,design of basic computer, design of accumulator logic.

Microprogrammed Control Unit : Control memory, address sequencing.

Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes.

Computer Arithmetic: Introduction, addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operation, decimal arithmetic unit, decimal arithmetic operations.

Input – Output Organization: Peripheral devices, input – Output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input – output processor.

Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

Text:

1. Mano ,M “Computer System and Architecture”, PHI.

References:

1. Pal Chaudhuri, P. “Computer Organization & Design”, PHI.
2. Malvino “Digital Computer Electronics: An Introduction to Microcomputers,3/e”, Mc Graw Hill.
3. Malvino “Digital Principals and Applications,4/e”, Mc Graw Hill.
4. Hayes.J.P, ”Computer Architecture and Organization”, Mc Graw Hill .
5. Stallings,W “Computer Organization & Architecture”, PHI.

Code No. : IT 605
Paper : Programming and Data Structures

L T
3 1

C program structures, Variables, Data Types, Declarations, Operators (Arithmetic, Relational, Logical), increment and decrement operators, Assignment operators and expressions, Arithmetic expressions, statements, symbolic constants, conditional expressions, Bitwise operators, precedence and order of evaluations, input-output functions.

Statements and Blocks, branching statements (if, switch), Loops (while, for, do-while, repeat-until), Break and continue, go to and labels.

Functions, external variables, scope rules, header files, static variables, initialization, parameter passing (call-by-value, call-by-reference), recursion, C preprocessor.

Pointers and addresses, pointers and function arguments, pointer and arrays, address arithmetic, character pointers and functions, pointer arrays, multidimensional arrays, initialization of pointer arrays, pointers and multidimensional arrays, command line arguments, memory management.

Structures: Defining and processing, passing to a function, Unions.

Files: Standard input and output, formatted output, formatted input, file access, miscellaneous functions.

Data Structures:

Arrays : representation and basic operations.

Linked list : Singly, Doubly, Circular and Doubly circular, definition, representation and their basic operations.

Stacks and queues : insertion, deletion.

Trees : insertion, deletion, traversal (inorder, preorder and postorder), binary trees, AVL trees, B-trees, B+-trees.

Text:

1. Gottfried, "Schaum's Outline series in C Programming", McGraw Hill.
2. Horowitz, E. and Sahni, S., "Fundamentals of Data Structures", Galgotia Publications.

References

1. Kernighan and Ritchie, "The C programming Language", PHI.
2. Lipschultz, "Schaum's Outline series in Data Structures", McGraw Hill.
3. Hutchison, R., "Programming in C", McGraw Hill.
4. Johnsonbaugh, R. and Kalin M., "Applications programming in C", PHI.
5. Rajaraman, V., "Computer programming in C", PHI.

Code No: BA 607
Paper : Discrete Mathematics

L **T**
3 **1**

Sets , Relations & Functions: Property of binary relations, equivalence, compatibility, partial ordering relations, hasse diagram, functions, inverse functions, composition of functions, recursive functions.

Mathematical Logic: Logic operators, Truth tables, Theory of inference and deduction, mathematical calculus , predicate calculus, predicates and quantifiers.

Groups & Subgroups: Group axioms, permutation groups, subgroups, cosets, normal subgroups, semi - groups , free semi – groups, monoids, sequential machines, error correcting codes, modular arithmetic, grammars.

Lattices & Boolean Algebra: Axiomatic definition of boolean algebra as algebraic structures with two operations basic results truth values and truth tables, the algebra of propositional functions, boolean algebra of truth values.

Finite Fields: Definition, representation, structure, minimal polynomials, primitive elements, polynomial roots.

Combinatorics & Recurrence Relations: Disjunctive and sequential counting, combinations and permutations, enumeration without repetition, recurrence relation, fibonacci relation, solving recurrence relation by substitution, solving non – recurrence relation by conversion to linear recurrence relation.

References:

1. Kolman, Busby & Ross “Discrete Mathematical Structures”, PHI.
2. Trembly . J . P & Manohar . P “ Discrete Mathematical Structures with Applications to Computer Science”, Mc Graw Hill.

Code No: BA 609
Paper: Mathematics I

L **T**
3 **1**

Probability: Sample space, events, axioms, conditional probability, Baye's rule, random variables: discrete and continuous, distribution and density functions, marginal and conditional distributions, stochastic independence.

Expectation: expectation of a function, conditional expectation and variance, moment , moment generating function, cumulant generating functions , skewness, kurtosis, characteristic functions, distributions: discrete and continuous distributions.

Probability distributions: Random variables, mean and variance of a probability distribution, Chebyshev theorem, law of large number, central limit theorem, binomial distribution, poisson distribution, , poisson approximation to binomial distribution, poisson distribution, poisson approximation to binomial distribution, poisson processes.

Probability Densities: Continuous random variables, normal distribution, normal approximation to the binomial distribution.

Sampling distributions: Population and samples, sampling distribution of the mean (σ known), sampling distribution of the mean (σ unknown), sampling distribution of the variance. Testing of statistical hypothesis, F-test, T-test, χ^2 -test.

Curve fitting: The method of least square, inferences based on the least square estimators, curvilinear regression , multiple regression, correlation.

References:

1. Irwin Miller and John .E . Freund "Probability & Statistics for Engineers" PHI
2. Spiegel, "Probability And Statistics", Schaum Series.
3. S.C.Gupta & V.K.Kapur "Fundamentals of Mathematical Statistics".

Code No: IT 651
Lab : Computer Lab 1

P
6

The practicals will be based on the following papers:

- a) Information technology
- b) Programming and data structures.

Code No: IT 653
Lab: Computer Lab II

P
2

The practical will be based on the “ Computer Architecture” paper.

Code No: IT 655
Title: Term Paper – I

T
4

Every student is required to present a seminar on a current (general) topic in the area of Information Technology under the supervision of a teacher. The presentation schedule will begin after the first sessional examination.
(Duration of presentation: 30 minutes).

Code No: IT 602
Paper: Software Engineering

L **T**
3 **1**

Introduction:

Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Software Metrics:

Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics.

Software Project Planning:

Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Software Requirement Analysis and Specifications:

Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.

Software Design:

Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.

Software Reliability:

Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calender time Component, Reliability Allocation.

Software Testing:

Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Software Maintenance:

Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

Text:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd ed., McGraw Hill Int. Ed., 1992.
2. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2001.

Reference:

1. R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
2. P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
3. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
4. James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons
5. Sommerville, "Software Engineering ", Addison Wesley, 1999.

Code No: IT 604
Paper : Data Base Management Systems

L	T
3	1

Basic concepts: database & database users, characteristics of the database, database systems, concepts and architecture, data models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, data modelling using the entity-relationship approach. Overview of hierarchical, Network & Relational Data Base Management Systems.

Relational model, languages & systems: relational data model & relational algebra: relational model concepts, relational model constraints, relational algebra, SQL- a relational database language: data definition in SQL, view and queries in SQL, specifying constraints and indexes in sql, a relational database management systems, DB2.

DB2 Architecture, Logical Data Structures Physical Data Structure, Instances, Table Spaces, Types of Tablespace, Internal Memory Structure, Background Processes, Data Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers.

Relational data base design: function dependencies & normalization for relational dataases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition.

Concurrency control & recovery techniques: concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery techniques: recovery concepts, database backup and recovery from catastrophic failures.

Concepts of object oriented database management systems, Distributed Data Base Management Systems.

Text:

1. Desai, B., "An introduction to database concepts", Galgotia publications.

References:

1. Date, C. J. , "An introduction to database systems", 7th Edition, Addison Wesley.
2. Date, C. J. , "An introduction to database systems", 3rd Edition, Narosa publishing house.
3. Elmsari and Navathe, "Fundamentals of database systems", Addison Wesley.
4. Ullman, J. D., "Principals of database systems", Galgotia publications.
5. DB2 Manuals

Code No: IT 606
Paper: Algorithm Analysis and Design

L	T
3	1

Preliminaries:

Growth of functions, Summations, Recurrences: The substitution method, The iteration method, The master method, Divide and Conquer paradigm, Dynamic programming, Greedy Algorithms.

Sorting and Order Statistics:

Merge Sort, Heap sort, Quick sort, Sorting in linear time, Medians and Order statistics.

Searching and Data Structures for Disjoint Sets:

Hash Tables, Binary Search Trees, Red-Black trees, order statistic tree, disjoint-set Operations, Linked list representation of disjoint sets, Disjoint set forests.

Graph Algorithms:

Representation of Graphs, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Algorithm for Kruskal's and Prim's for Finding Minimum cost Spanning Trees, Dijkstra's and Bellman Fort Algorithm for finding Single source shortest paths. All pair shortest paths and matrix multiplication, Floyd-Warshall algorithm for all pair shortest paths.

String matching:

The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth Marris Pratt algorithm.

NP-Complete Problem

Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems.

Text:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest "Introduction to Algorithms", PHI.

References:

1. A.V. Aho, J.E. Hopcroft, J.D. Ullman "The Design & Analysis of Computer Algorithms", Addison Wesley.
2. V. Manber "Introduction to Algorithms – A Creative Approach", Addison Wesley.
3. Ellis Harwitz and Sartaz Sahani "Fundamentals of Computer Algorithms", Computer Science Press.
4. Peter Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House.
5. J.E.Hopcroft & J.D.Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Wesley.
6. K.L.Mishra & N.Chandrasekaran, "Theory of Computer Science", PHI.
7. John C.Martin, "Introduction to Languages and Theory of Computation", TMH.

Code No: MS 608
Paper : Organizational Behaviour

L **T**
3 **1**

Introduction: Meaning and nature of management; management systems and process, Tasks and responsibilities of a professional manager; Managerial skills.

Organization Structure and Processes: Organizational climate and culture, Management ethos; Organizational Structure and Design; Managerial Communication; Planning process; Controlling.

Behavioural Dynamics: Individual determinants of Organization Behaviour; Perceptions, Learning, Personality, Attitudes and Values, Motivation; Stress and its management.

Interactive Aspects of Organizational Behaviour; Analysis inter-personal relations; Group Dynamics; Management of Organizational Conflicts; Leadership Styles.

Decision Making: Organizational Context of Decisions, Decision Making Models; Problem Solving and Decision Making.

References:

1. Luthans Fred., "Organizational Behaviour", McGraw Hill, 1998.
2. Robbins (4th ed.), "Essentials of organizational behaviour", Prentice Hall of India Pvt. Ltd., New Delhi, 1995.
3. Hersey and Blanchard (6th ed.), "Management of organizational behaviour: utilising human resources", Prentice Hall of India Pvt. Ltd., New Delhi, 1996.
4. Dwivedi, R. S., "Human relations and organizational behaviour: a global perspective", Macmillan India Ltd., Delhi, 1995.
5. Arnold, John, Robertson, Ivan t. and Cooper, Cary, l., "Work psychology: understanding human behaviour in the workplace", Macmillan India Ltd., Delhi, 1996.

Code No: BA 610
Paper : Mathematics II

L	T
3	1

Linear programming : graphical methods for two dimensional problems – central problem of linear programming – various definitions – statements of basic theorems and properties – phase i and phase ii of the simplex method – revised simplex method – primal and dual – dual simplex method – sensitivity analysis – transportation problem and its solution – assignment problem and its solution by Hungarian method.

Integer programming: Gomory cutting plane methods – branch and bound method.

Queuing theory: characteristics of queuing systems – steady state $m/m/1, m/m/1/k$ and $m/m/c$ queuing models.

Replacement theory : replacement of items that deteriorate – replacement of items that fail group replacement and individual replacement.

Inventory theory : costs involved in inventory problems – single item deterministic models – economic lot size models without shortages and with shortages having partition rate infinite and finite.

Pert and CP/M : arrow network- time estimates – earliest expected time, latest allowable occurrence time, latest allowable occurrence time and slack – critical path – probability of meeting scheduled date of completion of project – calculation of CP/M network – various floats for activities – critical path – updating project – operation time cost trade off curve – selection of schedule based on cost analysis

References:

1. Gillet, B.E., “Introduction to Operation Research : a computer oriented algorithmic approach “ Tata McGraw Hill, NY.
2. Gross D., and Harris, C. M., “Fundamentals of queuing theory “, John Willey and Sons, NY.
3. Hillier F., and Lieberman, G. J. , “Introduction to Operation Research”, Holden Day , NY.
4. Kambo, N.S., “Mathematical Programming Techniques”, McGraw Hill.
5. Kanti Swaroop, Gupta P. K., Man Mohan, “Operations Research”, Sultan Chand and Sons.
6. Taha, H. A., “Operations Research – An Introduction”, McMillan Publishing Company, NY.

Code No: IT 652
Lab: Computer Lab III

P
4

The practical will be based on the following paper:

1. Algorithm analysis and design. (IT-606)

Code No: IT 654
Lab: Computer Lab IV

P
4

The practical will be based on the following papers:

1. "Database Management System" (IT-604)
2. Software Engineering (IT-602)

Code No: IT 656
Title: Term Paper – II

T
4

Every student is required to submit a term paper on topic related to the course offered in semester – I and /or semester – II. The term paper should include subject matter not covered in the syllabi. The presentation will be held in the last two weeks of the semester – II. (Duration of presentation: 30 minutes).

Code No: IT 701
Paper : Object Oriented Programming Using C++

L T
2 0

Objects, relating to other paradigms (functional, data decomposition),basic terms and ideas (abstraction, encapsulation, inheritance, polymorphism).

Overview of C, Encapsulation, information hiding, abstract data types, object & classes: attributes, methods. C++ class declaration, state identity and behavior of an object, constructors and destructors, instantiation of objects, default parameter value, object types, C++ garbage collection, dynamic memory allocation, metaclass.

Inheritance, Class hierarchy, derivation – public, private & protected, aggregation, composition vs classification hierarchies, polymorphism, operator overloading, parametric polymorphism, generic function – template function, function name overloading, overriding inheritance methods, run time polymorphism.

Standard C++ classes, using multiple inheritance, persistent objects, streams and files,

Text:

1. S. B. Lippman & J. Lajoie, “C++ Primer”, 3rd Edition, Addison Wesley.
2. A. R. Venugopal , Rajkumar, T. Ravishankar, “Mastering C++”,TMH.

References:

1. E. Balaguruswamy, “Objected Oriented Programming with C++”, TMH.
2. D . Parsons, “Object Oriented Programming with C++”,BPB Publication.
3. R. Lafore, “Object Oriented Programming using C++”.
4. R. S. Pressman “Software Engineering”, Mc Graw Hill
5. Rumbaugh et. al. “ Object Oriented Modelling & Design” , Prentice Hall
6. G . Booch “Object Oriented Design & Applications”, Benjamin,Cummings.
7. R. S. Pressman, “Software Engineering”, McGraw Hill.
8. Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication

Code No: IT 703
Paper : Front End Design Tools

L T
2 0

Visual Basic:

Variable Names, Data Types, Assignment, If-then, if-then-else, if then-elseif-else, expression, print statement, arrays, variable declaration, built-in & User Defined types, Subroutine and functions, Boolean Operators, Arithmetic Operator, For-.next, do loop, while-wend, procedures/Public, Private, and Static & Dim Statement.

Structure of VB program, Forms & built in controls, Properties and events, Code Module, Scale Modes, Printer Object (Printing text, setting Fonts, graphics) Common dialog Boxes, picture controls, image-controls, send keys, MS-Common controls, Error Handling, Classes, Control Arrays, MDI, SDI.

Database Interface

Review of ANSI SQL, ODBC, Pass through ODBC, DAO, MS-Jet Engine, DB-Engine, Workspaces, Databases, recordsets, Data bound controls, ActiveX controls, ADO, Active X Data controls, RDO, Data view Window, Data Environment Designer, Crystal Report and Data Report Utility.

Help Writing: Building a help, System, Building & Topics File, Labeling the topics, Creating a help project, primary & secondary help window, linking to internet, Adding Multimedia, Using HTML help workshop, content sensitive help, help file.

Overview of COM/DCOM, using Windows API Functions, MAPI interface, Microsoft Transaction Server, Visual source safe.

Text:

1. B. Reselman et al, "Using Visual Basic 6", PHI
2. Mohd. Azam, "Programming with Visual Basic 6.0", Vikas Publication
3. B. Siler & J. Spotts, "Using Visual Basic 6", PHI

Reference:

1. E. Petroutsos, "Mastering Visual Basic 6.0", BPB.
2. G. Perry, "Teach Yourself Visual Basic 6 in 21 days ", Techmedia.
3. E. Brierley, Anthony Prince, & David Rinaldi, "Visual Basic 6: How-to", Techmedia
4. V.K. Jain, "Introduction to OOP and VB", Vikas Publication.

Code No: IT 705
Paper : Web Site Design

L T
2 0

Overview of Internet: Introduction to Internet and WWW, Concept of Networking and Layers of OSI Model, Internet protocols like TCP/IP, http, telnet and ftp, url, email, domain name, Web Browsers, Search Engines, Counters, Chat & Bulletin Board Services, Various Internet & Web Technologies, Hardware and Software requirement for different Internet Applications.

Principles of Web Design: Key issues to be considered in web site design.

Structure of a Web Page: Introduction to HTML, Elements of HTML syntax, Head and Body sections, Building HTML documents, Inserting text, images, hyperlinks, Backgrounds and Color Control, ordered and unordered lists, content layout & presentation.

HTML Tags: Use of Different HTML tags in web pages.

Table Handling: Table layout & presentation, constructing tables in a web page, developing a web page in a table.

HTML Editors & Tools: Use of different HTML editors and tools like Netscape Communicator and Microsoft Front Page etc.

Graphical and Animation Techniques: Use of Different graphical and animation tools like Adobe Photoshop, Gif Animator etc.

Frames: Developing Web pages using frames.

Interactivity: Client Server Model, Static & Dynamic Web pages, Creating forms, CGI, Role of Databases in web applications.

Security: Concept of various methods of Internet security like firewalls etc.

Web Technologies: Overview of various web technologies and their applications like JavaScript, active server pages, Macromedia flash, embedding java applets in a web page etc.

Text:

1. C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill.
2. Joel Sklar, "Principles of Web Design", Web Warrior series.

References:

1. Rick Dranell, "HTML4 unleashed", Techmedia Publication.
2. Shelly Powers, "Dynamic Web Publishing Unleashed", Techmedia.
3. Don Gosselin, "JavaScript", Vikas Publication
4. Mark Swank & Drew Kittel, "World Wide Web Database", Sams net.

Code No: IT 751 **P**
Lab: Computer Lab -V **2**

The practicals will be based on the Object Oriented Programming using C++ (IT 701)

Code No: IT 753 **P**
Lab: Computer Lab -VI **6**

The practicals will be based on the following Papers.

1. Front End Design Tools (IT 703)
2. Web Site Design (IT 705)

Code No: IT 755 **P**
Lab: Project Report **20**

The Students are required to do a project on an approved topic (by the departmental committee).The Project will be on a real life topic. The Project Report in a approved format must be submitted at the end of the semester with the source code.

Code No: IT 757 **P**
Lab: Seminar and Progress Report **4**

The Students Progress in the Project will be evaluated on the basis of Progress Report submitted from time to time and on the seminar presented.

Code No: IT 702
Paper : Computer Networks

L T
3 1

Uses of Computer Networks, Network Architecture, Reference Model (ISO-OSI, TCP/IP-Overview, IP Address Classes, Subnetting), Domain Name Registration & Registrars

The Physical Layer: Theoretical basis for data communication, transmission media-Magnetic Media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable, Fibre Cable, Structured Cabling, Cable Mounting, Cable Testing, Wireless transmission, the telephone system, narrowband ISDN, broadband ISDN and ATM.

The Data Link Layer: Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, Examples of Data Link Protocols.

The Medium Access Sublayer: The channel allocation problem, multiple access protocols, IEEE standard 802 for LANS and MANS, high-speed LANs, satellite networks, Network devices-repeaters, hubs, switches and bridges.

The Network Layer: Network layer design issues, routing algorithms, congestion control algorithm, internetworking, the network layer in the internet, the network layer in ATM networks.

Text:

1. Tananbaum A.S., "Computer Networks", 3rd Ed, PHI, 1999.

Reference:

1. Black U., "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. Stallings W., "Computer Communication Networks", PHI.
3. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.
4. Michael A. Miller, "Data & Network Communication", Vikas Publication
5. William A. Shay, "Understanding Data Communication & Networks", Vikas Publication

Code No: IT 704
Paper : Operating Systems

L T
3 1

Overview:

Importance of Operating Systems; Basic Concepts and Terminology; An Operating System Resource Manager: Memory Management Functions, Processor Management Functions, Device Management Functions, and Information Management Functions;.

Memory Management:

Single Contiguous Allocation: H/W Support, S/W Support, Advantages, Disadvantages ; Introduction to Multiprogramming : Concept of Multiprogramming , Measure of System I/O Wait Percentage, Relevance of Multiprogramming to Memory Management ; Partitioned Allocation, Relocatable Partitioned Memory Management, Paged Memory Management, Demand-Paged Memory Management, Segmented Memory Management, Segmented and Demand -Paged Memory Management, Other Memory Management Schemes (Swapping, Overlays);

Processor Management:

State Model : Job Scheduler, Process Scheduling , Job and Process Synchronization, Structure of Processor Management ; Job Scheduling : Functions, Policies, Job Scheduling in Nonmultiprogrammed Environment, Job Scheduling in Nonmultiprogrammed environment, Job Scheduling in multiprogrammed environment ; Process Scheduling, Multiprocessor Systems : Separate Systems, Coordinated Job Scheduling, Master/Slave Scheduling, Homogeneous Processor scheduling ; Process Synchronization : Race Condition, Synchronization Mechanism, Deadly Embrace, Synchronization Performance Considerations;

Device Management:

Techniques for Device Management : Dedicated Devices, Shared Devices, Virtual Devices ; Device Characteristics- Hardware Considerations : Input or Output Devices, Storage Devices; Channels and Control Units : Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing ; Device Allocation Considerations; Virtual Devices;

Information Management: Introduction; A Simple File System; General Model of a File System; Symbolic File System; Basic File System, Access Control Verification; Logical File System; Physical File System; Case study on DOS, Windows 98, Windows NT & Linux.

Text:

1. Madnick E., Donovan J., "Operating Systems", Tata McGraw Hill.
2. Silbershatz and Galvin, " Operating System Concepts", Addison Wesley.

Reference:

1. Tannenbaum, "Operating systems", PHI.4. Peterson, "Operating System".

Code No: IT 706
Paper: Object Oriented Software Engineering

L **T**
3 **1**

Introduction to Software Engineering: Software Engineering Development, Software Engineering Development, Software Life Cycle Models, Standards for developing life cycle models.

Object Methodology & Requirement Elicitation: Introduction to Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation

Architecture: Model Architecture, Requirements Model, Analysis Model, Design Model, Implementation Model, Test Model

Modeling with UML: Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams

System Analysis: Analysis Model, Dynamic Modelling & Testing

System Design: Design concepts & activities, Design models, Block design, Testing

Testing Object Oriented Systems: Introduction, Testing Activities & Techniques, The Testing Process, Managing Testing

Case Studies

Text Books:

1. Stephen R. Scach, "Classical & Object Oriented Software Engineering with UML and Java", McGraw Hill, 1999.

Code No: IT 708
Paper : Java Programming

L T
3 1

Introduction to Java Importance and features of java, keywords, constants, variables and data types, Operators and expressions, Decision making, branching and looping: if, else, switch, ?: operator, while, do, for statements, labeled loops, jump statements : break, continue, return.

Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.

Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes.

Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions.

Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads.

Input/Output: Basics, Streams, Byte and Character stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net).

Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Datagram Programming.

Event Handling: Different mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet.

Text:

1. Java-2 The complete Reference by Patrick Naughton and Herbertz Schildt, TMH.

Reference:

1. "Programming with java", by E Balaguruswamy.
2. "Computing Concepts with Java 2 Essentials", by Horstmann, John Wiley.
3. "Programming.Java", Decker & Hirshfield, Vikas Publication
4. "HTML 4 unleashed", by Rick Dranell, second edition, Techmedia publication.
5. "Dynamic web publishing unleashed" by Shelley Powers, second edition, Techmedia.

Code No: IT 710
Paper : Fuzzy Sets & Logic

L	T
3	1

Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, α -cuts, Properties of α -cuts, Decomposition Theorems, Extension Principle.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations: Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Possibility Theory: Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Unertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp sets, Fuzziness of Fuzzy Sets.

Applications of Fuzzy Logic:

Text / References :

1. G.J.Klir & T.A. Folger, "Fuzzy Sets, Uncertainty & Information", PHI, 1988.
2. G.J.Klir & B.Yuan, "Fuzzy sets & Fuzzy logic," PHI, 1995.

Code No: IT 712
Paper : Artificial Intelligence

L T
3 1

Scope of AI

Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

Problem solving

State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

Knowledge Representation

Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems : Forward reasoning: conflict resolution, backward reasoning: use of no backtrack.

Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

Handling uncertainty

Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic.

Learning

Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

Expert Systems

Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.

Text:

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.

Reference:

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Code No: IT 714
Paper : Digital Signal Processing

L **T**
3 **1**

Discrete time signals and systems, Z-transforms, structures for digital filters, design procedures for FIR and IIR filters. Frequency transformations: linear phase design; DFT. Methods for computing FFT. Noise analysis of digital filters, power spectrum estimation.

Signals and signal Processing: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications.

Time Domain Representation of Signals & Systems: Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems, state-space representation of LTI Discrete-Time systems, random signals.

Transform-Domain Representation of Signals: the Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of z-transform, transform domain representations of random signals.

Transform-Domain Representation of LTI Systems: the frequency response, the transfer function, types of transfer function, minimum-phase and maximum-Phase transfer functions, complementary transfer functions, Discrete-Time processing of random signals.

Digital Processing of Continuous-Time Signals : sampling of Continuous Signals, Analog Filter Design, Anti-aliasing Filter Design, Sample-and-hold circuits, A/D & D/A converter, Reconstruction Filter Design.

Digital Filter Structure: Block Diagram representation, Signal Flow Graph Representation, Equivalent Structures, basic FIR Digital Filter Structures, IIR Filter Structures, State-space structure, all pass filters, tunable IIR Digital filters. cascaded Lattice realization of IIR and FIR filters, Parallel all pass realization of IIR transfer function, Digital Sine-Cosine generator.

Digital Filter Design: Impulse invariance method of IIR filter design, Bilinear Transform method of IIR Filter Design, Design of Digital IIR notch filters, FIR filter Design based on truncated Fourier series, FIR filter design based on Frequency Sampling approach.

Applications of DSP.

Text / Reference:

1. Sanjit K. Mitra, "Applications DSP a Computer based approach", TMH.
2. Allan Y. Oppenheim & Ronald W. Schater, "Applications DSP",.

Code No: IT 716

Paper : Functional and Logic Programming

L	T
3	1

Introduction to symbolic processing. Common LISP, LISP paradigms for knowledge representation. Other functional programming paradigms.

Logic programming fundamentals, First-order logic: Completeness, compactness and undecidability, Herbrand universe, skolemization, natural deduction systems, resolution, unification algorithms, Logic programming languages : their declarative and procedural semantics, Verification issues. Prolog, programming for AI using LISP and prolog.

Text / References :

1. Elaine Rich, "Artificial Intelligence".
2. Walker, McCord et.al., "Knowledge Systems and Prolog", Addison Wesley.
3. Carl Townsend, "Introduction to Turbo Prolog", BPB.
4. Clocksin and Mellish, "Programming in Prolog", Narosa Publishing.

Code No: IT 718
Paper : Data Warehousing and Data Mining

L T
3 1

Data Warehousing: Definition, Scope, Practical Implications, Structures and functions.

Data Mining: Process, Technologies & Rules, platform tools & tool characteristics, operational vs. information systems.

Types of Data Warehouses: Host based, single stage, LAN based, Multistage, stationary distributed & virtual data-warehouses.

Data warehouses architecture: Metadata, operational data & operational data bases. Data warehouse architecture model, 2-tier, 3-tier & 4-tier data warehouses.

OLAP & DSS support in data warehouses.

Data Mining: Knowledge discovery through statistical techniques, Knowledge discovery through neural networks, Fuzzy tech. & genetic algorithms.

Text:

1. "Building the Data Warehouse", W.H.Inmon, John Wiley & Sons.
2. "Developing the Data Warehouse", W.H.Inmon, C.Kelly, John Wiley & Sons.

Reference:

1. "Managing the Data Warehouse", W.H.Inmon, C.L.Gassey, John Wiley & Sons.
2. "Advances in knowledge discovery & Data Mining", Fayyad, Usama M. et. al.,MIT Press.

Code No: IT 720
Paper : Microprocessors

L T
3 1

Architecture of 8086, instruction set, assembly language programming, assembler directives, procedures and macros.

8086 minimum mode, system timing diagram, addressing memory and ports in microprocessors based systems, interrupts and interrupt service procedures, interfacing 8086 with 8251, 8254, 8255, 8259, 8279, A/D and D/A converters.

8086 maximum mode, DMA transfer, interfacing and refreshing dynamic RAM, 8087, overview of architecture of 80386, 486 and pentium processors and power PC.

Text:

1. D.V. Hall, "Microprocessors and Interfacing", TMH, 2nd edition.

Reference:

1. Peter Able, "IBM PC assembly language programming.", PHI
2. James L. Antonakes, "An Introduction to the Intel Family of Microprocessors", Published by Addison Wesley.
3. Liu Gibson, "Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design", Published by PHI.

Code No: IT 722
Paper : Computer Graphics

L T
3 1

Basic raster graphics algorithms for drawing 2 D Primitives liner, circles, ellipses, arcs, clipping, clipping circles, ellipses & polygon.

Polygon Meshes in 3D, curves, cubic & surfaces, Solid modeling.

Geometric Transformation: 2D, 3D transformations, window to viewport transformations, acromatic and color models.

Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners.

Shading Tech: Transparency, Shadows, Object reflection, Gouraud & Phong shading techniques. Visible surface determination techniques for visible line determination, Z-buffer algorithm, scanline algorithm, algorithm for oct-tres, algorithm for curve surfaces, visible surfaces ray-tracing , recursive ray tracing, radiosity methods.

Elementary filtering tech, elementary Image Processing techniques, Geometric & multi-pass transformation mechanisms for image storage & retrieval.

Procedural models, fractals, grammar-based models, multi-particle system, volume rendering.

Text:

1. “Computer Graphics Principles & practice “, Foley et. al. , AWL.

Reference:

1. “Procedural elements of Computer Graphics”, Rogers, Mc-Graw Hill.
2. “Mathematical elements of Computer Graphics”, Rogers, Mc-Graw Hill.

Code No: IT 752
Lab: Computer Lab VII

P
4

The Experiments will be based on the following papers:

- a) Java Programming
- b) Elective-I*

Code No: IT 754
Lab: Computer Lab VIII

P
4

The Experiments will be based on the following papers:

- a) Computer Networks (IT-702)
- b) Object Oriented Software Engineering (IT -706)
- c) Elective-II*

*If the students takes a elective in which there are no practical offered then that students will have to do more numbers of Experiments in the part-A.

Code No: IT 801
Subject: Software Verification, Validation & Testing

L T
3 1

Introduction: What is software testing and why it is so hard?, Error, Fault, Failure, Incident, Test Cases, Testing Process, Limitations of Testing, No absolute proof of correctness, Overview of Graph Theory.

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

Reducing the number of test cases:

Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, Slice based testing

Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

Object Oriented Testing: Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.

Testing Tools: Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools.

Text:

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
3. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Louise Tamres, "Software Testing", Pearson Education Asia, 2002

Reference:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
2. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
3. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 2003.
4. Marc Roper, "Software Testing", McGraw-Hill Book Co., London, 1994.
5. Gordon Schulmeyer, "Zero Defect Software", McGraw-Hill, New York, 1990.
6. Watts Humphrey, "Managing the Software Process", Addison Wesley Pub. Co. Inc., Massachusetts, 1989.
7. Boris Beizer, "Software System Testing and Quality Assurance", Van Nostrand Reinhold, New York, 1984.
8. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York, 1979.

Code No: IT 803
Subject: Linux & X-Windows Programming

L T
3 1

Linux History, Overview of Linux Architecture, Installation, Booting and Shutdown Process, System Processes (an overview), User Management – Types of users, Creating users, Granting Rights, File Quota, File-system Management and Layout, Login Process, Linux shells (bash and tcsh), Shell Programming, Networking on Linux (an overview), Printing and print sharing, ftp service, http service.

Review of C and C++, Introduction to system calls.

History of X-Windows, X-Windows configuration, X-Protocol (overview), Event-Driven Programming Model, Client-Server and Windows Management, Xlib Programming Model, Xlib Usage, Creating and Managing Windows, Handling events, Keyboard and Mouse Management, Text handling, X-Windows graphics, colormap and colormap manipulation.

Overview of X-toolkits (Xt, OSF/motif or any other equivalent toolkit).

Text:

1. Nicholas Wells, “Guide to Linux Installation and Administration”, Vikas Publishing House.
2. Barkakati, N. “X-Windows System Programming”, PHI (2001)
3. Jack Dent & Tong Gaddis, “Guide to Unix Using Linux”, Vikas Publishing House.
4. Cox K., “Red Hat Linux Administrator’s Guide”, PHI (2001)

Reference:

1. O’Reilly and Associates – Vol. 0: X Protocol Reference Manual (1992)
2. O’Reilly and Associates – Vol. 1: Xlib Programming Manual (1992)
3. O’Reilly and Associates – Vol. 2: Xlib Programming Manual (1992)
4. Bach, “The Design of the Unix Kernel”, PHI
5. Swan T., “GNU C++ for Linux”, PHI, (2000)
6. Jones O., “Introduction to the X-Windows System”, Prentice Hall, Englewood Cliffs, (1989)
7. Young D.A., “The X-Windows System: Programming and Applications with Xt, OSF/Motif Edition”, Prentice Hall, Englewood Cliffs, (1990).
8. Nemeth E. et. al., “Unix System Administration Handbook”, Prentice Hall PTR, (1995)
9. Komarinski M.F. et. al., “Linux System Administration Handbook”, Prentice Hall PTR, (1998)
10. Taylor G., “Linux Complete”, BPB, (2000)
11. Relevant Linux HOW-TO(s) and System documentation.

Code No: IT 805
Paper : Advanced Computer Networks

L T
3 1

Review of Physical, Data link layer, TCP/IP: Datalink Protocols; ARP and RARP.

Network Layer: Routing algorithms and protocols, Congestion control algorithm, Router Operation, Router configuration, Internetworking, IP Protocol, IPv6 (an overview), Network layer in ATM Network.

Transport Layer: Transport Service, Transport Protocol (TCP, UDP, ATM AAL layer protocol).

Application layer: Security, DNS, SNMP, RMON, Electronic Mail, WWW.

Network Security: Firewalls (Application and packet filtering), Virtual Public Network.

Text:

1. Tananbaum A.S., "Computer Networks", 3rd Ed, PHI, 1999.
2. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.

Reference:

1. Black U., "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. Stallings W., "Computer Communication Networks", PHI.
3. Stallings W., "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3rd Ed., Addison Wesley, 1999.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication.

Code No: IT 807
Paper : Multimedia Applications

L T
3 1

Introduction:

Concept of Multimedia, Multimedia Applications, Hardware Software requirements, Multimedia products & its evaluation.

Components of multimedia: Text, Graphics, Audio, Video.

Design & Authoring Tools, Categories of Authority Tools, Types of products.

Animation:

Introduction, Basic Terminology techniques, Motion Graphics 2D & 3D animation.

Introduction to MAYA(Animating Tool):

Fundamentals, Modeling: NURBS, Polygon, Organic, animation, paths & boxes, deformers.

Working with MEL: Basics & Programming

Rendering & Special Effects: Shading & Texturing Surfaces, Lighting, Special effects.

Text / Reference:

1. David Hillman, "Multimedia Technology & Applications", Galgotia Publications.
2. Rajneesh Agrawal, "Multimedia Systems", Excel Books.
3. Nigel Chapman & Jenny Chapman, "Digital Multimedia", Wiley Publications.
4. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.

Code No: IT 809

Paper : Digital Image Processing

L	T
3	1

Introduction And Digital Image Fundamentals

Digital Image Representation, Fundamental Steps in Image Processing, Elements of Digital image processing systems, Sampling and quantization, some basic relationships like neighbours, connectivity, Distance measure between pixels, Imaging Geometry.

Image Transforms

Discrete Fourier Transform, Some properties of the two-dimensional fourier transform, Fast fourier transform, Inverse FFT.

Image Enhancement

Spatial domain methods, Frequency domain methods, Enhancement by point processing, Spatial filtering, Lowpass filtering, Highpass filtering, Homomorphic filtering, Colour Image Processing.

Image Restoration

Degradation model, Diagonalization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain.

Image Compression

Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Error free comparison, Lossy compression, Image compression standards.

Image Segmentation

Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

Representation and Description

Representation schemes like chain coding, Polygonal Approximation, Signatures, Boundary Segments, Skeleton of region, Boundary description, Regional descriptors, Morphology.

Recognition and Interpretation

Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretation.

Text:

1. Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", AWL.
2. A.K. Jain, "Fundamental of Digital Image Processing", PHI.

Reference:

1. Rosefield Kak, "Digital Picture Processing",
2. W.K. Pratt, "Digital Image Processing",

Code No. : IT – 811

L

T

Paper: Advanced Computer Architecture

3

1

Parallel computer models: The state of computing , Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks

Program and network properties :Conditions of parallelism, Data and resource dependences,Hardware and software parallelism,Program partitioning and scheduling, Grain size and latency, Program flow mechanisms,Control flow versus data flow,Data flow architecture,Demand driven mechanisms,Comparisons of flow mechanisms

System Interconnect Architectures : Network properties and routing, Static interconnection networks,Dynamic interconnection Networks,Multiprocessor system interconnects,Hierarchical bus systems, Crossbar switch and multiport memory,Multistage and combining network.

Processors and Memory Hierarchy : Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors

Memory Technology Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Backplane Bus System :Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches.

Pipelining :Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines

Vector Processing Principles : Vector instruction types, Vector-access memory schemes.

Synchronous Parallel Processing : SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement

Text:

1. Kai Hwang, “Advanced computer architecture”; TMH.

References:

1. J.P.Hayes, “computer Architecture and organization”; MGH.
2. Harvey G.Cragon,”Memory System and Pipelined processors”; Narosa Publication.
3. V.Rajaraman & C.S.R.Murthy, “Parallel computer”; PHI.
4. R.K.Ghose, Rajan Moona & Phalguni Gupta, “Foundation of Parallel Processing”; Narosa Publications.
5. Kai Hwang and Zu, “Scalable Parallel Computers Architecture”; MGH.
6. Stalling W, “Computer Organisation & Architecture”;PHI.
7. D.Sima, T.Fountain, P.Kasuk, “Advanced Computer Architecture-A Design space Approach,”Addison Wesley,1997.
8. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”; Narosa Publishing.
9. D.A.Patterson, J.L.Hennessy, “Computer Architecture :A quantitative approach”; Morgan Kauffmann feb,2002.
10. Hwan and Briggs, “ Computer Architecture and Parallel Processing”; MGH.

Code No: IT 813
Paper : Compiler Construction

L **T**
3 **1**

Classification of grammars, Context free grammars, Deterministic finite state automata (DFA) Non-DFA.

Scanners, Top down parsing, LL grammars, Bottom up parsing, Polish expression Operator Precedence grammar, IR grammars, Comparison of parsing methods, Error handling.

Symbol table handling techniques, Organization for non-block and block structured languages.

Run time storage administration, Static and dynamic allocation, Intermediate forms of source program, Polish N-tuple and syntax trees, Semantic analysis and code generation.

Code optimization, Folding, redundant sub-expression evaluation, Optimization within iterative loops.

Text / References:

1. Tremblay, et. al., "The Theory and Practice of Compiler Writing", McGraw Hill, New York, 1985.

Code No: IT 815
Paper : Software Project Management

L **T**
3 **1**

Introduction to Software Project Management: The Nature of Software Production, Key Objectives of Effective Management, Quality, Productivity, Risk Reduction, The Role of the Software Project Manager

Planning the Project: Business Planning, Determining Objectives, Forecasting demand for the Product, Proposal Writing, Requirements analysis, Legal issues (patent, copyright, liability, warranty).

Technical Planning: Life-cycle models, Types of Plans, Plan documentation methods, Work breakdown structures, PERT and CPM, Gantt Charts, Standards, Planning for Risk Management and Control, Entry and Exit criteria, Intermediate checkpoints, Performance prediction and analysis People, Prototyping and modeling, Inspections and reviews, Process and process assessment, Development Methods, Metrics, Configuration management, Testing and quality assurance, Capacity Planning, Estimating – what it takes to do the job, Cost (direct and indirect), Resources, Time, Size and complexity of the product, Risk determination, Role of requirements and design in estimating, Financial planning – budgeting, Resource Allocation, Organizational considerations, (teams, hierarchies, etc.), Technology, Human factors and usability, Tools and environments, Transition of the Product to the user.

Managing the Project: Managing the Task, Project Control, Managing to the Plan, Reviews, Feedback and Reporting Mechanisms, Configuration Management, Quality Control and Quality Assurance, Managing Change, Readjusting Goals and Milestones, Risk Management, Testing Phases, Formalized Support Activities, Managing the Team, Team Organizations, Recruiting and Staffing – picking the right people, Technical leadership, Avoiding obsolescence – training, etc.) Managing the Context, Communication Skill, Decision Theory, Business Management, Assessing the Organization's ability to perform the process, Probability and Statistics, Managing Product Support and Maintenance.

Evaluating the Project.

Text:

1. Tom Gilb, Finzi Susannah, "Principles of Software Engineering Management", Addison-Wesley, England, 1988.
2. Philip Metzger, "Managing A Programming Project", Prentice Hall, New Jersey, 1981.

Reference:

1. Tom Demarco, "Controlling Software Project Management, Measurement" , Prentice Hall, New Jersey, 1986.
2. Barbee Mynatt, "Software Engineering with Student Project Guidance", Prentice Hall, New Jersey, 1990.
3. Richard Thayer, "Tutorial: Software Engineering Project Management", IEEE Inc, CA, 1987.
4. Mark Norris, Peter Rigby, Malcolm Payne, "The Healthy Software Project – A Guide to Successful Development & Management", John Wiley & Sons, 1993
5. Dennis Lock, "Handbook of Project Management", Jaico Publishing House, 1994.
6. Neal Whitten, "Managing Software Development Projects", John Wiley, 1995.
7. Sanjiv Purba, David Sawh & Bharat Shah, "How to Management a Successful Software Project – Methodologies, Techniques, Tools", John Wiley, 1995.

Code No: IT 817
Paper : Software Quality Management

L **T**
3 **1**

Concepts and Overview: Concepts of Software Quality, Quality Attributes, Software Quality Control and Software Quality Assurance, Evolution of SQA, Major SQA activities, Major SQA issues, Zero defect Software.

Software Quality Assurance: The Philosophy of Assurance, The Meaning of Quality, The Relationship of Assurance to the Software Life-Cycle, SQA Techniques.

Tailoring the Software Quality Assurance Program: Reviews, Walkthrough, Inspection, and Configuration Audits.

Evaluation: Software Requirements, Preliminary design, Detailed design, Coding and Unit Test, Integration and Testing, System Testing, types of Evaluations.

Configuration Management: Maintaining Product Integrity, Change Management, Version Control, Metrics, Configuration Management Planning.

Error Reporting: Identification of Defect, Analysis of Defect, Correction of Defect, Implementation of Correction, Regression Testing, Categorization of Defect, Relationship of Development Phases.

Trend Analysis: Error Quality, Error Frequency, Program Unit Complexity, Compilation Frequency.

Corrective Action as to Cause: Identifying the Requirement for Corrective Action, Determining the Action to be Taken, Implementing the Correcting the corrective Action, Periodic Review of Actions Taken.

Traceability, Records, Software Quality Program Planning, Social Factors: Accuracy, Authority, Benefit, Communication, Consistency, and Retaliation.

Text:

1. Robert Dunn, "Software Quality Concepts and Plans", Prentice-Hall, 1990.
2. Alan Gillies, "Software Quality, Theory and Management", Chapman and Hall, 1992.

Reference:

1. Michael Dyer, "The Cleanroom approach to Quality Software Engineering", Wiley & Sons, 1992.
2. Daniel Freedman, Gerald Weinberg, "Handbook of Walkthroughs, Inspections and Technical Reviews", Dorset House Publishing, 1990.
3. Tom Gilb, "Principles of Software Engineering Management", Addison-Wesley, 1988.
4. Tom Gilb, Dorothy Graham, "Software Inspection" Addison-Wesley, 1993.
5. Watts Humphrey, "Managing the Software Process", Addison-Wesley, 1990.
6. Watts Humphrey, "A Discipline for Software Engineering", Addison-Wesley, 1995.
7. Arthur Lowell, "Improving Software Quality An Insiders guide to TQM", 1993, Wiley & Sons.

Code No: IT 819
Paper : TCP/IP

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3 1

Introduction: TCP/IP Layering, Internet Addresses, The Domain Name System, Encapsulation, Demultiplexing, Client-Server Model, Port numbers, Standardization Process, RFCs, Standard, Simple Services, The Internet, Implementations, Application Programming Interfaces.

Link Layer-Ethernet and IEEE 802 Encapsulation, Trailer Encapsulation, SLIP, Compressed SLIP, PPP, Loopback Interface, MTU, Serial Line Throughput Calculations.

Internet Protocol: Header, Routing, Subnet Addressing, Subnet Mask, Special Case IP Addresses.

Address Resolution Protocol: ARP Cache, ARP Packet Format, Proxy ARP, RARP, RARP packet format.

Internet control Message Protocol: Message Types, ICMP Address Mask Request and Reply, ICMP Timestamp Request and Reply, ICMP Port unreachable Error.

Ping Program, Traceroute Program, IP Routing, Dynamic Routing Protocols,

User Datagram Protocol: Header, Checksum, IP Fragmentation.

Broadcasting and Multicasting, Internet Group Management Protocol, The Domain Name System, Trivial File Transfer Protocol, Bootstrap Protocol.

Transmission Control Protocol: Services and Headers, Connection establishment and Termination, Timeout of Connection Establishment and TCP timeout and retransmission, Maximum Segment Size, Reset Segments, TCP Options.

Simple Network Management Protocol: Structure, Object Identifier, Instance Identification. Telnet and Rlogin, FTP, SMTP, NFS, Finger Whois, Archie, WAIS, Gopher, Veronica, and WWW.

IPv6 (overview), IPv6 address, IPv4 mapped IPv6 addresses, IPv4 compatible IPv6 addresses, loopback addresses, ICMPv6 an overview, Mbone virtual networks, 6bone virtual networks.

Text:

1. W. R. Stevens, "TCP/IP Illustrated, Vol-I: The Protocols", Addison Wesley.
2. G. R. Wright & W. R. Stevens, "TCP/IP Illustrated, Vol-II: The Implementation", Addison Wesley.

Reference:

1. W. R. Stevens, "TCP/IP Illustrated, Vol-I: The Protocols", Addison Wesley.
2. G. R. Wright & W. R. Stevens, "TCP/IP Illustrated, Vol-II: The Implementation", Addison Wesley.
3. A. W. Comer et al, "Internetworking with TCP/IP Vol-I, II & III. Prentice-Hall.

4. Andrew S. Tanenbaum, "Computer Networks", 3rd edition, PHI.
5. Stalling, "Data and Computer Communication", NY, Macmillan
6. Relevant RFC's.

Code No. 821

Subject: Neural Networks

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Biological, Analogy, Architecture classification, Neural Models, Learning Paradigm and Rule, single unit mapping and the preception.

Feed forward networks – Review of optimization methods, back propagation, variation on backpropagation, FFANN mapping capability, Mathematical properties of FFANN's Generalization, Bias & variance Dilemma, Radial Basis Function networks.

Recurrent Networks – Symmetric hopfield networks and associative memory, Boltzmann machine, Adaptive Resonance Networks

PCA, SOM, LVQ, Hopfield Networks, Associative Memories, RBF Networks, Applications of Artificial Neural Networks to Function Approximation, Regression, Classification, Blind Source Separation, Time Series and Forecasting.

Text / Reference:

1. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999.
3. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation",
4. Addison-Wesley, California, 1991.
5. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.
6. Freeman J.A., D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison-Wesley, Reading, Mass, (1992).
7. Golden R.M., "Mathematical Methods for Neural Network Analysis and Design", MIT Press, Cambridge, MA, 1996.
8. Cherkassky V., F. Kulier, "Learning from Data-Concepts, Theory and Methods", John Wiley, New York, 1998.
9. Anderson J.A., E. Rosenfield, "Neurocomputing: Foundations of Research, MIT Press, Cambridge, MA, 1988.
10. Kohonen T., "Self-Organizing Maps", 2nd Ed., Springer Verlag, Berlin, 1997.
11. Patterson D.W., "Artificial Neural Networks: Theory and Applications", Prentice Hall, Singapore, 1995.
10. Vapnik V.N., "Estimation of Dependencies Based on Empirical Data", Springer Verlag, Berlin, 1982.
11. Vapnik V.N., "The Nature of Statistical Learning Theory", Springer Verlag, New York, 1995.
12. Vapnik V.N., "Statistical Learning Theory: Inference from Small Samples", John Wiley, 1998.

Code No: IT 823

Paper : Simulation & Modeling

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Definition of System, types of system : continuous and discrete, modelling process and definition of a model, computer workloads and preparation of its models, verification and validation modeling procedures, comparing model data with real system data, differential and partial differential equation models, combining discrete event and continuous models. Simulation process: Use of simulation, discrete and continuous simulation procedures, simulation of time sharing computer system. Simulation Languages : A brief introduction to important discrete and continuous simulation languages, one language may be studied in detail depending on the availability.

Text:

1. Gordon G., "System Simulation", PHI.

Reference:

1. Banks J., Carson S., Nelson B.L., "Discrete -Event System Simulation", 2nd Edition, Prentice Hall of India, N. Delhi, 1996.
2. Deo N., "System Simulation with Digital Computers", Prentice Hall of India, 1979.
3. Law A.M., Kelton W.D., "Simulation Modeling and Analysis", 2nd Edition, McGraw Hill, N.Y., 1991.

Code No: MS 825
Paper : Cognitive Psychology

L T
3 1

A Brief history of the cognitive approach, cognitive science, Neuro science, Artificial intelligence, The Parallel processing approach.

Perceptual Process: Perception, pattern recognition, theories of pattern recognition, Bottom-up vs Top-down Processing, Template matching, feature analysis, prototype matching, pattern recognition: The role of the perceives.

Communication and Language Processing: Linguistic Hierarchy, Chomsky's theory of grammar, Psycho-linguistic aspects, Abstraction of linguistic ideas, knowledge and comprehension, non-verbal abstraction – musical syntax, The language of motion.

Memory Modules: Memory, process, storage, Short term memory, long term memory, organization in memory, simulation modules of learning and memory, mnemonics, syntactic and semantic issues, Concept formation, problem solving.

Contribution of cognitive psychology to advances in Artificial Intelligence, computer based learning/teaching systems, knowledge acquisition and knowledge based systems, expert systems.

References:

1. Marc de May, "The cognitive Paradigm", Reidel, 1982
2. R. C. Shank, P. Childers, "Cognitive computer on language, Learning and AI", 1984
3. P.C. Kendall, "Advances in Cognition behavioural research and therapy", Academic Press, 1984.
4. Solso, R.L. "Cognitive Psychology (3rd Edition), 1991, Allyn & Balon.
5. Matlin M.W., "Cognition (3rd Edition), 1995, Harcourt Brace (Prism Indian Edition).
6. Leahey T.H. & Harris R.J., "Learning and Cognition (4th Edition), 1997, PHI.

Code No: MS 827
Paper : Transactional Analysis

L T
3 1

Introduction to Transactional Analysis: A historical perspective: Frensdorff, Penfield and Eric Berne, Ego Status – The parent, The adult and the child, types of transaction – complementary & crossed, analyzing the transactions.

Life position – I'm not o.k. – You're o.k.; I'm not o.k. – You're not o.k.; I'm o.k. – You're not o.k.; I'm o.k. – You're o.k.

Application of Concepts: Marriage, Employment, Sales, Problem Solving, Grievances Handling, Stokmy leadership and conflict resolution.

Winners & Losers: Learning to pull your own strings.

References:

1. Eric Berne, "Transactional Analysis in Psychotherapy, New York", Grove Press Inc., 1961.
2. Eric Berne, "Games People Play, New York", Grove Press Inc., 1964.
3. Thomas A. Harris, "I'm o.k. – you're o.k.: A practical guide to Transactional Analysis", New York, Harper & Row Publication Inc., 1969.
4. Graham Barnes, "Transactional Analysis after Eric Berne", Harper and Row, 1977.
5. J. Allyn Bradford and Reuben Guberman, "Transactional Awareness", Addison Wesley Publication Co., 1978.
6. James M. & Jongeward D., "Born to Win", Addison Wesley, 1971.
7. Dyer W.W., "Pulling your own Strings", Hamlyn Books, U.K., 1978.

Code No: IT 851
Lab: Computer Lab IX

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The Experiments will be based on the following papers:

1. Multimedia Applications (IT—807)
2. Software Verification, Validation & Testing (IT-801)
3. Elective - I

Code No: IT 853
Lab: Computer Lab X

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The Experiments will be based on the following papers:

1. Advanced Computer Networks (IT-805)
2. Linux & X-Windows Programming (IT-803)
3. Elective - II