DEPARTMENT OF COMPUTER SCIENCE & INFORMATICS

UNIVERSITY OF KOTA, KOTA

Master of Computer Application (MCA), session *2023-2024*

Structure and Syllabus for MCA

Important information about the course

Name of faculty & Name of Course	Intake	Duration	Eligibility	Admission fee (in Rs.) & Admission Process
MCA	60 [30(SFS) + 30(GAS)]	04 Sem. (2 years)	Passed BCA/ Bachelor Degree in Computer Science Engineering or equivalent Degree. **OR** Passed B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level. Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying Examination.	As per RMCAAP

Objective of the course

MCA is an emerging postgraduate degree course in the field of computer applications and has following objectives:

- Provide foundations and advanced technical education in both theoretical and applied Computer Applications inline with Industry demands
- Create highly skilled computer professionals capable of designing and innovating real life solutions
- Sustain an academic environment conducive to research and teaching focused to generate up skilled
- professionals with ethical values
- Promote entrepreneurial initiatives and innovations capable of bridging and contributing with sustainable, socially relevant technology solutions
- To develop among students the programming techniques and the problem solving skills through programming.
- To develop the ability to use this knowledge to analyze new situations.

Learning outcome of the course

- Acquiring knowledge on basics of Computer Science and ability to apply principles in the development of solutions for problems of varying complexity in the benefit of society
- Ability to prepare the students to carry out research and development work
- Preparing the students to take up a career in the IT industry
- Possessing a sound knowledge of the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning
- Ability to implement standard Software Engineering practices and strategies in real-time software project development
- Design and develop computer programs/computer based systems in the areas related to AI, algorithms, networking, web design, cloud computing and data analytics.

MCA –I Semester

S. No.	Sub. Code	Type	Name of Paper	Duration of Exam. (Hrs.)	Credit	Contact Hrs.			Distribution Marks		of	Min. marks	pass
						L*	T*	P*	Internal	Sem. Exam.	Total Marks	Internal	Sem. Exam.
1.	MCA1001T	DCC	Computer organization & Architecture	3	4	4	0	0	30	70	100	12	28
2.	MCA1002T	DCC	Data structures	3	4	4	0	0	30	70	100	12	28
3.	MCA1003T	DCC	Discrete Mathematics	3	4	4	0	0	30	70	100	12	28
4.	MCA1004T	DCC	Data Base Management System	3	4	4	0	0	30	70	100	12	28
5.	MCA1005P	AEC	Technical Communication	1.5	2	0	0	4	15	35	50	8	18
6.	MCA1006P	DCC	Lab on Data structures	3	3	0	0	6	25	50	75	13	25
7.	MCA1007P	DCC	Lab on DBMS using PHP	3	2	0	0	4	15	35	50	8	18
8.	MCA1008P	DCC	Seminar	3	2	0	0	4	15	35	50	8	18
9.	MCA1009T	SEC	***Bridge Course	3	4 (3+1)	3	0	2	30 (15L+15P)	70 (35L+35P)	100	12	28
		Total Credit			25	Total Marks					625		

L* = Lecture   T* = Tutorial   P* = Practical

*** NOTE: Only for students admitted on the basis of B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level. Students have to pass compulsorily the bridge course examination. Marks of this paper will not be mentioned in the mark-sheet, only pass/fail will be mentioned. Bridge course shall be an Audit Course whose award shall not be considered for overall MCA Course credit and percentage.

2

MCA - II Semester

S. No.	Sub. Code	Type	Name of Paper	Duration of Exam. (Hrs.)	Credit	Contact Hrs.			Distribution of Marks			Min. pass marks	
						L*	T*	P*	Internal	Sem. Exam.	Total Marks	Internal	Sem. Exam.
1.	MCA2001T	DCC	Data Science using Python	3	4	4	0	0	30	70	100	12	28
2.	MCA2002T	DCC	Computer Oriented Numerical Methods	3	4	4	0	0	30	70	100	12	28
3.	MCA2003T	DCC	Data Communication & Networking	3	4	4	0	0	30	70	100	12	28
4.	MCA2004T	DCC	Software Engineering	3	4	4	0	0	30	70	100	12	28
5.	MCA2005T	GEC	*Open Course	1.5	2	0	0	4	50	--	50	20	--
6.	MCA2006P	DCC	Lab on Computer Oriented Numerical Methods	1.5	2	0	0	4	15	35	50	8	18
7.	MCA2007P	DCC	Lab on Data Science using Python	3	3	0	0	6	25	50	75	13	25
8.	MCA2008P	DCC	Summer training ##	3	2	0	0	4	0	50	50	--	25
		Total Credit			25	Total Marks					625		

*Open Course may be opted From the list (POOL A) given here :
 https://www.uok.ac.in/Syllabus-2023

##			
Paper	Credit	Duration	Marks
MCA2008P (Summer Training)	2	45 days	50

MCA - III Semester

S. No.	Sub. Code	Type	Name of Paper	Duration of Exam. (Hrs.)	Credit	Contact Hrs.			Distribution of Marks			Min. pass marks	
						L*	T*	P*	Internal	Sem. Exam.	Total Marks	Internal	Sem. Exam.
1.	MCA3001T	DCC	Information and Network Security System	3	4	4	0	0	30	70	100	12	28
2.	MCA3002T	DCC	Programming with JAVA	3	3	3	0		25	50	75	10	20
3.	MCA3003T	DCC	Theory of Computation	3	4	4	0	0	30	70	100	12	28
4.	MCA3004T	DCC	Design and Analysis of Algorithms	3	4	4	0	0	30	70	100	12	28
5.	MCA3005T	GEC	*Open Course	1.5	2	0	0	4	50	--	50	20	--
6.	MCA3006P	DCC	Lab on Java	3	2	0	0	4	15	35	50	8	18
7.	MCA3007P	DCC	Lab on Design and Analysis of Algorithms	3	2	0	0	4	15	35	50	8	18
8.	MCA3008P	DCC	Minor Project	3	2	0	0	4	15	35	50	8	18
9.	MCA3009T MCA3010T MCA3011T	DSE	Big Data Analytics Cloud Computing Machine Learning	1.5	2	0	0	4	15	35	50	6	14
		Total Credit			25	Total Marks					625		

*Open Course may be opted From the list (POOL B) given here :
https://www.uok.ac.in/Syllabus-2023

4

MCA - IV Semester

S. No.	Sub. Code	Type	Name of Paper	Duration of Exam. (Hrs.)	Credit	Contact Hrs.			Distribution of Marks			Min. pass marks	
						L*	T*	P*	Internal	Sem. Exam.	Total Marks	Internal	Sem. Exam.
1.	MCA4001T	DCC	Computer Graphics	3	4	4	0	0	30	70	100	12	28
2.	MCA4002T	DCC	Operating System	3	4	4	0	0	30	70	100	12	28
3.	MCA4003P	DCC	Lab on Computer Graphics	3	2	0	0	4	15	35	50	8	18
4.	MCA4004P	DCC	Lab on Operating System	3	2	0	0	4	15	35	50	8	18
5.	MCA4005P	DCC	Major Project	3	5	0	0	10	50	75	125	25	38
6.	MCA4006T MCA4007T MCA4008T	DSE	Wireless Technologies Image Analysis & Computer Vision System testing	3	4	4	0	0	30	70	100	12	28
7.	MCA4009T MCA4010T MCA4011T	DSE	Natural Language Processing Artificial Intelligence Software Project Management	3	4	4	0	0	30	70	100	12	28
		Total Credit			25	Total Marks					625		

Distribution of Marks (I to IV Semester)

Major Project [125]: Break-up

The following competencies will be acquired by the student through Major Project:

1. An ability to identify, formulate and implement computing solutions.

2. An ability to design and conduct experiments, analyze and interpret data related software development projects.

3. Able to design a system, component or process as per needs and specification of the clients.

4. Development of the skill to work on multidisciplinary tasks and will be aware of the new and emerging disciplines that will impact development.

Internal Evaluation (Max. Marks 50)	SRS (Document + Presentation)	16
	SDS (Document + Presentation)	16
	Mid-term demo of Project	18
External Evaluation (Max. Marks 75)	Project Report	50
	Viva-Voce + final Presentation	10+15
	Total Marks	**75**

Internal Marks Break-up

Class Test – I	50%
Presentation/ Case-Study/ Group Activity/ Class Test / Lab work	50%
Total Percentage	**100%**

Seminar [50] Break-up

Internal Evaluation (Max. Marks 15)	Article Submission (Based on Latest developments in the field of Computer Science)	10
	Presentation (Based on Article submitted)	5
External Evaluation (Max. Marks 35)	Viva-Voce+ Presentation (Based on Article submitted)	15+20
	Total Marks	50

Summer Training Marks [50] Break-up

Report Submission (Based on Summer Training)	20
Presentation (Based on work done during Summer Training)	15
Viva-Voce	15
Total Marks	50

Semester wise- marks	MCA I Semester	MCA II Semester	MCA III Semester	MCA IV Semester
	625	625	625	625
Total Marks	2500			

NOTE: students are advised to visit following online resources for studying different subjects:
1. MIT Open Learning Library (https://ocw.mit.edu/)

2. NPTEL courses (https://nptel.ac.in/)

Important Notes:

1. A student**,** who remains absent (defaulter) or fails or want to improve the marks in the internal assessment, may be permitted to appear in the desired paper(s) (only on time) in the same semester with the permission of the concerned Head of Department. A defaulter/ improvement fee of rupees 250/- per paper shall be charged from such candidates. Duly forwarded application of such candidates by the teacher concerned shall be submitted to HOD who may permit the candidate to appear in the internal assessment after depositing the defaulter/improvement fee. A record of such candidates shall be kept in the Department.

Passing Rules:

2. Minimum Pass Marks and Rules regarding Determination of Result are recommended as follows:

(i) The candidate shall be declared as pass in a semester examination. If he/she secures at least 40% marks in each theory paper separately in external & internal

examination and 50% marks in each practical paper and at least 50% marks in project/dissertation with 50% aggregate marks in that semester.

(ii) A candidate declared as fail/absent in one or more papers at any odd semester examination shall be permitted to take admission in the next higher semester (even semester) of the same academic session.

(iii) A candidate may be promoted in the next academic session (odd semester) if he/she has cleared collectively at least 50 % of the paper of both semester of previous academic session with 50 % of the aggregate marks. The candidate who does not fulfill the above condition will remain as an ex-student and will reappear in the due paper along with next odd/even semester exams.

(iv) If any student who is provisionally admitted in higher odd semester but could not secure prescribed minimum marks in previous semester will be treated as ex-student and his/her admission fee will be carry forwarded to the next odd semester of forthcoming academic session.

(v) If a candidate, who is declared as pass, wishes to improve his/her performance in the theory papers of previous semester. He/she may re-appear only one time in these papers in next odd/even semester examinations.

(vi) Candidate shall not be permitted to re-appear or improve the marks obtained in the external examination of practical/dissertation in any condition.

(vii) If the number of paper prescribed in a semester examination is an odd number. It shall be increased by one for the purpose of reckoning 50% of the papers for considering the student pass/fail.

(viii) A candidate may be given only two additional chances for passing the semester thus maximum tenure for completing the two years' postgraduate course will be limited to four years.

3. Classification of Successful Candidates after Last Semester Examination is recommended as follows:

Description of Marks Obtained	Division / Result
• 80% and above marks in a paper	Distinction in that paper
• A candidate who has secured aggregate 60% and above marks	First Division
• A candidate who has secured aggregate 50% and above but less than 60% marks	Second Division

4. External examination Question paper pattern (70 Marks):

There will be two sections A and B in the Question paper. Section A will consist of 10 questions and each of 2 marks. Thus total weightage of the section A will be 20 marks. Section B will consist of five questions with one question from each unit with internal choice (may have sub divisions). The weight of each question of 10 marks hence the total weightage of this section is 50 marks.

5. **Fee Refund** : As per University Rules.

Bridge Course (Only for students admitted on the basis of B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level)

UNIT-I

Generations of Computer, Block Diagram of a Computer, Functions of the Different Units, Input & Output Devices, Memories, Software: application and system software, Hardware, Computer Languages, firmware, Classification of computers on the basis of data handling and size.

UNIT-II

The steps involved in computer programming, problem analysis, algorithms & flow charts. Computer Programming(in C): various data types (simple and structured) and their representation (BCD,ASCII and EBCDIC), constants and variables, arithmetic and logical expressions, data assignments, input and output statements. Program header & declarations. High level and low level programming languages, Programming paradigms.

UNIT-III

An overview of object oriented programming system: Object oriented programming, Classes & Objects fundamentals, OOP principles: Abstraction, Polymorphism, Inheritance, Encapsulation.

UNIT-IV

Number System, LCD & GCD, Fibonacci numbers, Sequences and series : AP, GP and HP, Sum of n terms, Derivative, derivatives of sum, differences, product & quotients, derivatives of composite functions, logarithmic differentiation, L'Hospitals rule, maxima & minima, Integrations, Introduction to matrix, determinants, Inverse of matrix

UNIT-V
Internet: Network, World Wide Web, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Service Providers, Introduction to Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services, Intranet and Extranet, how to connect with internet.

NOTE: Students have to pass compulsorily the bridge course examination. Marks of this paper will not be mentioned in the mark-sheet, only pass/fail will be mentioned.

Text/Reference Books:.

1. Let us C by Y.Kanetkar, BPB Publications.
2. Mastering C by Vijay Prasad, TMH.
3. Programing with C, Balaguruswamy, Tata McGraw-Hill.
4. How to Solve it by Computers, Dromey, PHI.
5. C Project by Kanetkar, BPB Publications,2006.
6. Object Oriented Modeling and design, Rambaugh, Blaha et.al , Pearson Education.
7. Mastering C++, Venugopal K.R. Tata McGraw – Hills.
8. Let us C++, Kanetkar Yashwant, BPB Publications.
9. Object Oriented programming with C++, Balaguruswami E., Tata Mc Graw Hill.
10. An Introduction to OOP and Silvertalk – Addison Wesley, L. Pinson and R. Wiener,.
11. Computer Fundamentals by P.K. Sinha, BPB Publications.

Semester - I

MCA1001 T: COMPUTER ORGANIZATION AND ARCHITECTURE

Unit-1

Brief introduction to computer organization, representation of data, bits and bytes, Number system (binary, octal, decimal, hexadecimal), Representation of integers, real numbers, positive and negative numbers. Binary arithmetic, Simple concepts and theorems of Boolean Algebra. Representation of characters: BCD, ASCII, EBCDIC Codes, Self Complementary Codes, Error Detecting and Error correcting codes (Parity, Gray& Hamming Codes).

Unit-II

Logic Gates and Boolean Algebra, Basics of logic families, Karnaugh Map, Combinational Circuit Design: Adder, subtractor, Encoder, Decoder, Multiplexer, Demultiplexer, Magnitude Comparator. Sequential Circuits, Flip-Flops, Shift Registers, Asynchronous and Synchronous Counters.

Unit-III

CPU Organization: Design of ALU, design of shifter and accumulator, Status Register, Processor unit, Control unit organization. Micro instruction format, Hardwired and micro-programmed control.

Unit-IV

Data bus and address bus, stack organization, various registers, instruction formats, addressing techniques. I/O Organization – Simple I/O devices and their properties, device interfacing, DMA interface, program & interrupt control transfer.

Unit-V

Semiconductor Memories: Types of Memories, Sequential and Random Access Memory (RAM, ROM, PROM, EPROM), Storage location and address, fixed and variable word length storage, Cache Memory, bubble memory, Secondary Memory devices and their characteristics. Development of Indian super computer 'PARAM': History, Characteristics, Strengths, weakness and basic architecture.

Text/Reference Books

1. Malvino C.P., Leach D.P., Digital Principles and Applications, Tata Mc- Graw Hill, 1985.
2. Bartee, Thomas C., Digital Computer Fundamentals, 1991, 6th Edition, McGraw Hill.
3. Mano, M.M., Computer System Architecture, Prentice Hall, 1988.
4. Hayes John P., Computer Architecture and Organization, Mc-Graw Hill 1988 (International Edition)
5. Nicholas Carter and Raj Kamal, Schaum Series "Computer Architecture and Organization" 2nd Ed. 2010.

Online study sources:
1. MIT Open Learning Library (https://ocw.mit.edu/)
2.NPTEL courses (https://nptel.ac.in/)

MCA 1002 T: Data Structures

Unit I

Introduction: structure and problem solving, algorithmic notation, Data Structure, Algorithms and sub algorithms, introduction to algorithm analysis for time and space requirement, rate of growth, basic time and space analysis of an algorithm.

Unit II

Primitive and non primitive data structure concept, representation and manipulation of strings, linear data structures and their sequential storage representation, concept and terminology for non primitive data structure, storage structure for arrays, stacks, queues. Operations on arrays, stacks & queues.

Unit III

Linear data structures and their linked storage representation: pointers and linked allocation, linked linear list, singly linked list, circularly linked lists, doubly linked list, application of linked linear lists.

Unit IV

Non Linear data structure: Trees, types of trees, binary tree, application of trees, Graphs and their representations, applications of graph.

Unit V

Sorting and searching: sorting, selection sort, bubble sort, merge sort, tree sort, radix sort, sequential search, binary search, File structure, sequential files, indexed sequential files, direct files.

Text / Reference Books

1. J.P. Tremblay & P.G.Sorensons, An Introduction to Data Structures with Applications, Tata McGraw Hills publications. (Pdf available).
2. Aho., Alfred V., Data structure and algorithms, Pearson Education.
3. Horowitz, Ellis, Fundamentals of Data structure in C, Galgotia publication.
4. Rowe, Glenn W., Introduction to Data Structure and algorithms with C++, Prentice , Hall
5. Langsun , Augenstein , Tenenbaum Aaron M, Data structures using C and C++ , Prentice Hall

Online study sources:
1. MIT Open Learning Library (https://ocw.mit.edu/)
2.NPTEL courses (https://nptel.ac.in/)

MCA 1003 T: Discrete Mathematics

Unit - I
SETS: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

Unit – II
RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function.

Unit – III
PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebric Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattices.

Unit -IV
Graphs: types and operations(bipartite graph. Subgraph, distance of a graph, cut-edges & cut vertices, isomorphic and homomorphic graphs), degree of graphs, adjacent and incidence matrices, path circuit(Floyd's and Warshall algorithms), hamiltonian graph, graph colouring.

Unit – V
Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

Text/References Books

1. Winfried Karl Grassmann, Jean-Paul Tremblay, Logic and Discrete Mathematics: A Computer Science Perspective, Prentice Hall.
2. David J. Hunter, Essentials of Discrete Mathematics.
3. C. L. Liu, Element of Discrete Mathematics, McGraw-Hill, 2nd Edition, 1985, reprinted 2000.
4. Bernard Kolman, Robert Busby, Sharon C. Ross, Discrete Mathematical Structures, 6/E. Pearson Education.
5. Discrete Mathematics and its Applications by Kenneth H. Rosen, 5th Edition, McGraw Hill, Inc, 2003.
6. Narsingh Deo, Graph Theory, PHI.

MCA 1004 T: Database Management System

Unit-I

Introduction: DBMS, Basic DBMS terminology and Data base System versus file System, Data independence architecture of DBMS. Entity Relationship model : Basic Concepts, keys, design issues, E-R diagram, weak entity sets, extended E-R features, reduction of E-R scheme to tables.

Unit-II

Relational model: structure of relational database relational algebra, tuple relational calculus, domain relational calculus. SQL: Basic structure, set operations, aggregate functions, null values.

Unit-III

Data Base Design: Functional Dependencies, normal forms, first, second and third normal form, BCNF multivalued dependencies, fourth normal form, join dependencies.

Unit-IV

Query processing and optimization: Transaction processing concepts, ACID Properties, Concurrency control technique, locking techniques, time stamping, Recovery, Integrity and security of database.

Unit-V

Distributed database system: Fragments of relations, optimization, Distributed Concurrency Control, management of deadlocks and crashes, Database recovery Management.

Text /Reference books

1. H. Korth, A. Silbertz, Sudarshan, Data base system and concepts, Fifth Edition, McGraw – Hill.

2. Elmasari, Navathe, Fundamentals of Database Systems, Addison Wesley

3. Date C.J, An Introduction to Database systems, Addison Wesley

4. Majumdar & Bhattachrya, Database Management System, TMH
5. Ramakrishna, Gehkre, Database Management System, McGraw – Hill

6. Leon alexis, leon Mathews, Database Management systems, Vikash publication

7. Rob, coronel, Database system, 7th edition, Cengage Learning.

MCA 1005T: Technical Communication

Unit -1

Fundamentals of Technical Communication: Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

Unit - II

Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Key-Note Speech: Introduction & Summarization; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration.

Unit - III

Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Unit - IV

Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

Unit - V

Kinesics & Voice Dynamics: Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: Vowel & Consonant Sounds.

Text /Reference books

1. Meenakshi Raman & Sangeeta Sharma, Technical Communication – Principles and Practices, Oxford Univ. Press, 2007, New Delhi.
2. Prof. R.C. Sharma & Krishna Mohan, Business Correspondence and Report Writing, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
3. L.U.B. Pandey, Practical Communication: Process and Practice, A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.
4. Sherman, Theodore A, Modern Technical Writing, Apprentice Hall, New Jersey; U.S.
5. S.D. Sharma, A Text Book of Scientific and Technical Writing, Vikas Publication, Delhi

Semester -II

MCA2001T: Data Science using Python

UNIT-I
Develops all aspects of the machine learning pipeline: data acquisition and cleaning, handling missing data,
UNIT-II
Exploratory data analysis, visualization, feature engineering, modeling, interpretation, presentation in the context of real-world datasets.
UNIT-III
Classical models and techniques for regression: linear, step-wise, polynomial, lasso and logistic regression with regularization.
UNIT-IV
Classical models and techniques for classification: support vector machines, decision trees, and random forests including training, testing, and validation.
UNIT-V
Uses the Python data science ecosystem (e.g., sklearn, pandas, matplotlib).

Text/Reference Books:
1. Rachel Schutt, Cathy O'Neil, Doing Data Science: Straight Talk from the Frontiline, Schroff/O'Reilly, 2013.
2. Foster Provost, Tom Fawcett, Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking, O'Reilly, 2013.
3. John W. Foreman, Data Smart: Using data Science to Transform Information into Insight, John Wiley & Sons, 2013.
4. Ian Ayres, Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart, Ist Edition Bantam, 2007.
5. Eric Seigel, Predictive Analytics: The Power to Predict who Will Click, Buy, Lie, or Die, 1st Edition, Wiley, 2013.
6. Matthew A. Russel, Mining the Social Web: Data mining Facebook, Twitter, Linkedln, Google+, GitHub, and More, Second Edition, O'Reilly Media, 2013.

MCA2002T: Computer Oriented Numerical Methods

Unit I

Computer Arithmetic: Floating point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. Error in number representation-pitfalls in computing.

Unit II

Iterative methods: Bisection, False position, Newton-raphson methods. Discussion of convergence.Polynomial evaluation. Solving polynomial.

Unit III

Solution of simultaneous linear equation and ordinary differential equations: Gauss elimination method-pivoting, Conditioned equations, refinements of solutions, Gauss-seidel methods: Acceleration of its native methods.Taylor series and Euler methods, Local and global error analysis, RungeKutta method, Predictor-corrector method, Automatic Error monitoring, Stability of solution.

Unit IV

Interpolation & Approximation: Polynomial interpolation. Difference regression.Polynomial fitting and curve fitting. Approximation of function by Taylor series and chebyshev polynomials.

Unit V

Numerical differentiation and integration : Differentiation formula based on polynomial fit. Pitfalls in differentiation, Trapezoidal, Simpson rules, Gaussian quadrature.

Text / Reference Books

1. E. Balagurusamy, Computer Oriented Statistical and Numerical Method, Macmillan India Ltd.
2. R.S. Salaria, Computer Oriented Numerical Methods, Khanna Book Publishing Co. (P) Ltd.
3. M.K. Jain, S.R.K. Iyengar & R.K. Jain, Numerical Methods, for scientific and Engineering computation, New Age International, 6th Edition.
4. Rajaraman, Computer Oriented Numerical Method, PHI

MCA2003T: Data Communication and Computer Networking

Unit-1

Introduction to computer networks, advantage of networking, network architecture & strategies. Data transmission: concept and terminology (data and signal), Analog and digital data transmission, transmission impairments.

Unit- II

Transmission media : guided v/s unguided transmission media, multiplexing ; TDM, FDM, SDM & WDM types of network : LAN (Star, Ethernet, BUS), VLAN, MAN ,WAN: Configuration, topology ,network hardware (hub, bridge, switch and router).

Unit-III

Principles and purpose of layered approach, ISO-OSI model, protocols and their standards, protocol architecture, different layers and their functions of OSI model, Introduction to TCP/IP models.

Network switching: circuit switching, packet switching; routing and congestion control.

Unit- IV

Network technologies: ATM, Frame relay network, DSL ,cable modem system ,ISDN, SONET/SDH: architecture and functions.

Unit -V

Network management: – functions SNMPV1: architecture and models, Internetworking, Concept of DNS, URL and models RMON. Issues related to network reliability and security, SSL, firewalls, encryption / decryption and data compression, concept of cyber laws and cyber crimes.

Text / Reference Books

1. Stallings William, Data and Computer communications, Prentice Hall of India, 5th edition.
2. Andrew S., Tanenbaum, Computer Networks, (Prentice) Hall, 4th Edition.
3. Forouzon, A. Behrouz, Data Communications & Networking, McGraw Hill, 5thedition.
4. Peterson & Dovie, Harcoert, Computer Network: A system approach, 3rd edition, 2005.
5. Douglas E. Comer, Computer Networks and Internets, Pearson/PHI, 4th edition, 2004.

MCA2004T: Software Engineering

Unit- I

Software engineering concepts, historical perspective, software evaluation, program design paradigms. Software project planning: identifying software scope, resources.

Unit- II

Analysis concept, analysis modeling (behavioral model, data model, functional model), analysis tools & techniques, risk management, project scheduling, tracking Cost estimation : project metrics, cost factors, cost estimation techniques (decomposition, empirical, automated estimation, Delphi).

Unit- III

System design: Design concepts & principles (modularization abstraction, refinement, cohesion, coupling) design methods (structured design, object oriented design, real time system design), Implementation : modern programming language features & characteristics, language classes, coding style, efficiency.

Unit- IV

Software Quality Assurance : Quality factors and criteria, SQA metrics, SQA techniques. Verification and

Validation: software testing methods (WBT, BBT), software testing strategy (Unit testing, integration testing, validation system, testing).

Unit- V

Maintenance: Maintenance characteristics, Maintainability, software reuse, re-engineering, reverse engineering, CASE tools.

Text / Reference books

1. Roger S. Pressman, Software Engineering: A practitioners approach, McGraw Hill, (Third and Forth Edition), 1992.
2. Pankaj Jalote , An Integrated approach to Software Engineering, Narosa publishing House.
3. H. Sommervill Ian , Software Engineering, Addition Wesley Pub. Co.
4. Fairley Richard , Software Engineering Concepts, McGraw Hill, 1985.
5. Braude, E.J., Software Engineering: An object Oriented Perspective, Willey, 2001.

Semester-III

MCA3001T: Information and Network Security System

Unit-I

Basic Security Concept, Computer Security, Threats to Security, attacks, Security services & Mechanisms, Communication Security-Encryption, Classical Encryption Model, Steganography.

Unit-II

Cryptography- transposition/ substitution, Caesar Cipher, Cryptosystem, Symmetric and Asymmetric crypto primitives, Private Key Cryptography, Block Cipher Principles, Data encryption Standards, Encryption and Decryption using round functions, AES, Triple DES, Random number generation, Key distribution.

Unit-II

Message Authentication and hash functions-message digest, strong and weak collision, message authentication code, MD5, Hash functions, Secure Hash algorithm (SHA), Birthday paradox, digital signature, Digital signature standards (DSS).

Unit-IV

Public Key Cryptography – Number Theory: Euclidean algorithm, Euler Theorem, Fermat theorem, Totent function, multiplicative and additive inverse. Principles of Public key cryptography, Public Key infrastructure (PKI), RSA algorithm, Key management, Elliptic Curve cryptography, Diffie Hellman Key Exchange.

Unit-V

Network and System Security – Network Attacks, IP Security (IPSec): AH & ESP, Web security: SSL /TLS, Kerberos, E-mail Security: Pretty good Privacy (PGP), S/Mime, Network scanning, System security: intruders, viruses, firewall Design Principles, Intrusion Detection system (IDS), Concept of Cyber Security.

Text/Reference Books

1. William Stallings, Cryptography and Network Security, Pearson Education, 6th edition, 2013.
2. Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw Hill.
3. Atul Kahate, Cryptography and Network Security, McGraw Hill Education India (Pvt. Ltd.) 2nd edition, 2009.
4. Micki Krause & Harold F.Tipton, Handbook of Information Security Management, Vol. – 3, CRC Press LLC, 2004.

MCA3002T: Programming with JAVA

Unit- I

An overview of Java, JVM, byte code, Java class libraries, Data types, Variable, Data types and casting, Operators, operator precedence and Control statements.

Unit- II

Declaring object reference variable, Introducing methods, constructors, the key word, garbage collection, Overloading methods, String handling, and String buffer.

Unit-III

Inheritance and polymorphism: super class and subclass, protected members, Relationship between super and sub class. Inheritance hierarchy, abstract classes and methods, final methods and classes, nested classes, Packages and Interfaces: Defining a package, importing package, defining an interface, implementing and applying interfaces.

Unit- IV

Exception Handling: Fundamentals, exception types, using try and catch. File handling: Character based file and binary file, Multithreaded Programming: Creating a single and multiple threads, thread priorities, synchronization.

Unit-V

Applets: Applets basics, applets architecture, applets skeleton, the html applet tag, passing parameters in applets, event-handling: event classes and event listener interfaces, introduction to swing and servlets.

Text/Reference Books
1. P. Naughton and H. Schildt, Java 2: The Complete Reference, Tata Mc-Graw Hill. (Pdf available).
2. Patrick Naughton, Michael Morrison, The Java hand books, Osborne/McGraw-Hill
3. David Flanagan, Java in a Nutshell: A Desktop Quick Reference for Java Programmers, O'Reilly& Associates, Inc.
4. E. Balaguruswamy, Programming with Java: A Primer, TMH. (Pdf available).
5. Cay Horstmann, Big Java, Wiley India edition, 2nd Edition.
6. Dietel and Dietel, Core Java, Pearson/Prentice Hall , 7th Edition.
7. Rajkamal, Internet and Web-Technologies, TataMcGraw-Hill, 6th Edition, 2011.

MCA3003T: Theory of Computation

Unit - I :

Introduction Basic Concepts: Symbols, Strings, Language, Formal Language, Natural Language. Basic Machine and Finite State Machine. Finite Automata: Definition and Construction – Deterministic Finite Automata, Non Deterministic Finite Automat, NFA with Epsilon-Moves, Equivalence of NFA and DFA, Minimization of Finite Automata, Concept of Generalized non-deterministic finite automata.

Unit - II :

Regular Expressions, Regular Grammar and Languages Definition and Identities of Regular Expressions, Regular Grammar and Finite Automata: FA to RG and RG to FA, Left Linear and Right Linear Grammar and Inter-conversion between them. Closure Properties of Regular Languages, Non-regular languages and Pumping Lemma.

Unit - III :

Context Free Grammar and Languages Definition and Construction of CFG, Definition, Parse tree, derivation, ambiguity, Ambiguous Grammar and Removal of Ambiguity. Simplification of Grammar. Normal Forms of Grammar: Chomsky normal form and GNF. Non-Context Free Languages, pumping lemma.

Unit - IV :

Pushdown Automata Definition and Construction of Deterministic pushdown automata (DPDA) and Non-Deterministic pushdown automata (NPDA). Pushdown Automata - Examples and Relation with CFGs, Equivalence of PDAs and CFGs, Closure Properties of CFLs.

Unit - V :

Turing Machines & Decidability Definition and Construction of Turing Machines. Languages of TM. Types of TM. Time Complexity of TM, Halting Problem, Decidability/ undecidability

Text/Reference Books

1. Hopcroft J.E. and Ullman J., Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, 1988. (Pdf available).
2. Derickwood, Theory of Computation, Harper & Row Publishers, New York, 1987.
3. Lewis H.R. & Papadimitriou C.H, Elements of the Theory of Computation, Prentice Hall International Inc. 1981.
4. Michal Sipear, MA, Introduction to the Theory of Computation,. Thomson course technology, 2nd edition, 2006.
5. J. Hopcroft, R. Motwani and Jeffery Ullman, Automata Theory, language and Computation, Addison wisely, 3rd edition, 2013.
6. K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science: Automata, Language and computation, PHI Learning Pvt. Ltd.

MCA3004T: Design and Analysis of Algorithms

Unit-I

Algorithms and structured programming, analysing algorithms, asymptotic behaviour of an algorithm, Order notations, time and space complexities (polynomial, logrithmic and exponential), average and worst case analysis, lower and upper bounds.

Unit-II

Advanced data structures: Threaded trees, B-trees, Heaps and heap sort, sets and relations, Graphs, Hashing. Basic search & Traversal Techniques (Breadth first and Depth first traversals of Graphs).

Unit-III

Algorithm design strategies: Divide and conquer, Merge sort, Quick sort, matrix multiplication. Greedy method: General method, knapsack problem, job sequencing with deadlines, minimum cost spanning trees). Dynamic programming (0/1 knapsack, travelling salesman problem).

Unit-IV

Backtracking: 8 - Queens problem, Sum of Subsets, Graph coloring, 0/1 Knapsack. Branch & Bound 0/1 knapsack, Travelling salesman.

Unit-V

Approximation algorithms: Polynomial Time Approximation Schemes. Complexity: - NP-Hard and NP- complete Problems - Cook's theorem, NP completeness reductions.

Text/Reference Books

1. E. Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publications, 1985.
2. Aho, J.E. Hopcroft, & J.D. Ullman, Design & Analysis of Computer Algorithms, Addition Wesley, 1974.
3. P.Berlions & P. Bizard, Algorithms - The Construction, Proof & Analysis of Programs, John Wiley & Sons, 1986.
4. K. Melhorn, Data Strucures and Algorithms, Vol. I & II, Springer Verlag, 1984.
5. Charles E. Leiserson, Clifford Stain, Ronald Rivest and Thomas H. Cormen, Introduction to Algorithms, 3rd Edition, PHI Learning pvt. Ltd. (Pdf available).

MCA3009T: Big Data Analytics

UNIT I :

INTRODUCTION TO BIG DATA AND HADOOP Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II :

HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III :

Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Unit IV :

Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction

UNIT V :

Data Analytics with python Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with python.

Text/References books:

1 Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2 Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
3 Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.
4 Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP, 2012.
5 Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

MCA3010T: Cloud Computing

Unit -I

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

Unit -II

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

Unit -III

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

Unit -IV

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

Unit -V

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers
– Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Text/Reference books

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing for Dummies" (Wiley India Edition),2010
2. John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010.
3. Antohy T Velte ,Cloud Computing : "A Practical Approach", McGraw Hill,2009
4. Michael Miller, Cloud Computing: "Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
5. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

MCA3011T: MACHINE LEARNING

Unit:I

Machine Learning: Introduction, Types of machine learning, Application of machine learning.

Unit:II

Nearest Neighbour Methods, Validation: Nearest neighbour prediction, K-nearest methods, Weighted Neighbour methods.

Unit-III

Probability, Matrix, Random variable, Conditional probability, Bayes' theorem, Over fitting.

Unit-IV

Linear classification: Characterizing a linear classifier, Training a linear classifier, Logistic regression.

Unit-V

Decision Trees, Decision tree classifiers, K-means, Hierarchical Clustering,

Reference Books:

1. Hastie, Tibshirani, and Friedman, The Elements of Statistical Learning
2. Barber, Bayesian Reasoning and machine learning
3. Tom M. Mitchell, machine learning

Semester-IV

MCA4001T: **Computer Graphics**

Unit-I
Introduction to Graphics systems, Basic elements of Computer graphics, Applications of computer graphics. Graphics Hardware: Architecture of Raster and Random scan display devices, input/output devices.

Unit-II
Fundamental Techniques in Graphics: Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling

Unit-III
2D and 3D Geometric Transformations; translations, rotation, scaling, shearing, reflection, composite transformation

Unit-IV
Projections, Vanishing points. Geometric Modeling: Representing curves & Surfaces. Visible Surface determination: Hidden surface elimination. Surface rendering: Illumination and shading models.

Unit-V
Basic color models and Computer Animation, and a case study of a popular graphics software.

Text/Reference Books

1. D. Hearn & P. Baker, Computer Graphics – C version, Pearson Education, 2nd edition, 2004.
2. Steven Harrington, Computer Graphics: A programming Approach, McGraw-Hill Inc.,US
3. David F. Rogers, J. Alan Adams, Mathematical elements for computer graphics, McGraw Hill
4. David F. Rogers, Procedural elements for Computer Graphics, McGraw Hill
5. James D. Foley, Andries Van Dam et.al., Computer Graphics –Principles and Practice, Pearson education 2nd edition,2007.
6. B.M. Havaldar, Computer Graphics & Project, Anmol Publications.

MCA4002T: Operating System

Unit- I

Operating system as resource Manager: Overview of processor management, memory management, file management, Device management; operating system services; operating system classifications-single user, multiuser, multiprocessing, batch processing, time sharing, real time operating system.

Processor management: Process overview, process states, multiprogramming, levels of schedulers and scheduling algorithms, multi-processor scheduling, deadlock prevention, avoidance, detection and recovery.

Unit- II

Memory management**:** Partition, paging and segmentation; types of memory management schemes, virtual memory-demand paging, procedure sharing, run time storage allocation.

File Management**:** File supports, access methods, allocation methods- continuous, linked and index allocation; directory systems-single level, tree structured, acyclic graph and general graph directory, file protection, layered file system.

Unit- III

Resource Protection: Mechanism, policy and domain of protection, access matrix and its implementation, dynamic protection structure.

Unit- IV

Device Management**:** Dedicated, shared and virtual devices, sequential access and direct access devices , channel and control units, I/O buffering, I/O schedulers, spooling system.

Unit – V

Concurrent Process and Programming: Precedence graph, Bernstein condition, process hierarchy, process synchronization-critical section and mutual exclusion, classical process co-ordination problems, critical region, monitors, concurrent languages.

Text/Reference Books
1. A.Silberschatz, PterB. Galvin and G.Gagne, Operating System Concepts, Principles, Wiley India Ltd., 6 edition.
2. Andrew S. Tannenbaum, Modern Operating Systems, Pearson Edition, 2nd edition, 2004.
3. Gary Nutt, Operating Systems, Pearson Education, 3rd Edition, 2004.
4. Harvey M. Deitel, Operating Systems, Pearson Education, 3rd edition, 2004.
5. A. M. Lister, Fundamentals of Operating Systems, Springer Science+Business Media, LLC
6. D.M. Dhamdhere, Operating systems : A Concept Based Approach, Tata McGraw-Hill Edition.

MCA4006T: Wireless Technology

Unit-I

Introduction to wireless Communication System: Evolution, Generations of wireless communication, Wireless transmission concepts: Frequencies, signals, Antennas. Comparison of wireless communication system: Land- Mobile technologies (GSM, CDMA) , Satellite, Personal Communication Systems.

Unit-II

Wireless MAC Protocols: S/F/T/CDMA, CSMA protocols, specialized MAC, Cellular Systems, Spread Spectrum: DSSS & FHSS; Wireless WAN, GSM: Mobile Service, GSM architecture, Radio Interface, Protocols, Localization & Calling, Handover & security.

Unit-II

Wireless LAN: IEEE 802.11 b/a/g: System architecture, Protocol architecture, MAC management; introduction to HIPERLAN. Concept of Bluetooth - IEEE 802.16.

Unit-IV

Mobile IP – Packet delivery – Registration process, Tunneling and Encapsulation, Routing protocols, DHCP, Unicast & multicast Communication, Wireless TCP- Indirect, Snooping & mobile TCP; Introduction to wireless PAN.

Unit-V

Ad-Hoc Networks- (Infrastructure and Ad-Hoc networks) Routing algorithms, Support for mobility WAP, WAP architecture, Transport Security – Transaction protocol, Session protocol, Introduction to pervasive computing-Applications, Devices, Software. Introduction to Mobile Operating System / Android 5.0/ Windows 8.1 and Macintosh OS.

Text/Reference Books

1. Jochen Mobile Schiller. Communications, Pearson Education
2. Stojmenovic HandBook Ivan, of Wireless Networks and Mobile Computing, John Wiley & Sons
3. Theodore S. Rappaport, Wireless Communications: Principles and Practice, Second Edition, Prentice Hall. 2002.
4. Chander Dhawan, Mobile Computing- A System Integrator's Approach, McGraw-Hill
5. William Stallings, Wireless Communication and Networking, PHI, 2003.
6. C. Siva Ram Murthy, B.S. Manoj, Ad-hoc Wireless Networks- Architecture and Protocols, Pearson Education, 2nd Edition, 2005.
7. Raj Kamal, Mobile Computing, Oxford Univ. Press.

MCA4007T: Image Analysis and Computer Vision

Unit-I

The Digitized Image and its Properties: Applications of image processing, image function, image representation, sampling, quantization, color images, metrics and topological properties of digital images, histograms, image quality, noise image.

Unit-II

Image Pre-processing: Pixel brightness transformation, geometric transformation, local pre-processing- image smoothening, zero-crossing, scale in image processing, spatial operation, intensity transformation and spatial filtering, color models, gray scale transformation. Image Restoration: Image degradation and re-storage process.

Unit-III

Morphological properties of image: Erosion and Dilation, opening and closing, basic morphological algorithms.

Segmentation: point, line and edge detection, Threshold detection methods, parametric edge models, edges in multi spectral images, Thresholding, Region based segmentation.

Unit-IV

Image representation and description: Representation, border following and chain codes, boundary descriptors, regional descriptors.

Unit-V

Pattern Recognition Fundamentals: Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model.

Text/Reference Books:

1. Rafel C. Gonzalez Richard E. Woods, Digital Image Processing:, Second edition, Addison-Wisley.

2. A K Jain, Digital Image Processing:, PHI

3. R. M. Haralick, L. G. Shapiro. Computer and Robot Vision.Addison-Wesley, 1993.

4. A. Rosenfeld, A. C. Kak. Digital Picture Processing.Addison-Wesley, 1983

MCA4008T: System Testing

Unit- I

Introduction to Software testing, Error fault, Failure, Incident, Test cases, Test Plan, Software testing processes overview, Incremental testing approach, Test outlines, Limitation of Testing.

Unit- II

Functional Testing: Boundary value analysis, Equivalence Class Testing, Decision Table Based Testing and cause effect – graphing Technique.

Unit- III

Structural Testing: Path Testing, Cyclomatic Complexity, Graph metrics, Data Flow testing, Mutation Testing. Object Oriented Testing: Issues, Class Testing, GUI Testing, Object Oriented Integration and System testing, Testing Web Based Systems

Unit- IV

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, and Integration Testing, System Testing, Debugging, Domain Testing.

Unit – V

Testing Tools: Static Testing Tools, Dynamic testing Tools, and characteristics of Modern Tools.

Building and applying standards to test Documentation: Configuration management, Reviews, Industry Standards – ISO 9001, CMM for Software, IEEE standards.

Text: References:
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
5. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
6. Boris Beizer, "Software System Testing and Quality Assurance," Van Nostrand Reinhold, New York, 1984.

MCA4009T: **Natural Language Processing**

Unit-I

Introduction to Natural Language, Understanding Language as a knowledge base process, Basic linguistics.

Morphology-Types and Parsing, N-gram Model, Maximum Likelihood Estimation, Smoothing techniques on N-gram Model, Words and Word Classes, POS Tagging.

Unit-II

Grammar and Parsing – Top-Down Parsing, Bottom-up Parsing, Dependency Grammar, Parsing Indian Language.

Unit-III

Meaning Representation, First Order Predicate Calculus, Elements of FOPC, Semantics and FOPC, Syntax Driven Semantic Analysis, Principal of Compositionally, Semantic Augmentation of CFG Rules, Robust Semantic Analysis.

Unit-IV

Introduction to Semantic Grammar, Structure of word, Thematic Roles, Word Sense Disambiguation-Selection

Restrictions, Machine Learning Approaches, Dictionary Based Approaches.

Unit-V

Context and World Knowledge: Knowledge Representation and Reasoning. Local Discourse context and Reference. Discourse structure and understanding using World Knowledge, Language Learning and Concept Learning.

Text/Reference Books

1. James Allen, Natural Language Understanding, Pearson Education India.

2. Rich & Knight, Artificial Intelligence, Tata Mc Graw Hill Pub.

3. Dan W. Patterson, Artificial Intelligence: A Modern approach, Pearson Education, India

4. Russell Norwig, Artificial Intelligence: A Modern approach, Pearson Education, India.

5. Jurafsky and Martin, Speech and Language Processing, Prentice Hall, 2000.

MCA4010T: **Artificial Intelligence**

UNIT-I

General Issues and Overview of AI: The AI problems, what is an AI technique? Problem Solving, Search and Control Strategies**:** General problem solving, production systems, control strategies: Forward and backward chaining. Exhaustive searches: Depth and Breadth first search.

UNTT-II

Heuristic Search Techniques: Hill climbing, Branch and Bound technique, Best first search & A* algorithm, AND/ OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems, means ends analysis. Knowledge Representation: First order predicate calculus, skolemization, resolution principle & unification, interface mechanism, Horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-III

AI Programming Language: PROLOG: Introduction, Clauses: Facts, goals and rules. Prolog

unification mechanism, arithmetic operator, list manipulations, Fail and Cut predicates recursion.

UNTT-IV

Planning: Overview-An Example Domain: The block word, component of planning systems, goal stack planning (linear planning), non-linear planning using goal sets. Handling Uncertainty: Probability theory, Bayes theorem and Bayesian networks, Certainty factor, Fuzzy Logic.

UNIT-V

Natural Language Processing: Parsing techniques, context-free grammar, Case and Logic grammars, Semantic Analysis. Expert Systems: Introduction to expert system, knowledge acquisition, case studies: MYCIN.

Text / Reference books

1. , Elaine Rich and Kelvin Knight, Artificial Intelligence, Tata McGraw Hill.

2. D.W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India.
3. W. F. Clocksin, C. S. Mellish, Programming in PROLOG, Narosa Publishing.
4. Timothy J. Ross, Fuzzy logic with Engineering Applications, McGraw Hill, 1995.
5. Melnaic Mitchell, An Introduction to Generic Algorithm, PHI, 1998.

MCA4011T: Software Project Management

Unit-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.

Unit-2

Planning the Project: Business Planning, Types of Plans, Plan documentation methods, Determining Objectives,Forecasting demand for the Product, Proposal Writing, Requirements analysis. Technical Planning: Work breakdown structures, PERT and CPM, Gantt Charts, Standards.

Unit-3

Planning for Risk Management and Control, Entry and Exit criteria, Intermediate checkpoints, Performance prediction and analysis People, Capacity Planning, Estimating - what it takes to do the job, Cost (direct and indirect), Resources, Time, Size and complexity of the product, Managing the Project, Feedback and Reporting Mechanisms.

Unit-4

Financial planning - budgeting, Resource Allocation, Managing Product Support and adaptive maintenance,restructuring code, flexibility, reusability, reliability, efficiency, quality assurance, Managing Change, Readjusting Goals and Milestones.

Unit-5

Introduction to Software Architectures, Origin and design process of software architectures, Quality attributes, scope of software architecture, architectural styles, and software architectural design.

Text/Reference Books

1. Tom Gilb, Finzi Susannah, "Principles of Software Engineering Management', Addision-Wisley, England, 1988.
2. Paul Clements, et al., 'Documenting Software architectures: Views and beyond', Addision-Wisley, 2002.
3. Mark Norris, Peter Rigby, Malcolm Payne, 'The healthy Software Project-A Guide to Successful Development & Management', John Wiley & Sons, 1993.
4. Jan Bosch, Morven Gentleman, Christine Hofmeister, Juha Kusela, Software Architecture : System Design, Development and maintenance, Kluwer academic Publishers, 1992.
5. Barbee Mynatt, 'Software Engineering with Student Project Guidance', Prentice Hall, New Jersey, 1990.
6. Mary Shaw and David Garlan, 'Software Architecture: Perspectives on an Emerging Discipline', Prentice- Hall, 1996.
7. Neal Whitten, 'Managing Software Development projects', John Wiley, 1995.