

SCHEME OF INSTRUCTION

MCA (MASTER OF COMPUTER APPLICATIONS)

Proposed scheme with effect from the academic year 2017-2018

Semester -III

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PC301IT	Software Engineering	3	1	0	4	30	70	3
2.	PC302IT	Database Management Systems	3	1	0	4	30	70	3
3.	P3303IT	Design and Analysis of Algorithms	3	1	0	4	30	70	3
4.	PC304IT	Operating Systems	3	1	0	4	30	70	3
5.	PC305CM	Operations Research	3	1	0	4	30	70	3

6.	OE#	Open Elective-I	3	0	0	3	30	70	3
Practicals									
7.	PC351IT	Programming Lab V (DBMS Lab)	0	0	3	3	25	50	2
8.	PC352IT	Programming Lab VI (OS Lab)	0	0	3	3	25	50	2
Total			18	5	06	29	230	520	22

Open Elective-I:

1. OE301BM Organizational Behavior
2. OE302BM Professional Ethics
3. OE303LA Intellectual Property Rights and Cyber Laws
4. OE304BT Environmental Science

SCHEME OF INSTRUCTION

MCA (MASTER OF COMPUTER APPLICATIONS)

Proposed scheme with effect from the academic year 2017-2018

Semester - IV

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PC401CS	Data Mining	3	1	0	4	30	70	3
2.	PC402CS	Computer Networks	3	0	0	3	30	70	3
3.	PC403CS	Unix Programming	3	0	0	3	30	70	3
4.	PC404CS	Web Programming	3	0	0	3	30	70	3
5.	PC405CS	Distributed Systems	3	1	0	4	30	70	3
6.	# PE – I	Professional Elective-I	3	0	0	3	30	70	3
Practicals									

7.	PC451CS	Unix Programming Lab	0	0	3	3	25	50	2
8.	PC452CS	Web Programming Lab	0	0	3	3	25	50	2
9.	ITP1	Mini Project	0	0	3	3	25	50	2
Total			21	02	09	32	255	570	24

Professional Elective- I:

1. PE406CS Artificial Intelligence
2. PE407CS Distributed Databases
3. PE408CS Information Retrieval Systems
4. PE409CS Theory of Computation

PC301IT

SOFTWARE ENGINEERING

Credits: 3

Instruction: (3L +1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

The software Problem: Cost, Schedule and Quality, Scale and change,

Software Processes: - Process and project, Component Software Processes, Software Development Process Models, Project management Process.

UNIT-II

Software Requirements Analysis and Specification: Value of a good SRS, Requirements Process, Requirements Specification, Functional Specification with Use Cases, Other approaches for analysis.

Software Architecture: Role of Software Architecture Views, Component and connector view, Architectural styles for C & C view, Documenting Architecture Design, Evaluating Architectures.

UNIT-III

Planning a Software Project: Effort Estimation, Project Schedule and staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling. **Design:** Design concepts, Function oriented Design, Object Oriented Design, Detailed Design, Verification, Metrics.

UNIT-IV

Coding and Unit Testing: Programming Principles and Guidelines, Incrementally developing

code, managing evolving code, unit testing, code inspection, Metrics. **Testing:** Testing Concepts, Testing Process, Black Box testing, White box testing, Metrics.

UNIT-V

Maintenance and Re-engineering: Software Maintenance, supportability, Reengineering, Business process Reengineering, Software reengineering, Reverse engineering; Restructuring, Forward engineering, Economics of Reengineering.

Software Process Improvement: Introduction, SPI process, CMMI, PCMM, Other SPI Frameworks, SPI return on investment, SPI Trends.

Suggested Reading:

1. Pankaj Jalote, "*Software Engineering- A Precise Approach*", Wiley India, 2010.

Roger. S.Pressman , "*Software Engineering - A Practitioner's Approach*", 7th Edition, McGraw Hill Higher Education, 2010.

1. Deepak Jain, "*Software Engineering*", Oxford University Press, 2008.

2. Rajib Mall, "*Fundamentals of Software Engineering*", 4th Edition, PHI Learning, 2014.

3. Ian Sommerville, "*Software Engineering*", 10th Edition, Addison Wesley, 2015.

PC302IT

DATABASE MANAGEMENT SYSTEMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Introduction to DBMS and ER Model: File Systems versus DBMS, Advantages of DBMS, Database Design and E-R Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

The Relational Model: Introduction to Relational Model, Integrity Constraints over Relations, Logical Database Design (ER to Relational), Introduction to Views, Destroying / Altering Tables & Views.

Schema Refinement and Normal Forms: Schema Refinement, Functional Dependencies, Normal Forms, Normalization, Schema Refinement in Database Design.

UNIT-II

Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational Calculus, Expressive Power of Algebra and Calculus.

SQL: Queries, Constraints, Triggers: The Form of Basic SQL Query, Set Operators, Nested Queries, Aggregate Operators, Null Values, Triggers and Active Databases, Designing Active Databases, Accessing Databases from Applications using Embedded SQL, Cursors, Dynamic SQL.

UNIT-III

Overview of Storage and Indexing: File Organizations and Indexing, Index Data Structures, Comparison of File Organizations.

Tree-Structured Indexing: Indexed Sequential Access Method (ISAM), B+ Trees, Search, Insert Delete, B+ Trees in Practice.

Hash-Based Indexing: Static Hashing, Extendible Hashing, Linear Hashing, Extendible versus Linear Hashing.

UNIT-IV

Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control.

Concurrency Control: 2PL, Serializability, and Recoverability, Introduction to Lock Management, Dealing with Deadlock, Specialized Locking Techniques, Concurrency Control without Locking.

UNIT-V

Crash Recovery: Introduction to ARIES, The Log, Other Recovery Related Structures, The WAL, Checkpointing, Recovering from a System Crash, Media Recovery.

Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control, Mandatory Access Control, Additional Issues related to Security.

Suggested Reading:

1. Raghuram Ramakrishnan, Johannes Gehrke, "*Database Management Systems*", 3rd Edition, McGraw Hill, 2003.
Abraham Silberschatz, Henry F Korth, S Sudharshan, "*Database System Concepts*", 6th
1. Peter Rob, Carlos Coronel, "*Database System Concepts*", Cengage Learning, 2008
2. Ramez Elmasri, Durvasul VLN Somayajulu, Shamkant B Navathe, Shyam K Gupta, "*Fundamentals of Database Systems*", 6th Edition, Addison Wesley, 2011.

PC303IT

DESIGN AND ANALYSIS OF ALGORITHMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT I

Introduction to Algorithms: Algorithm Specification, Performance Analysis, Randomized Algorithms. **Elementary Data Structures:** Stacks and Queues, Trees, Dictionaries, Priority Queues, Sets and Disjoint Set Union, Graphs.

UNIT II

Divide and Conquer: Binary Search, Finding the Maximum and Minimum, Merge Sort; Quick

Sort, Selection, Strassen's Matrix Multiplication, Convex Hull. **The Greedy Method:** Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT III

Dynamic Programming: General Method, Multistage Graphs, All-Pairs Shortest Paths, Single-Source Shortest Paths, Optimal Binary Search Trees, 0/1 Knapsack, Reliability Design, The

Traveling Salesperson Problem. **Basic Traversal and Search Techniques:** Techniques for Binary Trees, Techniques for Graphs, Connected Components and Spanning Trees, Biconnected Components and DFS.

UNIT IV

Back Tracking: General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem. **Branch-Bound:** The Method, 0/1 Knapsack Problem, Traveling Sales Person.

UNIT-V

NP-Hard and NP-Complete Problems: Basic Concepts, Cook's Theorem, NP-Hard. Graph Problems, NP-Hard Scheduling Problems, NP-Hard Code Generation, Some Simplified NP-Hard Problems.

Suggested Reading:

1. E Horowitz, S Sahni, S Rajasekaran, "*Fundamentals of Computer Algorithms*", Second Edition, Universities Press, 2007.
2. R. Pannerselvam, "*Design and Analysis of Algorithms*", PHI, 2007.
3. Hari Mohan Pandey, "*Design, Analysis and Algorithm*", University Science Press, 2009.
4. TH Cormen, CE Leiserson, RL Rivert, C Stein, "*Introduction to Algorithms*", Third Edition, PHI, 2010.

PC304IT

OPERATING SYSTEMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT I

Introduction to Operating Systems: OS structure and strategies, Process concept, Interprocess communication, Threads, Multithreaded Programming. **Process Scheduling:** Scheduling Criteria, Scheduling Algorithms, Multi Processor scheduling, Thread Scheduling.

UNIT II

Memory Management: Swapping, Contiguous allocation, Paging, Static and dynamic partition, Demand paging, Page replacement Algorithms, Thrashing, Segmentation, Segmentation with Paging.

File System Interface: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, and Protection.

File System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, and Free Space management, Efficiency and Performance, Recovery.

UNIT III

Process Synchronization: Critical Section Problem, Semaphores, Monitors.

Deadlocks: Necessary conditions, Resource Allocation Graph, Methods for handling deadlocks, preventions, avoidance, detection and recovery.

Protection: Goal, domain of protection, access matrix.

UNIT IV

Device Management: Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID structure and Storage Implementation.

I/O System: I/O hardware, Application TO Interface, Kernel I/O Subsystem, Transforming I/O request to hardware operation, STREAM.

UNIT V

Case Studies: Linux System: Design Principles, Kernel Modules, Process Management, Scheduling Memory Management, File Systems, Input and Output, Inter-Process Communication, Network Structure, Security. **Windows XP:** General Architecture. The NT Kernel, The NT Executive.

Suggested Reading:

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne, "*Operating System Concepts*", 9th Edition, Wiley India, 2016.
2. Andres S Tanenbaum, "*Modern Operating Systems*", 4th Edition, PHI, 2016.
3. Robert Love, "*Linux Kernel Development*", Pearson Education, 2004.
4. William Stallings, "*Operating Systems*", 7th Edition, PHI, 2012.

PC305CM

OPERATIONS RESEARCH

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT I

Linear Programming: Introduction, Concept of Linear Programming Model, Development of LP models, Graphical Method, Linear Programming Methods, Special cases of Linear Programming, Duality, Sensitivity Analysis.

UNIT II

Transportation Problem: Introduction, Mathematical Model for Transportation Problem, Types of Transportation Problem, Methods to solve Transportation Problem, Transshipment Model.

UNIT III

Assignment Problem: Introduction, Zero-One Programming Model, Types of Assignment Problem, Hungarian Method, Branch-and-Bound Technique for Assignment Problem.

Integer Programming: Introduction, Integer Programming Formulations, The Cutting-Plane Algorithm, Branch-and-Bound Technique, Zero-One Implicit Enumeration Algorithm.

UNIT IV

Dynamic Programming: Introduction, Applications of Dynamic Programming, Solution of Linear Programming Problem through Dynamic Programming.

UNIT V

Game Theory: Introduction, Game with Pure Strategies, Game with Mixed Strategies, Dominance Property, Graphical Method for $2 \times n$ or $m \times 2$ Games, Linear Programming Approach for Game Theory.

Suggested Reading:

1. Pannarselvam, "*Operations Research*", 3rd Edition, PHI, 2009.
2. Prem Kumar Gupta, DS Hira, "*Problems in Operations Research*", S. Chand, 2010.
3. Rathindra P Sen, "*Operations Research - Algorithm and Application*", PHI, 2010.
 - a) JK Sharma, "*Operations Research*", Fourth Edition, MacMillan, 2009.

PC351IT

PROGRAMMING LAB – V

(DATABASE MANAGEMENT SYSTEMS LAB)

Credits: 2

Instruction: (3 P) hrs per week

Duration of SEE: 3 hours

CIE: 25 marks

SEE: 50 marks

1 SQLIPL- SQL:

- c) Creation of database (exercising the commands for creation)
- d) Simple to complex condition query creation using SQL plus
- e) Demonstration of blocks, cursors & database triggers.

2. Forms / Reports :

- a Creation of forms for the case study assigned.
- b Creation of Reports based on different queries.
- c Creating password and security features for applications.
- d Usage of file locking and table locking facilities in applications.

Creation of Small full fledged database application spreading over to 3 sessions.

Note :

- 1 Use Case Studies as Library Information Studies, Pay roll System, Bank Information System, Reservation System, Inventory System, etc.
- 2 The creation of Sample database, for the purpose of the experiments is expected to be decided by the instructor based on the case study assigned to the students.
- 3 Oracle DBMS package should be used to carry the Lab experiments.

PC352IT

PROGRAMMING LAB – VI

(OPERATING SYSTEMS LAB)

Credits: 2

Instruction: (3 P) hrs per week

Duration of SEE: 3 hours

CIE: 25 marks

SEE: 50 marks

- a) Printing file flags for specified descriptor.
4. Print type of file for each command line arguments.
5. Recursively descends a director hierarchy counting file types.
6. Program using process related system calls.
7. Programs to create threads.
8. Program using Signals.
9. Echo Server-using pipes.
10. Echo Server-using messages.
11. Producer & Consumer Problem using Semaphores and Shared Memory.
12. Producer & Consumer Problem using message passing.
13. Readers and Writers Problem using message passing.

14. Dining Philosopher's problem using semaphores.
15. Program using File Locking.
16. Understanding and submitting and assignment on RC scripts.
17. Programs using shell script

OE301BM

ORGANIZATIONAL BEHAVIOR

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT I

Management Process and Functions, Scientific and Modern Management, 3D Model of Managerial Behavior - MBO - MBWA - Line and Staff - The Peter's Principle - Parkinson's Law - Approaches to Organisation Structure-Management - Classical, Human Relations, Systems and Contingency Approaches, Hawthorne's Experiments - Human Engineering.

UNIT II

Decision Making and Negotiations: Approaches to Decision making - Rational, Behavioral, Practical, and Personal Approaches - Open and Closed Models of Decision Making, Types and steps in planning, Authority, Responsibility, Centralisation, Decentralisation and Recentralisation, Bureaucracy.

UNIT III

Psychological contract - Personality Traits, Big 5 personality traits, MBTI inventory, the Process of Perception - Perceptual distortions and errors, Kelly's personal construct Theory, Motivation-Content Theories: Maslow, Alderfer, Herzberg, McClelland. Process Theories: Vroom, Potter and Lawler, Equity Theory - Goal Theory - Attribution Theory.

UNIT IV

Models of Organization Behaviour - Autocratic, Custodial, Supportive, Collegial and System Models, Transactional Analysis, Johari Window. Group Dynamics: Typology of Groups - Conflicts in groups - The nature, of conflict - Reactions to conflict - A model of conflict. Trait and Behavioral Approaches to Leadership, Managerial Grid, Path-Goal Theory, Vroom's Decision Tree Approach to Leadership - Hersey and Blanchard Model.

UNIT V

Organization Design, Organization culture and Organisation climate, Stress Management and Counseling, Management of change and Organisation development. Communication - Emerging aspects of OB.

Suggested Reading:

- a) Harold Koontz and Heinz Weihrich, *Essentials of Management*, 9th Edition, McGraw Hill Education, 2015.
- ☐ Curtis W. Cook and Phillip L. Hunsaker, *Management and Organisational Behaviour*, 3rd Edition, McGraw-Hill, 2010.

1. Robbins & Judge, *Organisational Behaviour*, Prentice Hall of Indi, 2010.
2. Gregory Moorhead and Ricky W. Griffin, *Organisational Behaviour*, 2010
3. VSP Rao, V. Harikrishna, *Management - Text and Cases, Excel Books* ,2010.
4. K. Aswathappa, *Organisational Behaviour - Text, Cases and Games*, Himalaya Publishing House, 2010.
5. Udai Pareek, *Understanding Organisational Behaviour*, Oxford University Press,2010.
6. Lauriel J Mullins, *Management & Organisational Behaviour*, Pearson, 2010.
7. Robin Finchem and Peter Rhodes, *Principles of Organisational Behaviour*, Oxford University Press, 2010.
8. B.R. Virmani, *Managing People in Organisations*, Response Books, 2010.

OE302BM

PROFESSIONAL ETHICS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Development of Legal Profession in India — Advocates Act, 1961 — Right to Practice — a right or privilege? -- Constitutional guarantee under Article 19(1) (g) and its scope — Enrolment and Practice — Regulation governing enrolment and practice — Practice of Law — Solicitors firm — Elements of Advocacy.

UNIT-II

Seven lamps of advocacy — Advocates duties towards public, clients, court, and other advocates and legal aid ; Bar Council Code of Ethics.

UNIT-III

Disciplinary proceedings --- Professional misconduct — Disqualifications — Functions of Bar Council of India/State Bar Councils in dealing with the disciplinary proceedings — Disciplinary Committees -- Powers and functions - Disqualification and removal from rolls.

UNIT-IV

Accountancy for Lawyers - Nature and functions of accounting — Important branches of accounting — Accounting and Law – Bar - Bench Relations.

UNIT- V

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Suggested Reading:

1. Myneni S.R, *Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation*, Asia
2. Gupta S.P, *Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation*, Asia Law House, Hyderabad.
1. Kailash Rai, *Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation*, Allahabad Law Agency.
2. Siroh, *Professional Ethics*, Central Law Publications, Allahabad.
3. Ramachandra Jha, *Selected Judgements on Professional Ethics*, Bar Council of India Trust.

2002.

6. Dr. G.B. Reddy, *Practical Advocacy of Law*, 2nd Ed, Gogia Law agency, Hyderabad, 2005.

OE303LA INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Meaning, Nature, Classification and protection of Intellectual Property — The main forms of Intellectual Property — Copyright, Trademarks, Patents, Designs (Industrial and Layout) -- Geographical Indications - Plant Varieties Protection and Biotechnology

UNIT-II

Introduction to the leading International instruments concerning Intellectual Property Rights — The Berne Convention — Universal Copyright Convention — The Paris Union — Patent Co-operation Treaty -- The World Intellectual Property Organization (WIPO) and the UNEESCO, International Trade Agreements concerning IPR — WTO — TRIPS.

UNIT-III

Select aspects of the Law of Copyright in India--- The Copy Right Act,1957 - Historical evolution

— Meaning of copyright — Copyright in literary, dramatic and musical works, computer programmes and cinematograph films — Neighbouring rights — Rights of performers and broadcasters, etc. — Ownership and Assignment of copyright — Author's special rights — Notion of infringement — Criteria of infringement -- Infringement of copyright in films, literary and dramatic works — Authorities under the Act — Remedies for infringement of copyright.

UNIT-IV

Intellectual Property in Trademarks and the rationale of their protection - The Trade Marks Act, 1999 — Definition of Trademarks — Distinction between Trademark and Property Mark - Registration — Passing off — Infringement of Trademark — Criteria of Infringement — Remedies. The Designs Act, 2000 -- Definition and characteristics of Design — Law in India — Protection and rights of design holders -- Copyright in design — Registration — Remedies for infringement.

UNIT-V

Patents — Concept of Patent — Historical overview of the Patents Law in India — Patentable Inventions — Kinds of Patents — Procedure for obtaining patent — The Patents Act, 1970 — Rights and obligations of a patentee — Term of patent protection — Use and exercise of rights — Exclusive Marketing Rights — Right to Secrecy — The notion of 'abuse' of patent rights — Infringement of patent rights and remedies available.

Suggested Reading:

- 1) P. Narayanan, *Patent Law*, Eastern Law House, 1995.
- 2) Roy Chowdhary, S.K. & Other, *Law of Trademark, Copyrights, Patents and Designs*, Kamal Law House, 1999.
- 3) Dr. G.B. Reddy, *Intellectual Property Rights and the Law*, 5th Edition, Gogia Law Agency, 2005.
- 4) John Holyoak and Paul Torremans, *Intellectual Property Law*, Oxford University Press, 8th Edition, 2016.
- 5) B.L. Wadhera, *Intellectual Property Law*, 2nd Edition, Universal Publishers, 2000.
- 6) W.R. Cornish, *Intellectual Property Law*, 3rd Edition, Universal Publishers, 2001.

OE304BT

ENVIRONMENTAL SCIENCE

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Environmental Studies: Introduction - Definition, Scope and Importance - Basic principle of ecosystem functioning - Concept of ecosystem, structure and functioning of ecosystem, introduction and characteristic features, structures and functions, different ecosystems.

Biodiversity and its conservation: Introduction - Bio-geographical classification of India. Value of biodiversity - consumptive and predictive use, social, ethical and optional values. Biodiversity - Global, National and local levels. Hot spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of biodiversity - In-situ and Ex-situ conservant.

UNIT-II

Environmental and Natural Resources: Forest resources - Use and over-exploitation, Deforestation, Timber extraction, Mining and dams - their effects on forests and tribal' people. Water resources - Use and over-utilization of surface and ground water, floods, droughts, conflicts over water, dams - effects of extracting and using mineral resources. Food resources - World food problems - change caused by agricultural and overgrazing, effects of modern agricultural fertilizer pesticide problems, water logging and salinity.

Environmental Valuation: Welfare measure and environmental values, definition and classification of environmental values, valuation methods.

Environmental Economics: Economic approach to environmental preservation and conservation, property rights and externalities, management of natural resources.

UNIT-III

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution.

Environmental Problems in India: Effects of human activities on the quality of life, Water and River, Ground water, Wasteland reclamation.

UNIT-IV

Regional and Sectoral Issues: Urbanization, Agro-forestry, Dry lands, Goods and services, Mountain development, River basin water resources management. sustainable tourism, and Coastal zone management.

Environment and Development: The economy and environment interaction, State of the Environment - Economics of development; Preservation and conservation.

Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles - Role of an individual in prevention of pollution.

Human Population and the Environment: Population growth and environment - Human Rights. **UNIT-V**

Social Issues and the Environment: Sustainable Development - Resettlement and rehabilitation of people and its problems and concerns.

Environmental ethics: Issues and possible solutions-Consumerism and waste products - Public awareness.

Sustainable resources management.

Design of Environmental Policy -- Direct regulation by Government - Command and control instrumentation.

Suggested Reading:

1. B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji & K. Purushottam Reddy, *An Introduction to Environmental Studies*, Maruti Publications.
2. C.Manohar Chary and P.Jayaram Reddy, *Principles of Environmental Studies*, B.S. Publications, Hyderabad.
- 3.Y.Anjaneyulu, *Introduction to Environmental Science*, B.S. Publications, Hyderabad.
4. P.D. Sharma, *Ecology and Environment*, Rastogi Publications.

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MCA (MASTER OF COMPUTER APPLICATIONS)

Proposed scheme with effect from the academic year 2017-2018

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Theory									
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3.	PC403IT	Unix Programming	3	0	0	4	30	70	3
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5.	PC405IT	Distributed Systems	3	1	0	4	30	70	3
6.	# PE – I	Professional Elective-I	3	0	0	3	30	70	3

Practicals									
7.	PC451IT	Unix Programming Lab	0	0	3	3	25	50	2
8.	PC452IT	Web Programming Lab	0	0	3	3	25	50	2
9.	ITP1	Mini Project -I	0	0	3	3	25	50	2
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Professional Elective- I:

1. PE406CS Artificial Intelligence
2. PE407CS Distributed Databases
3. PE408CS Information Retrieval Systems
4. PE409CS Theory of Computation

PC401IT

DATA MINING

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Introduction: Challenges – Origins of Data Mining and Data Mining Tasks. Data: Types of Data

– Data Quality – Data Preprocessing – Measures of Similarity and Dissimilarity – OLAP and Multidimensional Data Analysis

UNIT-II

Classification: Preliminaries – General approach to solving a classification problem – Decision tree induction – Model overfitting – Evaluating the performance of a classifier – Methods of comparing classifiers - Rule-based classifier

UNIT-III

Classification: Nearest-Neighbor classifiers – Bayesian classifiers – Artificial Neural Networks – Support vector machine – Ensemble methods – Class imbalance problem – Multiclass problem

UNIT-IV

Association Analysis: Problem definition – Frequent item set generation – Rule generation – Compact representation of frequent item sets – Alternative methods for generating frequent item sets – FP-Growth Algorithm – Evaluation of association patterns – Effect of Skewed support distribution – Handling categorical attributes – Handling continuous attributes – Handling a concept hierarchy

UNIT-V

Cluster Analysis: Overview – K-means – Agglomerative hierarchical clustering – DBSCAN – Cluster evaluation – Characteristics of Data, Clusters, and Clustering Algorithms

Suggested Reading:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*, Pearson Education, 2008.
2. K.P.Soman, Shyam Diwakar, V.Ajay, *Insight into Data Mining Theory and Practice*, PHI, 2010.
3. Arun K Pujari, *Data Mining Techniques*, University Press, 2nd Edn, 2009.
4. Vikram pudi P. Radha Krishna , *Data Mining*, Oxford University Press, 1st Edition 2009
Galit S, Nitin RP, Peter C Bruce. *Data Mining for Business Intelligence*. Wiley India Edition,2007.

PC402IT

COMPUTER NETWORKS

Credits: 3

Instruction: (3L) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Data Communications : Components - Direction of Data flow - networks -Components and Categories - types of Connections - Topologies -Protocols and Standards - ISO/OSI model, TCP/IP. Transmission Media - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing.

UNIT II

Datalink Layer : Error detection and correction, CRC, Hamming code, Flow Control and Error control - stop and wait - go back-N ARQ - selective repeat ARQ-sliding window - HDLC.

Mac Layer : LAN - Pure and Slotted ALOHA, Ethernet IEEE 802.3 -IEEE 802.4 -IEEE 802.5, Bridges.

UNIT-III

Network Layer : Internetworks - virtual circuit and Datagram approach, Routers IP addressing, Subnetting, CIDR.

Routing - Distance Vector Routing, Link State Routing, OSPF and BGP.

UNIT-IV

Transport Layer : Services of transport layer, Multiplexing. Transmission Control Protocol (TCP)

1. Congestion Control, tinier management, Quality of services (QOS) and User Datagram Protocol (UDP)

UNIT-V

Application Layer : Domain Name Space (DNS) - SMTP - FTP - HTTP - WWW.

Suggested Reading:

- 1) Andrew S. Tanenbaum, "*Computer Networks*", Pearson Education; Fourth Edition, 2008.
- 2) Behrouz A. Forouzan, "*Data communication and Networking*", Tata McGraw-Hill, 2009.
- 3) James F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", Pearson Education, 2006.

PC403IT

UNIX PROGRAMMING

Credits: 3

Instruction: (3L) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Unix: Introduction, commands, file system, security and file permission, regular expression and grep, shell programming, awk

UNIT-II

The Unix Model, signal, process control, daemon process. **Interprocess Communication:** Introduction, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespacs, message queues, semaphores and shared memory.

UNIT-III

Socket programming, Socket address, elementary socket system calls, advanced socket system calls, reserved ports, socked options, asynchronous I/O, Input/ Output Multiplexing, out-off band data, sockets and signals, Internet super server.

UNIT-IV

Introduction to PHP: Overview, syntactic characteristics, primitives, operations and expressions, output, control statements, arrays, functions. pattern matching, form handling files, cookies and session tracking.

UNIT-V

Python Basics, Python Objects, Numbers, Sequences: Strings, Lists, and Tuples, Mapping and Set Types, Conditionals and Loops, Files and Input/Output, Errors and Exceptions, Functions and Functional Programming, Modules, Object oriented programming.

Suggested Reading:

1. Behrouz A. Forouzan and Richard F. Gilberg, "*Unix and Shell Programming: a Text book*" Cengage learning, 2008.
2. W. Richard Stevens, "*Unix Network Programming*", Pearson Education, 2009.
3. Robert W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 2008.
4. Wesley J. Chun, "*Core Python Programming*", Prentice Hall.
5. Sumitabha Das, "*Unix concepts & Applications*", Fourth Edition, Tata McGraw hill, 2006.

PC404IT

WEB PROGRAMMING

Credits: 3

Instruction: (3L) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

HTML: Markup languages, common tags, header, text styling, linking images Formatting text, Unordered lists, nested and ordered list, Tabs-and formatting, Basic forms; Complex forms linking, Meta Tags. Dynamic HTML: Cascading style sheets in line styles, style element External Style sheet, text flow and Box model, user style sheets.

UNIT-II

Object model and collections: Object referencing, collections all, children frames, navigator object. Event model: ONCLICK, ONLOAD, Error Handling, ON ERRORS ONMHOUSEMOVE, ONMUSEOVER, ONMOUSEOUT, ONFOCUS, ONBLUR, ONSUBMIT. Dynamic HTML: Filters and transitions, Data binding with Tabular data control binding to IMO, TABLE, Structured graphics, Active controls.

UNIT-III

Introduction to scripting, Java Script, Data types, Arithmetic's Equality relational, assignment increment, decrement operators, Java Script Control Structures- if, if-else, while. Java Script Control Structures: For, Switch, Do/while, break.

Programming modules, recursion, recursion vs iteration global functions arrays,. using arrays, Reference and reference parameters, passing arrays to functions, multiplesubscripted arrays, objects-math, string. Boolean and number.

UNIT-IV

Client side scripting with VB Script, operations, Data types and control structures, Functions, Arrays, String manipulations, classes and objects. Web Servers : Personal Web server, Internet information server, Apache Web Server, Installation of a Web Server.

UNIT-V

Active Sever Pages, Client side Scripting vs Server side Scripting, Server side Active X Component, ADO, file system objects, Session tracking, CGI and PERL5, String. Processing and Regular Expressions, Server side includes, Cookies and PERL XML Document Type Definition, XML Parsers, Using XML with HTML.

Suggested Reading:

- 1 Deiterl, Deitel & NIETO, "*Internet & World Wide Web - How to Program*", Pearson Education, Third Edition, 2004.
- 2 Steven Holzner, "*HTML Black Book - Comprehensive Problem Server*", Dream Tech Press, 2000.
- 3 B Sosinsky, V Hilley, "*Programming the Web - An Introduction*", MGH, 2004.

PC405IT

DISTRIBUTED SYSTEMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT -I

Introduction: Definition of Distributed Systems, Goals: Connecting Users and Resources,

Transparency, Openness, Scalability, Hardware Concepts: Multiprocessors, Homogeneous

Multicomputer systems, Heterogeneous Multicomputer systems, Software Concepts: Distributed Operating Systems, Network Operating Systems, Middleware, The client-server model: Clients and Servers, Application Layering, Client-Server Architectures.

UNIT-II

Communication: Layered Protocols, Lower-Level Protocols, Transport Protocols, Higher-Level

Protocols, Remote Procedure Call: Basic RPC Operation, Parameter Passing. Extended RPC Models, Remote Object Invocation: Distributed Objects, Binding a Client to an Object; Static versus Dynamic Remote Method Invocations, Parameter Passing, Message Oriented Communication: Persistence and synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented' Persistent Communication, Stream Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

UNIT-III

Process: Threads: Introduction to Threads, Threads in Distributed Systems, Clients: user

Interfaces, Client-Side Software for Distribution Transparency, Servers: General Design Issues,

Object Servers, Software Agents: Software Agents in Distributed Systems, Agent Technology,

Naming: Naming Entities: Names, Identifiers, and Address, Name Resolution, The Implementation of a Name System, Locating Mobile Entities: Naming versus Locating Entities, Simple Solutions, Home-Based Approaches, Hierarchical Approaches

UNIT-IV

Distributed Object based Systems: CORBA: Overview of CORBA, Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance, Security, Distributed COM: Overview of DCOM, Communication, Processes, Naming, Synchronization, Replication, Fault Tolerance, Security, GLOBE: Overview of GLOBE, Communication, Process, Naming, Synchronization, Replication, Fault Tolerance, Security, Comparison of COREA, DCOM, and Globe: Philosophy. Communication. Processes. Naming. Synchronization. Caching and Replication, Fault Tolerance. Security.

UNIT-V

Distributed Multimedia Systems: Introduction. Characteristics of Multimedia Data. Quality of

Service Management: Quality of Service negotiation. Admission Control. Resource Management:

Resource Scheduling.

Suggested Reading:

2. Andrew S. Tanenbaum and Van Steen, *Distributed Systems* . PHI, 2nd Edition, 2010.
3. Colouris G, Dollimore Jean, Kindberg Tim, *Distributed Systems Concepts and Design*, 5th Edition Pearson Education, 2011.

PC451IT

PROGRAMMING LAB – VII

(Unix Programming Lab)

Credits: 2

Instruction: (3 P) hrs per week

Duration of SEE: 3 hours

CIE: 25 marks

SEE: 50 marks

1. Examples using Shell scripts.
2. Programming using IPC.
3. Socket programs.
4. PHP Programs using form handling using cookies.
5. Develop Python programs for the following: (Prerequisite)

Demonstrate user-defined functions

Demonstrate Control Structures

Demonstrate Caching a Template Fragment

Programs based on object oriented design.

Examples using IPC

Echo Server using TCP (Concurrent or Iterative) and UDP

Time of the day server

Talker and Listener

Ping routine

Trace route

Mini DNS

Note: The above experiments [7-12] have to be carried out using socket programming interface. Multi- threading has to be employed wherever it is required.

PC452IT

PROGRAMMING LAB – VIII

(Web Programming Lab)

Credits: 2

Instruction: (3 P) hrs per week

Duration of SEE: 3 hours

CIE: 25 marks

SEE: 50 marks

1. Creating HTML pages to test different Tags.

Headers
Linking Images.
Images as anchor.
Text Formatting.
HTML Table Formatting.
Ordered and Unordered lists.

2. Creation of Frames.

3. Examination result in Java Script.

4. Creation of Quiz program.

5. Usage Data and the methods of Date and Time objects.

6. Floating alerts, aligning text and setting box dimension using CSS.

Demonstrating object hierarchy using collection children.

Using HTML Events.

1. Using Transition & Filters like Flip filter, Chrome filter, Shadow filter etc.,
2. VB script classes and regular expression.
3. Installing Web Server (PWS or IIS).
4. Guest book Active Server pages.
5. Creation of Small full fledged database application using ADO spreading over to 3 sessions.

ITP1

MINI PROJECT-I

Credits: 2

Instruction: (3P) hrs per week

Duration of SEE: 3 hours

CIE: 25 marks

SEE: 50 marks

The students are required to carry out mini project that involves usage of data mining tools, various algorithms to pre process and analysis related to the data mining problems.

The department will appoint a project coordinator who will be incharge of the following:

- A Grouping of students (a maximum of three in group)
- B Allotment of project guides
- X Project monitoring at regular intervals

All the projects are to be evaluated by a monitoring committee comprising of project coordinator and the supervisor on the basis of an oral presentation, demonstration, mini project report and Viva-Voce.

PE406IT

ARTIFICIAL INTELLIGENCE

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT - 1

Introduction: History Intelligent Systems, Foundations of Artificial Intelligence, Sub areas of AI, Applications.

Problem Solving - State - Space Search and Control Strategies: Introduction, General Problem Solving Characteristics of problem, Exhaustive Searches, Heuristic Search Techniques, Iterative - Deepening A*, Constraint Satisfaction.

Game Playing, Bounded Look - ahead Strategy and use of Evaluation Functions, Alpha Beta Pruning.

UNIT – II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Table, A System in Propositional Logic, Resolution, Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT - III

Expert System and Applications: Introduction, Phases in Building Expert Systems Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster - Shafer Theory.

UNIT - IV

Machine - Learning Paradigms: Introduction, Machine learning System, Supervised and Unsupervised Learning, Inductive Learning, Learning Decision Trees, Deductive Learning, Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction Artificial Neural Networks, Single - Layer Feed Forward Networks, Multi - Layer Feed Forward Networks, Radial - Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks

UNIT - V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web.

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

Suggested Reading:

B. Saroj Kaushik, *Artificial Intelligence*, Cengage Learning India, First Edition, 2011.

C. Russell, Norvig, *Artificial Intelligence: A Modern Approach*, Pearson Education, 2nd Edition, 2004.

D. Rich, Knight, Nair , *Artificial Intelligence*, Tata McGraw Hill, 3rd Edition 2009.

PE407IT

DISTRIBUTED DATABASES

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT- I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object-Based and Semistructured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems.

UNIT-II

Relational Model: Structure of Relational Databases, Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra Operations, Null Values, Modification of the Database.

Query Processing : Overview, Measures of query cost, Selection operation, sorting, Join operation, Other operations, Evaluation of Expressions.

UNIT-III

Query Optimization : Overview, Transformation of Relational expressions, Estimating statistics of expression results, Choice of evaluation plans, Materialized views.

Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism, Intraoperation Parallelism, Design of Parallel Systems.

UNIT-IV

Distributed Databases: Reference architecture for DDB, Types of Data Fragmentation, Distribution Transparency for Read-only applications, Distribution Transparency for Update applications, Distributed Database Access Primitives, Integrity Constraints in DDB.

Distributed Database Design: A frame work for Distributed Database Design, The design of Database fragmentation, The allocation of fragmentation.

UNIT-V

Translation of Global Queries to Fragment Queries: Equivalence transformations for queries, Transforming global queries into fragment queries, Distributed grouping and aggregate function evaluation, Parametric queries. **Optimization of Access Strategies:** Access Control Models, Database Security, A framework for query optimization, Join queries, General queries.

Suggested Reading:

II. Silberschatz A, Korth HF, Sudarshan S, *Database System Concepts*, McGraw-Hill International Edition, 5th Edition, 2006.

JJ. Ceri S, Pelagatti G, *Distributed Databases: Principles and Systems*, McGraw-Hill International Edition, 1984.

PE408IT

INFORMATION RETRIEVAL SYSTEMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Introduction to Retrieval. Strategies: Vector Space model, Probabilistic Retrieval.

Strategies Language Models: Simple Term Weights, Non Binary Independence Model.

UNIT-II

Retrieval Utilities: Relevance Feedback, Clustering, N-grams, Regression Analysis, Thesauri.

UNIT-III

Retrieval Utilities: Semantic Networks, Parsing, Cross-Language Information Retrieval:

Introduction, Crossing the Language Barrier.

UNIT-IV

Efficiency: Inverted Index, Query Processing, Signature Files, Duplicate Document Detection.

UNIT - V

Integrating Structured Data and Text: A Historical Progression, Information Retrieval as a Relational Application, Semi-Structured Search using a Relational Schema.

Distributed Information Retrieval: A Theoretical Model of Distributed Retrieval, Web Search.

Suggested Reading:

1. David A. Grossman, Ophir Frieder. "*Information Retrieval - Algorithms and Heuristics*", Springer, 2nd Edition (Distributed by Universities Press), 2004.
2. Gerald J Kowalski, Mark T Maybury. "*Information Storage and Retrieval Systems*", Springer, 2000
3. Soumen Chakrabarti, "*Mining the Web: Discovering Knowledge. from Hypertext Data*", Morgan-Kaufmann Publishers, 2002.
4. Christopher D. Manning, Prabhakar Raghavan, Hinrich SchGtze, "*An Introduction to Information Retrieval*", Cambridge University Press, Cambridge, England,-2009.

PE409IT

THEORY OF COMPUTATION

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Basic concepts of Automata Theory: Alphabets, Strings and Languages, Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA) – Definition, Representation using Transition Tables and State Diagrams, Language of DFA and NFA. NFA with ϵ -transitions, Language of NFA with ϵ -transitions, Equivalence of NFA and DFA

UNIT-II

Regular Expressions and Languages: Introduction, Definition of regular expression, Kleen's Theorem, Equivalence of regular expression and Finite Automata, Pumping Lemma for regular Languages, Closure properties of Regular Languages, Decision properties of Regular Languages, Finite Automata with Output: Moore and Mealy Machine, Equivalence of Moore and Mealy Machines.

UNIT-III

Non-Regular Grammars: Definition of Grammar, Classification of Grammars, Chomsky's Hierarchy. Context Free Grammars (CFG) and Context Free Languages (CFL) - Definition, Examples, Derivation trees, Ambiguous Grammars, Simplification of Grammars, Normal forms of CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumping lemma for CFLs. Push Down Automata (PDA): Definition and Description, Language of PDA and its applications.

UNIT-IV

Turing Machines: Introduction, Basic Features of a Turing Machine, Language of a Turing Machine, Variants of Turing Machine: Multitapes, Nondeterministic Turing Machine, Universal Turing Machine. Turing Machine as Computer of Integer functions, Halting problem of Turing Machine, Church-Turing Thesis

UNIT-V

Undecidability: Introduction, Undecidable problems about Turing Machines, Rice's Theorem, Post's Correspondence problem (PCP) and Modified PCP. Tractable and Intractable Problems: P and NP, NPComplete Problems, Introduction to recursive function theory

Suggested Reading:

- ② John E. Hopcroft, Jeffrey D. Ullman, *Introduction to Automata Theory, Languages and Computation*, Narosa, 1979
- ② J.E.Hopcraft, R.Motwani, and Ullman, *Introduction to Automata theory, Languages and Computation*, 2nd Edition, Pearson Education Asia, 2001.



**FACULTY OF
INFORMATICS, OSMANIA UNIVERSITY**

**CBCS Syllabus of
MCA 3rd YEAR, V & VI- SEMESTER (MASTER OF COMPUTER APPLICATIONS)
(With effect from the Academic Year 2018-19)**



**NIZAM COLLEGE
(AUTONOMOUS)
OSMANIA UNIVERSITY
HYDERABAD – 500 001, TELANGANA**

TABLE OF CONTENT:

SNO	COURSE	SEMISTER	TOTAL PAGES
1	MCA III YR	V	7- 29
		VI	30-31
2	BCA III YR	V	35-44
		VI	46-52

SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2018-2019
Semester -V

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PC501IT	Information Security	3	1	0	4	30	70	3
2.	PC502IT	Object Oriented System Development	3	1	0	4	30	70	3
3.	PC503IT	Big Data Analytics	3	1	0	4	30	70	3
4.	PE#	Professional Elective-II	3	1	0	4	30	70	3
5.	PE#	Professional Elective-III	3	1	0	4	30	70	3
Practicals									
6.	PC551IT	Object Oriented System Development Lab	0	0	3	3	25	50	2
7.	PC552IT	Big Data Analytics Lab	0	0	3	3	25	50	2
8.	PC553IT	Project Seminar	-	-	2	2	25	-	1
Total			15	5	08	28	225	450	20

Professional Elective-II

PE 510 IT Electronic Commerce
 PE 511 IT Human Computer Interaction
 PE 512 IT Software Reuse Techniques
 PE 513 IT XML & Web Services
 PE 514 IT Cloud Computing
 PE 515 IT System Administration

Professional Elective- III

PE 516 IT Soft Computing
 PE 517 IT Mobile Computing
 PE 518 IT Software Project Management
 PE 519 IT Rich Internet Applications
 PE 520 IT Software Quality and Testing
 PE 521 IT Research Methodology

SEMESTER – VI

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1.	ITP2	Project Work	-	-	6	6	50	100	12

SCHEME OF INSTRUCTION

BCA (BACHELOR OF COMPUTER APPLICATIONS)

Proposed scheme with effect from the academic year 2018-19

SEMESTER-V

S.No	Course Code	Course Title	Category	Contact Hour/week			No. of Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		SEE	CIE	SEE	CIE
THEORY											
1	BCA501	Programming using ASP Dot NET	PE	4	0	0	4	3	1	70	30
2	BCA502	Unix Programming	SEC	4	0	0	4	3	1	70	30
3	BCA503	Object Oriented Analysis Design	CC	4	0	0	4	3	1	70	30
4	BCA504	Software Quality Testing	CC	4	0	0	4	3	1	70	30
5.	BCA#	Elective I BCA 510 Mobile Application Development BCA 511 Internet Protocols BCA 512 Data Mining	PE	4	0	0	4	3	1	70	30
PRACTICALS											
6	BCA350	OOSD Lab	PC	0	0	4	2	3	1	50	25
7	BCA351	Unix Programming Lab	PC	0	0	4	2	3	1	50	25
8.	BCA 352	DOT NET Lab	PC	0	0	4	2	3	1	50	25
			TOTAL	20	0	12	32			500	225

SEMESTER - VI

S.No	Course Code	Course Title	Category	Contact Hour/week			Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		SEE	CIE	SEE	CIE
Theory											
1	BCA601	Information Security	CC	4	0	0	4	3	1	70	30
2	BCA602	Advanced JAVA	CC	4	0	0	4	3	1	70	30
3	BCA#	Elective-II BCA 604 Big Data Analytics BCA 605 Artificial Intelligence BCA 606 Cloud Computing	CC	4	0	0	4	3	1	70	30
PRACTICALS											
4	BCA680	Advanced Java Programming-Lab	PC	0	0	4	2	3	1	50	25
5	BCA681	Project work	PC	0	0	6	4	-	-	150	50
TOTAL				12	0	10	16			360	165

PC 501 IT**INFORMATION SECURITY****Credits: 3**

Instruction: (3L +1T) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 marks

UNIT-I

Introduction: History, Critical characteristics of information, NSTISSC security model, Components of an information system, Securing the components, Balancing security and access, The SDLC, The security SDLC. Need for Security: Business needs, Threats, Attacks- secure software development.

UNIT-II

Legal, Ethical and professional Issues: Law and ethics in information security, Relevant U.S laws-international laws and legal bodies, Ethics and information security.

Risk Management: Overview, Risk identification, Risk assessment, Risk control strategies, selecting a risk control strategy, Quantitative versus qualitative risk control practices, Risk management discussion points, Recommended risk control practices.

UNIT-III

Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies.

Security Technology: Firewalls and VPNs, Physical design, Firewalls, Protecting remote connections

UNIT-IV

Security Technology: Intrusion detection, access control and other security tools: Intrusion detection and prevention systems, Scanning and analysis tools, Access control devices.

Cryptography: Foundations of cryptology, Cipher methods, Cryptographic Algorithms, Cryptographic tools, Protocols for secure communications, Attacks on cryptosystems.

UNIT- V

Implementing Information Security: Information security project management, Technical topics of implementation, Non technical aspects of implementation, Security certification and accreditation.

Security and Personnel: Positioning and staffing security function, Employment policies and practices, Internal control strategies. Information security maintenance : Security management models, The maintenance model, Digital forensics

Suggested Reading:

1. Michel E Withman and Herbert J Mattord, Principles and Practices of Information Security, Cengage Learning, 2009.
2. Thomas R Peltier, Justin Peltier, John Blackley, Information Security Fundamentals, Auerbach Publications, 2010.
3. Detmar W Straub, Seymour Goodman, Richard L Baskerville, Information Security, Policy, Processes and Practices, PHI , 2008.
4. Mark Merkow and Jim Breithaupt, Information Security Principle and Practices, Pearson Education, 2007.

PC 502 IT

OBJECT ORIENTED SYSTEM DEVELOPMENT**Credits: 3**

Instruction: (3L + 1T) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 marks

UNIT – I

UML Introduction : , Introduction to UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.

Advanced Structural Modeling : Advanced Classes, Advanced Relationships, Relationships, Interfaces, Types and Roles, Packages, Instances, Object Diagrams , Components.

UNIT – II

Basic Behavioral Modeling: Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams.

Advanced Behavioral Modeling: Events and signals, State Machines, Processes and Threads, Times and space, State Chart Diagrams.

UNIT – III

Architectural Modeling: Artifacts, Deployment Collaborations, Patterns and Frame works, Artifact diagrams, Deployment diagrams, Systems and models.

UNIT – IV

Unified Software Development Process: The Unified Process, The Four Ps, A Use- Case- Driven Process, An Architecture, An Architecture – Centric Process, An Iterative and incremental Process.

UNIT – V

Core Workflows: Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.

Suggested Reading:

1. Grady Booch, James Rumbaugh, Ivor Jacobson,” The Unified Modeling Language – User Guide, “, 2nd Edition, Pearson Education, India, 2007.
2. Ivor Jacobson, Grady Booch, James Rumbaugh, “The Unified Software Development Process”, Pearson Education, India, 2008.

PC 503 IT

BIG DATA ANALYTICS*Credits: 3*

*Instruction: (3L +1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT – I:

Getting an overview of Big Data: Introduction to Big Data, Structuring Big Data, Types of Data, Elements of Big Data, Big Data Analytics, Advantages of Big Data Analytics.

Introducing Technologies for Handling Big Data: Distributed and Parallel Computing for Big Data, Cloud Computing and Big Data, Features of Cloud Computing, Cloud Deployment Models, Cloud Services for Big Data, Cloud Providers in Big Data Market.

UNIT – II:

Understanding Hadoop Ecosystem: Introducing Hadoop, HDFS and MapReduce, Hadoop functions, Hadoop Ecosystem.

Hadoop Distributed File System- HDFS Architecture, Concept of Blocks in HDFS Architecture, Namenodes and Datanodes, Features of HDFS. MapReduce.

Introducing HBase - HBase Architecture, Regions, Storing Big Data with HBase, Combining HBase and HDFS, Features of HBase, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie.

UNIT- III:

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework ,Exploring the features of MapReduce, Working of MapReduce, Techniques to optimize MapReduce Jobs, Hardware/Network Topology, Synchronization, File system, Uses of MapReduce, Role of HBase in Big Data Processing- Characteristics of HBase.

Understanding Big Data Technology Foundations: Exploring the Big Data Stack, Data Sources Layer, Ingestion Layer, Storage Layer, Physical Infrastructure Layer, Platform Management Layer, Security Layer, Monitoring Layer, Visualization Layer.

UNIT – IV:

Storing Data in Databases and Data Warehouses: RDBMS and Big Data, Issues with Relational Model, Non – Relational Database, Issues with Non Relational Database, Polyglot Persistence, Integrating Big Data with Traditional Data Warehouse, Big Data Analysis and Data Warehouse.

UNIT –V:

NoSQL Data Management: Introduction to NoSQL, Characteristics of NoSQL, History of NoSQL, Types of NoSQL Data Models- Key Value Data Model, Column Oriented Data Model, Document Data Model, Graph Databases, Schema-Less Databases, Materialized Views, CAP Theorem.

Suggested Reading:

1. BIG DATA, Black Book TM, DreamTech Press, 2016 Edition.
2. Seema Acharya, Subhasni Chellappan , “BIG DATA and ANALYTICS”, Wiley publications, 2016
3. Nathan Marz and James Warren, “BIG DATA- Principles and Best Practices of Scalable Real-Time Systems”, 2010

PE 510 IT**E- COMMERCE****Credits: 3**

Instruction: (3L +1T) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 marks

UNIT – I

Electronic Commerce – Electronic Commerce Frame Work , Electronic Commerce and Media Convergence, Anatomy of E- Commerce appellations, Electronic Commerce Consumer applications, Electronic Commerce Organization Applications.

Consumer Oriented Electronic Commerce – Consumer- Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumers’s Perspective., Mercantile Models from the Merchants’s Perspective.

UNIT – II

Electronic Payment systems – Types of Electronic Payment Systems, Digital Token – Based Electronic Payment Systems , Smart Cards Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk and Electronic Payment systems , Designing Electronic Payment Systems .

UNIT – III

Inter Organizational Commerce And EDI- Electronic Data Interchange , EDI applications in business, EDI:Legal, Security, and Privacy issues, EDI and Electronic Commerce

EDI Implementation,MIME , and Value added net works.-Standardization and EDI, EDI Software Implementation, EDI Envelope for Message Transport, Value-Added Networks, Internet-Based EDI.

Intraorganizational Electronic Commerce – Internal Information Systems, Work Flow Automation and Coordination, Customization and internal Commerce, Supply chain Management.

UNIT – IV

Corporate Digital Library – Dimensions of Internal electronic Commerce Systems, Types of Digital Documents, Issues behind Document Infrastructure, Corporate Data Warehouse Advertising and Marketing on the Internet – Information based marketing, advertising on Internet, on-line marketing process, market research.

UNIT –V

Consumer Search and Resource Discovery – Search and Resource Discovery paradigms, Information search and Retrieval, Electronic Commerce catalogues or Directories, information filtering, Consumer-Data Interface3:Emerging Tools.

Multimedia and Digital Video- key multimedia concepts, Digital Video and Electronic Commerce, Desktop video processing, Desktop video conferencing.

Suggested Reading:

1. Ravi Kalakota & A . B. Whinstong – “ *Frontiers of Electronic Commerce*”, Pearson Education, India, 2006.
2. Daniel Minoli, Emma Minoli: ” *Web Commerce Technology Handbook*” Tata McGraw Hill 2007
3. J Christopher W, Theodore HKC, *Global Electronic Commerce: Theory and Case Studies.* Universities Press, 2001

PE 511 IT

HUMAN COMPUTER INTERACTION*Credits: 3*

Instruction: (3L) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 marks

UNIT- I

Interaction Paradigms: Computing Environments, Analyzing Interaction Paradigms, Interaction Paradigms

Interaction Frameworks and Styles: Frameworks for Understanding Interaction, Coping with Complexity, Interaction Styles.

UNIT- II

Interaction Design Process: Iterative Design, User-Centered Design, Interaction Design Models, Overview of Interaction Design Models

Discovery: Discovery Phase Framework, Collection, Interpretation, Documentation

Design: Conceptual Design, Physical Design, Evaluation, Interface Design Standards, Designing the Facets of the Interface.

UNIT- III

Design Principles: Principles of Interaction Design, Comprehensibility, Learnability, Effectiveness/Usefulness, Efficiency/Usability, Grouping, Stimulus Intensity, Proportion, Screen Complexity, Resolution/Closure, Usability Goals

Interaction Design Models: Model Human Processor, Keyboard Level Model, GOMS, Modeling Structure, Modeling Dynamics, Physical Models

Usability Testing: Usability, Usability Test, Design the Test, Prepare for the Test, Perform the Test, Process the Data

UNIT- IV

Interface Components: The WIMP Interface, Other Components

Icons: Human Issues Concerning Icons, Using Icons in Interaction Design, Technical Issues Concerning Icons

Color: The Human Perceptual System, Using Color in Interaction Design, Color Concerns for Interaction Design, Technical Issues Concerning Color

UNIT- V

Text: Human Issues Concerning Text, Using Text in Interaction Design, Technical Issues Concerning Text

Speech and Hearing: The Human Perceptual System, Using Sound in Interaction Design, Technical Issues Concerning Sound

Touch and Movement: The Human Perceptual System, Using Haptics in Interaction Design, Technical Issues Concerning Haptics

Suggested Reading:

1. Steven Heim, *The Resonant Interface: HCI Foundations for Interaction Design*, Addison-Wesley, 2007
2. J. Preece, Y. Rogers, and H. Sharp, *Interaction Design: Beyond Human-Computer Interaction*, Wiley & Sons, 2nd Edition, 2007
3. Ben Shneiderman, Catherine Plaisant, *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, Addison-Wesley, 5th Edition, 2009.

PE 512 IT

SOFTWARE REUSE TECHNIQUES*Credits: 3**Instruction: (3L) hrs per week
CIE: 30 marks**Duration of SEE: 3 hours
SEE: 70 marks***UNIT-I**

Software reuse success factors, Reuse driven software engineering business, Object oriented software engineering, applications and component sub systems, use case components, object components.

UNIT-II

Design Patterns – Introduction, Creational patterns, factory, factory method, abstract factory, singleton, builder prototype.

UNIT-III

Structural Patterns- Adapters, bridge, composite, decorator, façade, flyweight, proxy.
Behavioral Patterns – Chain of responsibility, command, and interpreter.

UNIT-IV

Behavioral Patterns – Iterator, mediator, memento, observer, state, strategy, template, visitor, other, design patterns- Whole part, master- slave, view handler, forwarder- receiver, client – dispatcher- server, publisher – subscriber.

UNIT-V

Architectural patterns – Layers, pipes and filters, black board, broker ,model - view controller, presentation- abstraction – control, micro kernel, reflection.

Suggested Reading:

1. Ivar Jacobson, Martin Griss, Patrick Hohson – Software Reuse. Architecture, Process and Organization for Business Success, ACM Press, 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – Design Patterns- Addison, 1995, Pearson Education.
3. Frank Buschmann etc. – Pattern Oriented Software Architecture – Volume 1, Wiley 1996.
4. James W Cooper – Java Design Patterns, a tutorial, Addison 2000, Pearson Education.

PE 513 IT**XML AND WEB SERVICES***Credits: 3**Instruction: (3L) hrs per week
CIE: 30 marks**Duration of SEE: 3 hours
SEE: 70 marks***UNIT- I :**

Introduction : Role Of XML - XML and The Web - XML Language Basics - SOAP - Web Services - Revolutions Of XML - Service Oriented Architecture (SOA).

UNIT- II :

XML Technology : XML Technology, XML - Name Spaces - Structuring With Schemas and DTD - Presentation Techniques - Transformation - XML Infrastructure.

UNIT- III:

SOAP: Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns And Faults - SOAP With Attachments.

UNIT- IV:

WEB Services: Overview - Architecture - Key Technologies - UDDI - WSDL - ebXML - SOAP And Web Services In E-Com - Overview Of .NET And J2EE.

UNIT- V:

XML Security: Security Overview - Canonicalization - XML Security Framework - XML Encryption - XML Digital Signature - XKMS Structure - Guidelines For Signing XML Documents - XML In Practice.

Suggested Reading:

1. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.
2. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, Developing Java Web Services, Wiley Publishing Inc., 2004.
3. Sandeep Chatterjee, James Webber, Developing Enterprise Web Services, Pearson Education, 2004.
4. McGovern, et al., Java Web Services Architecture, Morgan Kaufmann Publishers,2005.
Gustavo A, Fabio C, Harumi K, Vijay M. Web Services: Concepts, Architectures and Applications. Springer (Universities Press), 2004

PE 514 IT**CLOUD COMPUTING***Credits: 3**Instruction: (3L) hrs per week**CIE: 30 marks**Duration of SEE: 3 hours**SEE: 70 marks***UNIT-I**

The Evolution of Cloud Computing: Hardware Evolution, Internet Software Evolution, Establishing a Common Protocol for Internet, Evolution of IPv6, Finding a common method to Communicate Using the Internet Protocol, Building a Common Interface to the Internet.

Cloud Formations: From One Computer to the Grid of Many, Server Virtualization, Parallel Processing, Symmetric Multiprocessing Systems, Massively Parallel Processing Systems.

UNIT II

Web services and the cloud: Communication-as-a-Service(CaaS), Infrastructure-as-a-Service(IaaS), Monitoring-as-a-Service(MaaS), Platform-as-a-Service(PaaS), Software-NIS-a-Service(SaaS)

Building Cloud Networks: The Evolution from the MSP Model to cloud, Computing and Software-as-a-Service, The cloud Data Center, Collaboration, Service-Oriented Architectures as a Step Toward Cloud Computing, Basic Approach to a Data Center-Based SOA

The Role of Open Source Software in Data Centers, Where Open Source Software Is Used
Case Studies: Amazon web services, Google App Engine.

UNIT III

Virtualization: Introduction, types and technologies, Accomplishing Virtualization, importance of virtualization in Cloud Computing,

Case studies: Xen Virtual machine monitor-Xen API, VMware- VMware products- VMware Features, Microsoft Virtual Server-Features of Microsoft Virtual server

UNIT IV

Federation in the Cloud, Presence in the Cloud I Privacy and Its Relation to Cloud-Based Information System. Cloud Security Challenges I Software-as-a-Service Security I Security-as-a-Service, the New MSSP.

UNIT V

Common Standards in Cloud Computing: The Open Cloud Consortium, The Distributed

Management Task Force, Standards of Application Developers I Standards for messaging, Internet Messaging Access. Protocol(IMAP) I Standards for Security.

Examples of End-User Access to Cloud Computing.

Mobile Internet Devices and the Cloud: Mobile Operating Systems for Smartphones. Mobile Platform Virtualization I Collaboration Applications for Mobile Platforms.

Suggested Reading:

1. John W. Rittinghouse, James F. Ransome, *Cloud Computing: Implementation, Management, and Security*, CRC Press 2009.
2. Ivanka Menken , *Cloud Computing Specialist Certification kit Virtualization*,
3. William von Hagen, *Professional Xen Virtualization*, Wrox Publications, First Edition, 2008.
4. Chris Wolf, Erik M. Halter, *Virtualization: From the Desktop to the Enterprise*, Apress, 2005.
5. David Marshall, Wade A. Reynolds, *Advanced Server Virtualization: VMWare and Microsoft Platform in Virtual Data Center*, Auerbach Publications, 2006.

Web Resources:

1. <http://aws.amazon.com>
2. <http://code.google.com/appsengine>

PE 515 IT**SYSTEM ADMINISTRATION***Credits: 3*

*Instruction: (3L) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT- I

Functions of system administration, UNIX: Files, Processes Devices, file system, essential administrative tools: Grep, awk, files and directory commands, starting and shutdown process.

UNIT- II

User accounts, security, managing system resources : System performance, managing CPU usage, memory, disk I/O automating tasks with scripts.

UNIT- III

File system and Disks: Mounting, adding disks, CD-Rom devices, and backup and restore terminals modems and printers.

UNIT- IV

TCP/IP Network Management: TCP/IP networking, adding a new host, NFS/NIS, monitoring the network, E-mail, configuring and building Kernel for Linux.

UNIT- V

Database administration skills covering installation, configuration and tuning a database, administering servers and server groups, managing and optimizing schemas, tables, indexes, and views, creating logins, configuring permissions, assigning roles and performing other essential security tasks, backup and recovery strategies, automation and maintenance.

Suggested Readings:

1. Aeleon Frisch, Essential System Administration, O'Reilly, 1995, Second Edition.
2. Aeleon Frisch, Essential Windows Administration, O'Reilly, 1998, First Edition.
3. Nemeth, Unix System Administration, Pearson Education, 2000.

PE 516 IT**SOFT COMPUTING***Credits: 3**Instruction: (3L) hrs per week**CIE: 30 marks**Duration of SEE: 3 hours**SEE: 70 marks***UNIT-I**

Fundamentals of Neural Networks: Basic Concepts of Neural Networks, Human Brain, Model of an Artificial Neuron, Neural Network Architectures, Characteristics of Neural Networks, Learning Methods, Taxonomy of Neural Network Architectures, History of Neural Network Research, Early Neural Network Architectures, Some Application Domains.

Back Propagation Networks: Architecture of a Back Propagation Network, Back Propagation Learning, Illustration, Applications.

UNIT-II

Associative Memory: Autocorrelators, Heterocorrelators, Wang Et Al's Multiple Training Encoding Strategy, Exponential BAM, Associative Memory for Real-Coded Pattern Pairs, Applications, Recent Trends.

Adaptive Resonance Theory: Introduction, ART1, ART2, Applications, Sensitives of Ordering of Data.

UNIT-III

Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations.

Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based Systems, Defuzzification Methods, Applications.

UNIT-IV

Fundamentals of Genetic Algorithms: Genetic Algorithms: History, Basic Concepts, Creation of Off springs, Working Principle, Encoding, Fitness Function, Reproduction.

Genetic Modeling: Inheritance Operators, Cross Over, Inversion, And Deletion, Mutation Operator, Bit-Wise Operators, Bit-Wise Operators used in GA, Generational Cycle, Convergence of Genetic Algorithms, Applications, Multi- Level Optimization, Real Life Problem, Differences and Similarities Between GA and Other Traditional Methods, Advances in GA.

UNIT-V

Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms: Hybrid Systems, Neural Networks, Fuzzy Logic, and Genetic Algorithms Hybrids, Preview of Hybrid Systems

Genetic Algorithms Based Back propagation Networks: Ga Based Weight Determination, Applications.

Fuzzy Logic Controlled Controlled Genetic Algorithms: Soft Computing Tools, Problem Description of Optimum Design, Fuzzy Constraints, Illustrations, GA in Fuzzy Logic Controller Design, Fuzzy Logic Controller, FLC-GA Based Structural Optimization, Applications.

Suggested Reading:

1. S.Rajasekaran, G.A. Vijayalakshmi Pai, Neural Networks, fuzzy logic, and genetic algorithms - Genetic Algorithm, PHI Learning Private Limited-2010
2. S.N.Sivanandam, S.N.Deepa Wiley India , Principles of SOFT COMPUTING, Second Edition 2011.

PE 517 IT

MOBILE COMPUTING*Credits: 3*

*Instruction: (3L) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT-I

Introduction: Wireless Transmission, Frequencies for Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread Spectrum, MAC, SOMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

UNIT-II

Telecommunication Systems: GSM, GPRS, Satellite Networks, Basics, Parameters and Configurations, Capacity Allocation, FAMA and DAMA, Broadcast Systems, DAB, DVB, CDMA and 3G.

UNIT-III

Wireless LAN: IEEE 802.11 Architecture, Services, MAC – Physical Layer, IEEE 802.11a – 802.11b standards, Bluetooth.

UNIT-IV

Routing Ad-hoc Network Routing Protocols: Ad-hoc Network Routing Protocols, Destination Sequenced Distance Vector Algorithm, Cluster Based Gateway Switch Routing, Global State Routing, Fish-eye state Routing, Dynamic Source Routing, Ad-hoc on-demand Routing, Location Aided Routing, Zonal Routing Algorithm.

Mobile IP - Dynamic Host Configuration Protocol.

Traditional TCP - Classical TCP Improvements – WAP, WAP 2.0.

UNIT-V

Publishing & Accessing Data in Air: Pull and Push Based Data Delivery models, Data Dissemination by Broadcast, Broadcast Disks, Directory Service in Air, Energy Efficient Indexing scheme for Push Based Data Delivery.

File System Support for Mobility: Distributed File Sharing for Mobility support, Coda and other Storage Manager for Mobility Support.

Mobile Transaction and Commerce: Models for Mobile Transaction, Kangaroo and Joey transactions, Team Transaction, Recovery Model for Mobile Transactions, Electronic Payment and Protocols for Mobile Commerce.

Suggested Reading:

1. Jochen Schiller, *Mobile Communications*, Pearson Education, 2nd Edition, 2009.
2. Kurnkum Garg, *Mobile Computing*, Pearson Education , 2010
3. Asoke K Talukder, Roopa R Yavagal, *Mobile Computing*, TMH 2008.
4. Raj Kamal, *Mobile Computing*, Oxford, 2009.
5. “A Survey of Mobile Transactions appeared in Distributed and Parallel databases” 16,193-230, 2004, Kluwer Academics Publishers.
6. S. Acharya, M. Franklin and S. Zdonil, “Balancing Push and Pull for Data Broadcast, *Proceedings of the ACM SIGMOD*”, Tuscon, AZ, May 1997.
7. S.Acharya, R. Alonso, M.Franklin and S.Zdonik, “Broadcast Disks: Data Management for Assymmetric Communication Environments, *Proceedings of the ACM SIGMOD Conference*”, San Jose, CA, May 1995.

PE 518 IT**SOFTWARE PROJECT MANAGEMENT***Credits: 3**Instruction: (3L) hrs per week
CIE: 30 marks**Duration of SEE: 3 hours
SEE: 70 marks***UNIT-I**

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, Old Way & New.

UNIT-II

Life – Cycle phases, Artifacts of the process, Model Based Software Architectures, Workflows of the Process, Checkpoints of the process.

UNIT-III

Iterative Process Planning, Project Organizations & Responsibilities, Process Automation, Project Control of Process Instrumentation, Tailoring the Process.

UNIT-IV

Modern Project profiles, Next Generation Software Economics, Modern process Transitions, Managing Contacts, Managing People & Organizing Terms.

UNIT-V

Process improvement & mapping to the CMM, ISO 12207 – an overview, programme management.

Suggested Reading:

1. Walker Royce, *Software Project Management – A Unified frame work*, Pearson Education, Addison, 1998,
2. Bob Hughes and Mike Cotterell , *Software Project Management*, Tata Mc Graw Hill, 3rd Edition, 2010.
3. Watt.S. Humphery, *Managing Software Process* , Addison - Wesley, 2008.

PE 519 IT

RICH INTERNET APPLICATIONS*Credits: 3**Instruction: (3L) hrs per week
CIE: 30 marks**Duration of SEE: 3 hours
SEE: 70 marks***UNIT-I**

Web 2.0 Folksonomies and Web 2.0, Software as a service. Multiple delivery channels (Voice – VOXML, and ANT (HTML), Social Net working.

UNIT - II

Client side programming – Overview of Java Script, Objects in Java Script, Regular expressions, Overview of XML, DTD and XML Schema, DOM and SAX
Parsers,CSS,XSLT.

UNIT- III

Web Services- SOA,SOAP,WSDL,REST Services.
JSON Format- Ajax introduction, XML HTTP object comparison with I frames.

UNIT-IV

Building Rich Internet Application- Flash Player, Flex framework, MXML introduction, Action Script Introduction, working with Action Script, Flex Data binding, Common UI Components using Datagrids. Tree controls, Pop up controls etc.

UNIT-V

Mashup using Flex and Ajax. Web services in Flex. Semantic web(Web 3.0). Resource Description Frame work, use and examples, Ontologies, Web ontology language(OWL).

Suggested Reading:

1. Ivan Bayross, Web Enabled Commercial Application Development using HTML, DHTML, Javascript , Perl CGI ,BPB Publications, 2007.
2. Colin Mook, Essential Actionscript 3.0 , O'Reilly publications, 2007.
3. Steven Holzner, Ajax Bible Wiley India Edition, 2007.
4. Justin Gehtland et al, A Web 2.0 Primer Pragmatic Ajax, SPD Publications, 2006.

PE 520 IT

SOFTWARE QUALITY AND TESTING*Credits: 3*

Instruction: (3L) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 marks

UNIT-I

Software Quality, Quality Management, Software Quality Metrics, Product Quality Metrics, In Process Quality Maintenance, Examples.

UNIT - II

Quality tools in Software Development, Seven Basic Tools, Check List, Pareto Diagram, Histogram, Run Charts, Scatter Diagram, Control Chart, Cause and Effect Diagram, Defect Removal, Effect Removal Effectiveness, Quality Planning, Cost Effectiveness of Phase Effect Removal.

UNIT – III

Software Testing Background, Software Development Process, Realities of Software Testing, Examining the Specification, Testing the Software with Blinders on Examining the Code, Testing the Software with X-ray.

UNIT - IV

Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Website Testing, Automated Testing and Test Tools Bug Bashes and Beta Testing.

UNIT - V

Planning Your Test Effort, Writing and Tracking Test Cases, Reporting Measuring SQA.

Suggested Reading:

1. Stephen H. Khan, *Metrics and Models in Software Quality Engineering*, Pearson Education, India, 1995.
2. Ron Patton, *Software Testing*, Sams Publishing, 2001.
3. Boris Beizer, *Software Testing Techniques*, Sams Publishing, 2001.
4. Allan Gilles, *Software Quality Theory And Management*, Thomson International Press, 1997.

RESEARCH METHODOLOGY

Credits: 3

*Instruction: (3L) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT-I

Research Methodology : Objectives and Motivation of Research, Types of Research, Research Approaches, Significance of Research, Research Methods Versus Methodology, Research and Scientific Method, Importance of Research Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the Society in general.

Defining the Research Problem: Definition of Research Problem, Problem Formulation, Necessity of Defining the Problem, Technique Involved in Defining a Problem.

UNIT-II

Literature Survey : Importance of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet.

Literature Review : Need of Review, Guidelines of Review, Record of Research Review.

UNIT-III

Research Design: Meaning of Research Design, Need of Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan, Design of Experimental Set-up, Use of Standards and Codes.

UNIT-IV

Exploration of the Data, Description and Analysis of Data, Sample Design and Sampling, Role of Statistics for Data Analysis, Functions of Statistics, Estimates of Population, Parameters, Parametric V/s Non Parametric Methods, Descriptive Statistics, Points of Central Tendency, Measures of Variability, Measures of Relationship, Inferential Statistics- Estimation, Hypothesis Testing, Use of Statistical Software.

Data Analysis: Deterministic and random data, uncertainly analysis, tests for significance: Chi-square, student's 't' test Regression modeling, direct and interaction effects. ANOVA, F-test, Time Series analysis, Autocorrelation and autoregressive modeling.

UNIT-V :

Research Report Writing : Format of the Research report, Style of writing report, References/ Bibliography / Webliography, Technical paper writing / Journal report writing.

Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing a Research Grant Proposal.

Suggested Reading:

1. C.R.Kothari, Research Methodology, Methods & Technique; New age International Publishers, 2004
2. R.Ganesan; Research Methodology for Engineers; MJP Publishers; Chennai, 2011.
3. Y.P.Agarwal; Statistical Methods; Concepts, Application and Computation; Sterling Publishers Pvt. Ltd; New Delhi; 2004
4. Dr.Vijay Upagade and Dr.Aravind Shende, Research Methodology, S.Chand & Company Ltd., New Delhi; 2009.
5. P.Ramdass and A Wilson Aruni; Research and Writing across the disciplines; MJP Publishers;

PC 551 IT**OBJECT ORIENTED SYSTEM DEVELOPMENT LAB***Credits: 2*

*Instruction: (2 P) hrs per week
CIE: 25 marks*

*Duration of SEE: 3 hours
SEE: 50 marks*

Course Objectives:

To understand the software engineering methodologies for project development.

To gain knowledge about open source tools for Computer Aided Software Engineering

To develop test plans and perform validation testing.

Course Outcomes :

Student will be able to

Use open source case tools to develop software

Analyze and design software requirements in efficient manner.

Implement the design , debug and test the code

Prepare the following documents for each experiment and develop the software using software Engineering methodology

1.Problem Analysis and Project Planning -Thorough study of the problem –Identify Project scope, Objectives and Infrastructure.

2. Software Requirement Analysis - Describe the individual Phases/modules of the project and Identify deliverables.

3. Data Modelling - Use work products – data dictionary, use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams.

4. Software Development and Debugging – implement the design by coding

5. Software Testing - Prepare test plan, perform validation testing, coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor

Sample Experiments:**Academic domain**

1. Course Registration System
2. Student marks analyzing system

Railway domain

3. Online ticket reservation system
4. Platform assignment system for the trains in a railway station

Medicine domain

5. Expert system to prescribe the medicines for the given symptoms
6. Remote computer monitoring

Finance domain

7. ATM system
8. Stock maintenance

Human Resource management

9. Quiz System
10. E-mail Client system

SOFTWARE REQUIRED:

Open source Tools: StarUML / UMLGraph / Topcased

PC 552 IT**BIG DATA ANALYTICS LAB*****Credits: 2***

Instruction: (2 P) hrs per week
CIE: 25 marks

Duration of SEE: 3 hours
SEE: 50 marks

1. (i) Perform setting up and Installing Hadoop in its three operating modes:
 - Standalone,
 - Pseudo distributed,
 - Fully distributed(ii) Use web based tools to monitor your Hadoop setup.
2. Implement the following file management tasks in Hadoop:
 - Adding files and directories
 - Retrieving files
 - Deleting files
3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
4. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.
5. Implement Matrix Multiplication with Hadoop Map Reduce
6. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
7. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

PC 553 IT**PROJECT SEMINAR**

Instruction: (2P) hrs per week

CIE: 25 Marks

Oral presentation is an important aspect of technical education. The objective of the Seminar Course is to motivate a student to do a systematic and independent study of state-of-topics in a board area of his/her interest.

Seminar topics may be chosen by the student with the suggestions from the family members. Students are to be exposed to following aspects of seminar presentation.

Students are to be exposed to following aspects of seminar presentations.

- Literature survey
- Organization of material to be presented
- Preparation of power point Presentation
- Technical writing

Each student is required to

1. Submit one page synopsis of the seminar talk for display on notice board of the department.
2. Give a 20 minutes presentation with the aid of a PC, followed by a 10 minutes discussion.
3. Submit the report on the seminar topic presented along with list of reference and slides used.

Seminar is to be scheduled from the third week to the last week of the semester and any change in schedule should be discouraged.

CIE marks will be awarded jointly or independently by at least two faculty members. The award will be on the basis of the oral presentation made, written materials submitted, active participation of the student in the proceedings as well as involvement in the discussions.

SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2018-2019

SEMESTER – VI

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1.	ITP2	Project Work	-	-	6	6	50	100	12

ITP2**PROJECT WORK***Credits 12**Instruction: (6P) hrs per week**Duration of SEE: 3Hours**CIE: 50 Marks**SEE:100 Marks*

Sixth Semester of the MCA course is exclusively meant for project work. Project has to be carried out by each student individually in a period of 15 weeks of duration. Students should submit a synopsis at the end of 2nd week in consultation with the Project Guide. The synopsis should consist of definition of the problem, scope of the problem and plan of action. After completion of eight weeks students are required to present a Project Seminar on the topic covering the aspects of analysis, design and implementation of the project work.

At the end of the semester the students are required to present themselves for a University Vive-voce examination.

A committee consisting of two faculty members of the respective college along with a guide will evaluate the project and award CIE marks.

Each student will be required to:

1. Submit one page of synopsis on the project work for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the project.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of CIE marks which will be on the basis of performance in all the 3 items stated above.

The project seminar presentation should include the following components of the project:

- Problem definition and specification.
- Literature survey, familiarity with research journals.
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar (activity) charts
- Presentation both oral and written.

With effect from the academic year 2023-2024



Osmania University

Faculty of Informatics

Two years MCA Program
Master of Computer Applications

Syllabi for Semesters – III and IV
With Effect from Academic Year 2023 – 2024

Osmania University
Hyderabad

SCHEME OF INSTRUCTION
MASTER OF COMPUTER APPLICATIONS (MCA)
SEMESTER- III

SNo	Course Code	Course Title	Hours/ Week			Scheme of Examination			No of Credits
						Max Marks	Duration (hrs)		
THEORY			L	T	P	CIE	SEE	SEE	Cr
1	PCC301	Software Engineering	4	-	-	30	70	3	4
2	PCC302	Computer Networks	4	-	-	30	70	3	4
3	PCC303	Artificial Intelligence	4	-	-	30	70	3	4
4	PCC304	Web Technologies	4	-	-	30	70	3	4
5	PEC**	Professional Elective-I	3	-	-	30	70	3	3
6	PEC**	Professional Elective-II	3	-	-	30	70	3	3
PRACTICALS									
7	LCC351	Computer Networks Lab	-	-	3	25	50	3	1.5
8	LCC352	Software Engineering Lab	-	-	3	25	50	3	1.5
9	LCC353	Web Technologies Lab	-	-	3	25	50	3	1.5
10	SIP321	Summer Internship	-	-	-	50		-	1.5
			22	-	9	305	570	-	28

Professional Electives	Course Code-PEC**	Professional Elective -1	
	PEC311	Software Quality & Testing	
	PEC312	Distributed Systems	
	PEC313	Internet of Things	
	PEC314	Image Processing	
Professional Electives	Course Code-PEC**	Professional Elective – II	
	PEC321	Network Security	
	PEC322	Cyber Security	
	PEC323	Information Retrieval System	
	PEC324	Natural Language Processing	

Abbreviation	Full Form	Abbreviation	Full Form
PCC	Professional Core Course	CIE	Continuous Internal Evaluation
PEC	Professional Elective Course	SEE	Semester End Evaluation
MGC	Management Course	L	Lecture
LCC	Laboratory Core Course	P	Practical

SCHEME OF INSTRUCTION

MASTER OF COMPUTER APPLICATIONS (MCA)

SEMESTER- IV

SNo	Course Code	Course Title	Hours/ Week		Scheme of Examination			No of Credits
					Max Marks	Duration (hrs)		
THEORY			L	P	CIE	SEE	SEE	Cr
1	PEC**	Professional Elective –III	3	-	30	70	3	3
2	PEC**	Professional Elective –IV	3	-	30	70	3	3
3	OE**	Open Elective	2	-	30	70	3	2
PRACTICALS								
4	Proj401	Project Work	-	24	50	100	3	12
Total			8	24	140	310	-	20

Professional Electives

Course Code- PEC**	Professional Elective – III
PEC411	Block Chain Technologies
PEC412	Big Data Analytics
PEC413	Cloud Computing
PEC413	Deep Learning

Course Code- PEC**	Professional Elective – IV
PEC421	Distributed Database Systems
PEC422	Digital Forensics
PEC423	Optimization Techniques
PEC424	Enterprise Architecture

**Course Code-
OE****

OE 431
OE 432
OE 433
OE 434
OE 435
OE 436

Open Elective

Professional Ethics
Constitution of India
Disaster Management
Organization Behaviour
Intellectual Property & Cyber Law
Environmental Science

With effect from academic year 2023-2024

PCC301

Software Engineering

Credits : 4

Instruction 4L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the software problem and addressing it through various software processes
2. Study the SRS and software architecture
3. Understand planning and designing a software project
4. Comprehend the testing strategies and the need for performing testing
5. Learn how to carry out reengineering to the system and maintain it

Course Outcomes – Students will learn to

1. Apply software processes to solve software problem
2. Create SRS document and software architecture
3. Perform software planning in terms of staffing and scheduling
4. Create test cases and procedures
5. Re-engineer the developed software

Unit I

The software Problem: Cost, Schedule and Quality, Scale and change,

Software Processes: Process and project, Component Software Processes, Software Development Process Models, Project management Process.

Unit II

Software Requirements Analysis and Specification: Value of a good SRS, Requirements Process, Requirements Specification, Functional Specification with Use Cases, Other approaches for analysis.

Software Architecture: Role of Software Architecture Views, Component and connector view, Architectural styles for C & C view, Documenting Architecture Design, Evaluating Architectures.

Unit III

Planning a Software Project: Effort Estimation, Project Schedule and staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling. **Design:** Design concepts, Function oriented Design, Object Oriented Design, Detailed Design, Verification, Metrics.

Unit IV

Coding and Unit Testing: Programming Principles and Guidelines, incrementally developing code, managing evolving code, unit testing, code inspection, Metrics. **Testing:** Testing Concepts, Testing Process, Black Box testing, White box testing, Metrics.

Unit V

Maintenance and Re-engineering: Software Maintenance, supportability, Reengineering, Business process Reengineering, Software reengineering, Reverse engineering; Restructuring, Forward engineering, Economics of Reengineering.

Software Process Improvement: Introduction, SPI process, CMMI, PCMM, Other SPI Frameworks, SPI return on investment, SPI Trends.

Suggested Reading

1. Pankaj Jalote, "Software Engineering- A Precise Approach", Wiley India, 2010.
2. Roger. S.Pressman , "Software Engineering - A Practitioner's Approach", 7th Edition, McGraw Hill Higher Education, 2010.
3. Deepak Jain, "Software Engineering", Oxford University Press, 2008.
4. Rajib Mall, "Fundamentals of Software Engineering", 4th Edition, PHI Learning, 2014.
5. Ian Sommerville, "Software Engineering", 10th Edition, Addison Wesley, 2015.

PCC302

Computer Networks

Credits : 4

Instruction 4L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Comprehend the fundamentals of computer networks
2. Learn the aspects relevant to physical and datalink layer
3. Understand network layer and its significance and functionality
4. Study transport layer and its operations
5. Learn the protocols implemented at application layer

Course Outcomes - Upon completion of the course, students will be able to:

1. Elaborate the network model
2. Explain transmission media and functions of datalink layer
3. Create routing tables based on DVR and LSR
4. Describe TCP and UDP protocols
5. Explain application layer protocols

Unit I

Data Communications: Components - Direction of Data flow - networks - Components and Categories - types of connections - Topologies -Protocols and Standards - ISO/OSI model, TCP/IP. **Transmission Media** - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing.

Unit II

Datalink Layer: Error detection and correction, CRC, Hamming code,

Flow Control and Error control , Stop and Wait protocol, Sliding Window protocol -go back-N ARQ - selective repeat ARQ .

MAC Layer: LAN - Pure and Slotted ALOHA, Ethernet IEEE 802.3 LAN Ethernet Efficiency Calculation,Bridges. ARP, RARP

Unit III

Network Layer: - Distance Vector Routing, Link State Routing, IP v4 addressing, Subnetting, CIDR., Introduction to IPv6
ICMP , IGMP,OSPF and BGP.

Unit IV

Transport Layer: Services of transport layer, Multiplexing. Transmission Control Protocol (TCP) Congestion Control, timer management, Quality of services (QOS) and User Datagram Protocol (UDP)

Unit V

Socket Programming: Primitive and Advance System calls, Iterative and concurrent client server programs

Application Layer: Domain Name Space (DNS) - SMTP - FTP - HTTP

Suggested Readings

1. Andrew S. Tanenbaum, "Computer Networks", Pearson Education; Fourth Edition, 2008.
2. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, 2009.
3. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, 2006.
4. W Richard Stevens, Unix Network Programming,PHI,2003

PCC303

Artificial Intelligence

Credits : 4

Instruction 4L hrs per week
CIE 30 marks

Instruction 4L hrs per week
CIE 30 marks

Course Objectives:

- To familiarize the principles of Artificial Intelligence
- To study the techniques for knowledge representation and inference
- To learn the techniques involved in the creation of intelligent systems
- To study different applications like Game Playing Expert Systems, machine learning and natural language processing

Course outcomes :

Student will be able to

- Identify problems that are amenable to solution by AI method
- Understand and analyze working of an AI technique
- Formalize a given problem in the language/framework of different AI methods

UNIT-I

Introduction, History, Intelligent Systems, Foundations of AI, Sub-areas of AI, Applications, Problem Solving. State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening, A*, Constraint Satisfaction. Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning

UNIT – II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Knowledge Representation using Frames

UNIT – III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools. Uncertainty Measure-Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

UNIT – IV

Machine-Learning Paradigms: Introduction, Machine Learning Systems, Supervised and Unsupervised Learning, Inductive Learning, Learning Decision Trees (Suggested Reading 2), Deductive Learning, Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

UNIT – V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web.

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

Suggested Readings:

1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 2011
2. Russell, Norvig, Artificial Intelligence- A Modern Approach, Pearson Education, 2nd Edition, 2004
3. Rich, Knight, Nair, Artificial Intelligence, Tata McGraw Hill, 3rd Edition, 2009

PCC304

Web Technologies

Credits : 3

Instruction 4(3L+1T) hrs per week

Duration of SEE 3 hours

CIE 30 marks

SEE 70 marks

Course Objectives

1. Learn basics of HTML and DHTML
2. Understand the workings of event model
3. Study the java scripting language
4. Learn the VB scripts
5. Comprehend the active server pages

Course Outcomes

1. Write HTML and DHTML programs
2. Create programs on event models
3. Implement java script programs
4. Write VB script programs
5. Create ASP programs

Unit I

HTML: Markup languages, common tags, header, text styling, linking images Formatting text, Unordered lists, nested and ordered list, Tabs-and formatting, Basic forms; Complex forms linking, Meta Tags. **Dynamic HTML:** Cascading style sheets in line styles, style element, External Style sheet, text flow and Box model, user style sheets.

Unit II

Object model and collections: Object referencing, collections all, children frames, navigator object. **Event model:** ONCLICK, ONLOAD, Error Handling, ON ERRORS ONMOUSEMOVE, ONMOUSEOVER, ONMOUSEOUT, ONFOCUS, ONBLUR, ONSUBMIT. **Dynamic HTML:** Filters and transitions, Data binding with Tabular data control binding to IMO, TABLE, Structured graphics, Active controls.

Unit III

Introduction to scripting, Java Script, Data types, Arithmetic's Equality relational, assignment increment, decrement operators, Java Script Control Structures- if, if-else, while. Java Script **Control Structures:** For, Switch, Do/while, break.

Programming modules, recursion, recursion vs iteration global functions arrays, using arrays, Reference and reference parameters, passing arrays to functions, multiple subscripted arrays, objects-math, string. Boolean and number.

Unit IV

Client side scripting with VB Script, operations, Data types and control structures, Functions, Arrays, String manipulations, classes and objects. **Web Servers:** Personal Web server, Internet information server, Apache Web Server, Installation of a Web Server.

Unit V

Active Sever Pages, Client side Scripting vs Server side Scripting, Server side Active X Component, ADO, file system objects, Session tracking, CGI and PERL5, String Processing and Regular Expressions, Server side includes, Cookies and PERL XML Document Type Definition, XML Parsers, Using XML with HTML.

Suggested Readings

- 1 Deitel, Deitel & Nieto, "Internet & World Wide Web - How to Program", Pearson Education, Third Edition, 2004.
- 2 Steven Holzner, "HTML Black Book - Comprehensive Problem Solver", Dream Tech Press, 2000.
- 3 B. Sosinsky, V. Hilley, "Programming the Web - An Introduction", MGH, 2004.

PEC311

Software Quality and Testing

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the essentials of software quality
2. Study methods to integrate software quality activities in the project
3. Understand the software quality metrics
4. Learn building software testing strategy
5. Comprehend testing various artifacts of a software project

Course Outcomes

1. Explain the essentials of software quality
2. Elaborate the methods to integrate software quality activities in the project
3. Describe the software quality metrics
4. Discuss building software testing strategy
5. Perform testing various artifacts of a software project

UNIT - I

The Software Quality Challenge, Introduction Software Quality Factors, The Components of the Software Quality Assurance System – Overview, Development and Quality Plans.

UNIT - II

Integrating Quality Activities in the Project Life Cycle, Assuring the Quality of Software Maintenance Components, CASE Tools and their effect on Software Quality, Procedure and Work Instructions, Supporting Quality Devices, Configuration Management, Documentation Control, Project Progress Control.

UNIT - III

Software Quality Metrics, Costs of Software Quality, Quality Management Standards - ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma, SQA Project Process Standards – IEEE Software Engineering Standards.

UNIT - IV

Building a Software Testing Strategy, Establishing a Software Testing Methodology, Determining Your Software Testing Techniques, Eleven – Step Software Testing Process Overview, Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report Test Results, Test Software Changes, Evaluate Test Effectiveness.

UNIT - V

Testing Client / Server Systems, Testing the Adequacy of System Documentation, Testing Web-based Systems, Testing Off – the – Shelf Software, Testing in a Multiplatform Environment, Testing Security, Testing a Data Warehouse, Creating Test Documentation, Software Testing Tools, Taxonomy of Testing Tools, Methodology to Evaluate Automated Testing Tools, Load Runner, Win Runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

Suggested Reading

1. Daniel Galin, Software Quality Assurance – From Theory to Implementation, Pearson Education.2004
2. Mordechai Ben – Menachem / Garry S.Marliss, Software Quality – Producing Practical, Consistent Software, BS Publications, 2014
3. William E. Perry, Effective Methods for Software Testing, 3 rd Edition, 2006, Wiley .
4. Srinivasan Desikan, Gopaldaswamy Ramesh, Software Testing, Principles and Practices, 2006. Pearson Education.
5. Dr.K.V.K.K. Prasad, Software Testing Tool, Wiley Publishers

PEC312

Distributed Systems

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand the architecture, processes and communication of distributed system
2. Learn the naming and synchronization strategies
3. Study fault tolerance, and distributed object based system
4. Learn distributed file system and distributed web based system
5. Comprehend the distributed coordination based system and map reduce

Course Outcomes

1. Explain the architecture, processes and communication of distributed system
2. Elaborate the naming and synchronization strategies
3. Describe the fault tolerance and distributed object based system
4. Discuss the distributed file system and distributed web based system
5. Explain distributed coordination based system and map reduce

Unit I

Introduction: Goals and Types of Distributed Systems

Architectures: Architectural Styles, System Architectures, Architectures versus Middleware, and Self-Management in Distributed Systems.

Processes: Threads, Virtualization, Clients, Servers, and Code Migration.

Communication: Fundamentals, Remote Procedure Call, Message-Oriented Communication, Stream-Oriented Communication, and Multicast Communication.

Unit II

Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, and Attribute-Based Naming.

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, and Election Algorithms. **Consistency and Replication:** Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, and Consistency Protocols.

Unit III

Fault Tolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, and Recovery.

Distributed Object-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, and Security.

Unit IV

Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, and Security.

Distributed Web-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, and Security.

Unit V

Distributed Coordination-Based Systems: Introduction to Coordination Models, Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, and Security.

Map-Reduce: Example, Scaling, programming model, Apache Hadoop, Amazon Elastic Map Reduce, Mapreduce.net, Pig and Hive.

Suggested Readings

1. Andrew S. Tanenbaum and Maarten Van Steen, —Distributed Systems‖, PHI 2nd Edition, 2009.
2. R.Hill, L.Hirsch, P.Lake, S.Moshiri, —Guide to Cloud Computing, Principles and Practicel‖, Springer, 2013.
3. R.Buyya, J.Borberg, A.Goscinski,‖Cloud Computing-Principles and Paradigms‖, Wiley 2013.

With effect from academic year 2023-2024

PEC313

Internet of Things

Credits : 3

Instruction 3L hrs per week

Duration of SEE 3 hours

CIE 30 marks

SEE 70 marks

Course Objectives

1. Discuss fundamentals of IoT and its applications and requisite infrastructure
2. Describe Internet principles and communication technologies relevant to IoT
3. Discuss hardware and software aspects of designing an IoT system
4. Describe concepts of cloud computing and Data Analytics
5. Discuss business models and manufacturing strategies of IoT products

Course Outcomes

Student will be able to

1. Understand the various applications of IoT and other enabling technologies.
2. Comprehend various protocols and communication technologies used in IoT
3. Design simple IoT systems with requisite hardware and C programming software
4. Understand the relevance of cloud computing and data analytics to IoT
5. Comprehend the business model of IoT from developing a prototype to launching a product.

UNIT- I

Introduction to Internet of Things

IOT vision, Strategic research and innovation directions, Iot Applications, Related future technologies, Infrastructure, Networks and communications, Processes, Data Management, Security, Device level energy issues.

UNIT- II

Internet Principles and communication technology

Internet Communications: An Overview – IP, TCP, IP protocol Suite, UDP. IP addresses – DNS, Static and Dynamic IP addresses, MAC Addressess, TCP and UDP Ports, Application Layer Protocols HTTP, HTTPS, Cost Vs Ease of Production, Prototypes and Production, Open Source Vs Closed Source.

UNIT- III

Prototyping and programming for IoT

Prototyping Embedded Devices – Sensors, Actuators, Microcontrollers, SoC, Choosing a platform, Prototyping, Hardware platforms – Arduino, Raspberry Pi. Prototyping the physical design – Laser Cutting, 3D printing, CNC Milling.

Techniques for writing embedded C code: Integer data types in C, Manipulating bits - AND, OR, XOR, NOT, Reading and writing from I/ O ports. Simple Embedded C programs for LED Blinking, Control of motor using switch and temperature sensor for arduino board.

UNIT- IV

Cloud computing and Data analytics

Introduction to Cloud storage models -SAAS, PAAS, IAAS. Communication APIs, Amazon webservices for IoT, Skynet IoT Messaging Platform.

Introduction to Data Analytics for IoT - Apache hadoop- Map reduce job execution workflow.

UNIT- V

IoT Product Manufacturing - From prototype to reality

Business model for IoT product manufacturing, Business models canvas, Funding an IoT Startup, Mass manufacturing - designing kits, designing PCB,3D printing, certification, Scaling up software, Ethical issues in IoT- Privacy, Control, Environment, solutions to ethical issues.

Suggested Readings

1. Internet of Things - Converging Technologies for smart environments and Integrated ecosystems, River Publishers.
2. Designing the Internet of Things , Adrian McEwen, Hakim Cassimally. Wiley India Publishers
3. Fundamentals of embedded software: where C meets assembly by Daneil W lewies, Pearson.
4. Internet of things -A hands on Approach, ArshdeepBahga, Universities press.

EC323

Image Processing

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand image processing fundamentals
2. Understand image transforms
3. Understand image enhancement
4. Understand image restoration and feature extraction
5. Understand image reconstruction

Course Outcomes

1. Learn image processing fundamentals
2. Learn image transforms
3. Learn image enhancement
4. Learn image restoration and feature extraction
5. Learn image reconstruction

Unit I

Fundamentals- Need for DIP- Fundamental steps in DIP – Elements of visual perception -Image sensing and Acquisition – Image Sampling and Quantization – Imaging geometry, discrete image mathematical characterization.

Unit II

Image Transforms - Two dimensional Fourier Transform- Properties – Fast Fourier Transform – Inverse FFT,Discrete cosine transform and KL transform.-Discrete Short time Fourier Transform-Wavelet Transform- Discrete wavelet Transform- and its application in Compression.

Unit III

Image Enhancement - Spatial Domain: Basic relationship between pixels- Basic Gray level Transformations – Histogram Processing – Smoothing spatial filters- Sharpening spatial filters. **Frequency Domain:** Smoothing frequency domain filters- sharpening frequency domain filters Homomorphic filtering.

Unit IV

Image Restoration:- Overview of Degradation models –Unconstrained and constrained restorations-Inverse Filtering ,WienerFilter.

Feature Extraction:- Detection of discontinuities – Edge linking and Boundary detection-Thresholding- -Edge based segmentation-Region based Segmentation- matching-Advanced optimal border and surface detection- Use of motion in segmentation. Image Morphology – Boundary descriptors- Regional descriptors.

Unit V

Image Reconstruction from Projections: - Need- Radon Transform – Back projection operator-Projection Theorem- Inverse Radon Transform.

Suggested Reading

1. Rafael C.Gonzalez& Richard E.Woods – Digital Image Processing – Pearson Education- 2/e – 2004.
2. Anil.K.Jain – Fundamentals of Digital Image Processing- Pearson Education-2003.
3. B.Chanda&D.DuttaMajumder – Digital Image Processing and Analysis – Prentice Hall of India – 2002
4. William K. Pratt – Digital Image Processing – John Wiley & Sons-2/e, 2004

With effect from academic year 2023-2024

PEC321

Network Security

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand the significant aspects of network security
2. Comprehend secret and public key cryptography
3. Learn hash functions and digital signatures
4. Study the digital signatures and smart cards
5. Comprehend the applications of network applications

Course Outcomes

1. Explain the fundamentals of network security
2. Elaborate the concepts secret and public key cryptography
3. Elucidate the hash functions digital signatures
4. Describe the digital signatures and smart cards
5. Explain the applications of network security

UNIT-I

Introduction: Attributes of Security, Integrity, Authenticity, Non-repudiation, Confidentiality Authorization, Anonymity, Types of Attacks, DoS, IP Spoofing, Replay, Man-in-the-Middle attacks General Threats to Computer Network, Worms, Viruses, -Trojans

UNIT-II

Secret Key Cryptography :DES, Triple DES, AES, Key distribution, Attacks

Public Key Cryptography: RSA, ECC, Key Exchange (Diffie-Hellman), Java Cryptography Extensions, Attacks

UNIT-III

Integrity, Authentication and Non-Repudiation :Hash Function (MD5, SHA5), Message Authentication Code (MAC), Digital Signature (RSA, DSA Signatures), Biometric Authentication.

UNIT-IV

PKI Interface: Digital Certificates, Certifying Authorities, POP Key Interface, System Security using Firewalls and VPN's.

Smart Cards: Application Security using Smart Cards, Zero Knowledge Protocols and their use in Smart Cards, Attacks on Smart Cards

UNIT-V

Applications: Kerberos, Web Security Protocols (SSL), IPSec, Electronic Payments, E-cash, Secure Electronic Transaction (SET), Micro Payments, Case Studies of Enterprise Security (.NET and J2EE)

Suggested Reading

1. William Stallings, Cryptography and Network Security, 4th Edition. Pearson,. 2009.
2. Behrouz A Forouzan, Cryptography and Network Security, TMH, 2009
3. Joseph MiggaKizza, A Guide to Computer Network Security, Springer, 2010
4. Dario Cataiano, Contemporary Cryptology, Springer, 2010.

PEC421

Cyber Security

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand the policies and security evolution
2. Learn cyber security objectives and guidance
3. Study policy catalog and issues
4. Comprehend cyber management and infrastructure issues
5. Learn the cyber security case studies

Course Outcomes

1. Explain the policies and security evolution
2. Describe cyber security objectives and guidance
3. Discuss policy catalog and issues
4. Elaborate cyber management and infrastructure issues
5. Elucidate the case studies on cyber security

Unit I: Policies and Security Evolution

Introduction - Cyber Security, Cyber Security policy, Domain of Cyber Security Policy, Laws and Regulations

Cyber Security Evolution - Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus, Policy, Cyber Security Evolution, Productivity, Internet, E-Commerce, Counter Measures, Challenges.

Unit II: Cyber Security Objectives and Guidance

Security Objectives - Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices, Security Policy Objectives, Guidance for Decision Makers, Tone at the Top, Policy as a Project.

Catalog Approach - Cyber Security Management, Arriving at Goals, Cyber Security Documentation, the Catalog Approach, Catalog Format, Cyber Security Policy Taxonomy

Unit III: Policy Catalog and Issues

Cyber Security Policy Catalog - Cyber Governance Issues, Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging, Cyber User Issues, Malvertising, Impersonation.

Cyber user and conflict Issues - Appropriate Use, Cyber Crime, Geo location, Privacy, Cyber Conflict Issues, Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

Unit IV: Cyber Management and Infrastructures Issues

Cyber Management Issues - Fiduciary Responsibility – Risk Management – Professional Certification – Supply Chain – Security

Cyber Infrastructure Issues - Principles – Research and Development – Cyber Infrastructure Issue – Banking and finance – Health care – Industrial Control systems.

Unit V: Case Study

Government's Approach to Cyber Security Policy - Cyber security strategy-Brief history-Public policy development in the U.S Federal Government.

Espionage - The rise of cyber crime- Espionage and Nation-state Actions-Policy response to growing Espionage threats-Congressional Action.

Suggested Readings

1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss “Cyber Security Policy Guidebook” John Wiley & Sons 2012.
2. Rick Howard “Cyber Security Essentials” Auerbach Publications 2011.
3. Richard A. Clarke, Robert Knake “Cyberwar: The Next Threat to National Security & What to Do About It” Ecco 2010
Dan Shoemaker “Cyber security The Essential Body of Knowledge”, 1st edition, Cengage Learning 2011.

PEC314

Information Retrieval System

Credits : 3

Instruction 3Lhrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand IR strategies
2. Study basic retrieval utilities
3. Learn cross language IR
4. Comprehend efficiency aspects
5. Learn distributed IR

Course Outcomes

1. Explain IR strategies
2. Elucidate basic retrieval utilities
3. Discuss cross language IR
4. Describe efficiency aspects
5. Elaborate distributed IR

UNIT-I

Introduction to Retrieval. Strategies: Vector Space model, Probabilistic Retrieval.
Strategies Language Models: Simple Term Weights, Non Binary Independence Model.

UNIT-II

Retrieval Utilities: Relevance Feedback, Clustering, N-grams, Regression Analysis, Thesauri.

UNIT-III

Retrieval Utilities: Semantic Networks, Parsing, Cross-Language Information Retrieval:
Introduction, Crossing the Language Barrier.

UNIT-IV

Efficiency: Inverted Index, Query Processing, Signature Files, Duplicate Document
Detection.

UNIT - V

Integrating Structured Data and Text: A Historical Progression, Information Retrieval as a
Relational Application, Semi-Structured Search using a Relational Schema.
Distributed Information Retrieval: A Theoretical Model of Distributed Retrieval, Web
Search.

Suggested Reading:

1. David A. Grossman, Ophir Frieder. "Information Retrieval - Algorithms and Heuristics", Springer, 2nd Edition (Distributed by Universities Press), 2004.
2. Gerald J Kowalski, Mark T Maybury. "Information Storage and Retrieval Systems", Springer, 2000.
3. SoumenChakrabarti, "Mining the Web: Discovering Knowledge. from Hypertext Data", Morgan-Kaufmann Publishers, 2002.
4. Christopher D. Manning, PrabhakarRaghavan, HinrichSchGtze, "An Introduction to Information Retrieval", Cambridge University Press, Cambridge, England,-2009.

PEC324

Natural Language Processing

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn elementary probability and information theory
2. Study the linguistic essentials
3. Comprehend statistical inference and word sense disambiguation
4. Understand evaluation measures and markov models
5. Learn probabilistic context free grammars

Course Outcomes – Learners on completion of the course, be able to

1. Explain elementary probability and information theory
2. Discuss the linguistic essentials
3. Describe statistical inference and word sense disambiguation
4. Elaborate evaluation measures and markov models
5. Elucidate probabilistic context free grammars

UNIT I

Introduction of Elementary Probability Theory, Essential Information Theory. Linguistic Essentials Corpus-Based Work Collocations.

UNIT II

Statistical Inference: Bins: Forming Equivalence Classes, Reliability vs. Discrimination, n-gram models, Building ngram models, An Information Theoretic Approach.

UNIT III

Word Sense Disambiguation: Methodological Preliminaries, Supervised and unsupervised learning, Pseudo words, Upper and lower bounds on performance, Supervised Disambiguation, Bayesian classification.

UNIT IV

Evaluation Measures, Markov Models: Hidden Markov Models, Use, General form of an HMM Part-of-Speech Tagging

UNIT-V

Probabilistic Context Free Grammars: Introduction of Clustering **Information Retrieval:** Background, The Vector Space Model.

Suggested Reading

1. Christopher D. Manning, HinrichSchutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.
2. James Allan, Natural Language Understanding, Pearson Education, 1994.
3. Tanveer Siddiqui, US Tiwary, Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

LCC351

Computer Networks Lab

Credits : 2

Instruction 3P hrs per week

Duration of SEE 3 hours

CIE 25 marks

SEE 50 marks

Course Objectives

1. Understand basic commands of networks
2. Learn socket program implementation
3. Understand connection oriented socket programs
4. Learn connectionless socket programs
5. Understand DNS implementation

Course Outcomes - Upon completion of the course, the students will be able to:

1. Execute basic commands of networks
2. Implement socket program implementation
3. Execute connection oriented socket programs
4. Implement connection less socket programs
5. Execute DNS implementation

Programs to be written on the following concepts using any programming language like Python, C, C++, Java.

1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whois.
2. Socket Programming: Implementation of Connection-Oriented Service using standard ports.
3. Implementation of Connection-Less Service using standard ports.
4. Implementation of Connection-Oriented Iterative Echo-Server, date and time, character generation using user-defined ports.
5. Implementation of Connectionless Iterative Echo-server, date and time, character generation using user-defined ports.
6. Implementation of Connection-Oriented Concurrent Echo-server, date and time, character generation using user-defined ports.
7. Program for connection-oriented Iterative Service in which server reverses the string sent by the client and sends it back.
8. Program for connection-oriented Iterative service in which server changes the case of the strings sent by the client and sends back (Case Server).
9. Program for Connection-Oriented Iterative service in which server calculates the net-salary of an employee based on the following details sent by the client
i) basic ii) hra iii) da iv) pt v) epf vi) net-salary=basic+hra+da-pt-epf).
10. Program for file access using sockets.
11. Program for Remote Command Execution using sockets .
12. Implementation of DNS.

With effect from academic year 2023-2024

LCC352

Software Engineering Lab

Credits : 2

Instruction 3P hrs per week

Duration of SEE 3 hours

CIE 25 marks

SEE 50 marks

Course Objectives

1. Learn use case diagram
2. Learn class and object diagram
3. Understand sequence and collaboration diagrams
4. Study state-chart and activity diagrams
5. Comprehend component and deployment diagrams

Course Outcomes

1. Apply use case diagram
2. Apply class and object diagram
3. Apply sequence and collaboration diagrams
4. Apply state-chart and activity diagrams
5. Apply component and deployment diagrams

1. Phases in software development project, overview, need, coverage of topics
2. To assign the requirement engineering tasks
3. To perform the system analysis: Requirement analysis, SRS
4. To perform the function-oriented diagram: DFD and Structured chart
5. To perform the user's view analysis: Use case diagram
6. To draw the structural view diagram: Class diagram, object diagram
7. To draw the behavioral view diagram: Sequence diagram, Collaboration diagram
8. To draw the behavioral view diagram: State-chart diagram, Activity diagram
9. To draw the implementation view diagram: Component diagram
10. To draw the environmental view diagram: Deployment diagram
11. To perform various testing using the testing tool unit testing, integration testing

Draw UML diagrams for the following system

1. ATM application
2. Library management system
3. Railway reservation
4. E-Commerce System
5. Banking System

Perform the following tasks

Background: Software has made the world a global village today. The impact of software spans across almost all aspect of human life. All organizations, Institutions and companies are leveraging the potentials of software in automating the critical functions and eliminating manual interventions. Software is also a predominant area for trade and export especially for the countries like India. Domains like health care, Airlines, financial Services, Insurance, retails, Education, and many more have exploited software and still there a lot of the scope for software to create impact and add values in multiple dimensions.

Problem Description: In the context of this background, identify the areas (or application or systems) how software has been leveraged extensively in the following domains

1. Health Care
2. Airlines
3. Banking Insurance
4. Retail
5. Education

Background: In the early years of computers applications, the focus of the development and innovation were on hardware. Software was largely views as an afterthought. Computer programming was an art. Programmers did not follow any disciplined or formalized approaches. This way of doing things was adequate for a while, until the sophisticated of computer applications outgrow. Software soon took over and more functions which were done manually. A software houses begin to develop for widespread distribution. Software development projects produced thousands of source program statement. With the increase in the size and complexity of the software, following situation resulted is collectively termed as software crisis.

1. Time Slippage
2. Cost Slippage
3. Failure at customer Site
4. Intractable Error after delivery

Problem Description: In the context of this background, for each of the scenario mentioned below, identify the most appropriate problem related to software crisis and mention the same in the table provided.

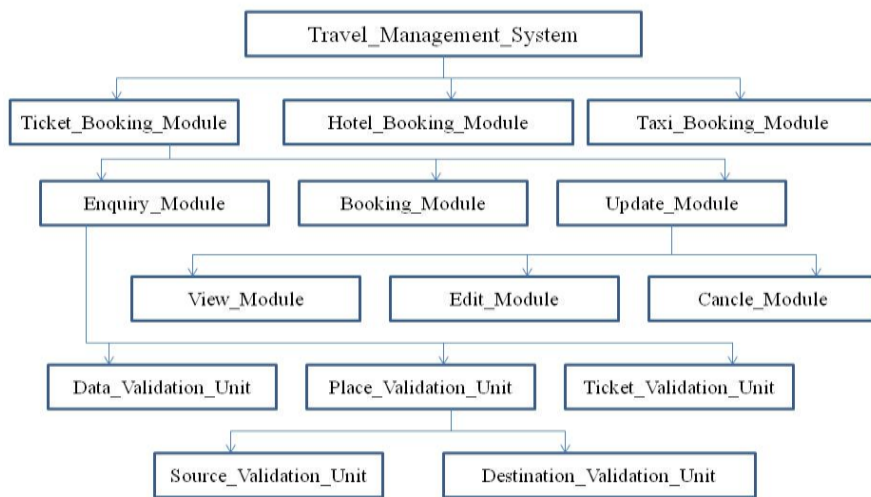
Scenario A: Railways reservation software was delivered to the customer and was installed in one of the metro station at 12.00 AM (mid-night) as per the plan. The system worked quite fine till the next day 12.00 PM (noon). The system crashed at 12.00 PM and the railways authorities could not continue using software for reservation till 02.00 PM. It took two hours to fix the defect in the software in the software.

Scenario B: A polar satellite launch vehicle was scheduled for the launch on August 15th. The auto-pilot of the rocket to be delivered for integration of the rocket on May 15th. The design and development of the software for the auto-pilot more effort because of which the auto-pilot was delivered for the integration on June 15th (delayed by a month). The rocket was launched on Sep 15th (delayed by a month).

Scenario C: Software for financial systems was delivered to the customer. Customer informed the development team about a mal-function in the system. As the software was huge and complex, the development team could not identify the defect in the software.

INTEGRATION TESTING

Background: Integration testing is carried out after the completion of unit testing and before the software is delivered for system testing. In top down integration testing, dummy stubs are required for bottom level modules. Similarly, in bottom up testing, dummy drivers are required for top level modules



Problem Description: Consider the scenario of development of software for Travel, Management System (TMS) is in progress. The TMS software has 3 major modules namely Ticket_Booking_Module, Hotel_Booking_Module and Taxi_Booking_Module. The Ticket_Booking_Module has 3 sub modules namely Enquiry_Module, Booking_Module and Update_Module. The enquiry module uses Date_Validation_Unit, Ticket_Validation_Unit and Place_Validation_Unit.

In the context of the given scenario, identify the usage of stub or driver for the following situations.

1. Except the Ticket_validation_Unit, the coding and unit testing of all other modules, sub modules and units of TMS are completed. The top-down integration is in progress for the TMS software. To carry out the integration testing, which among the following is necessary?
2. The coding and unit testing of all the module, sub modules and units of TMS are completed except the Update_Module (coding and testing for Edit_Module, Cancel_Module and View_Module are also completed). The bottom-up integration is to be started for the TMS software. Mention any stub or driver needed to carry out the integration testing?
3. Except the Taxi_Booking_Module, the coding and unit testing of all other modules, sub modules and units of TMS are completed. The top-down integration is to be started for the TMS software. Mention any stub or driver needed to carry out the integration testing.

Background: Performance testing tests the non-functional requirements of the system. The different types of performance testing are load testing, stress testing, endurance testing and spike testing.

Problem Description: Identify the type of performance testing for the following:

1. A space craft is expected to function for nearly 8 years in space. The orbit control system of the spacecraft is a real-time embedded system. Before the launch, the embedded software is to be tested to ensure that it is capable of working for 8 years in the space. Identify the suitable performance testing category to be carried out to ensure that the space craft will be functioning for 8 years in the space as required.
2. Global Education Centre (GEC) at Infosys Mysore provides the training for fresh entrants. GEC uses an automated tool for conducting objective type test for the trainees. At a time, a maximum of 2000 trainees are expected to take the test. Before the tool is deployed, testing of the tool was carried out to ensure that it is capable of supporting 2000 simultaneous users. Indicate the performance testing category?
3. A university uses its web-based portal for publishing the results of the students. When the results of an examination were announced on the website recently on a pre-planned date, the web site crashed. Which type of performance testing should have been done during web-site development to avoid this unpleasant situation?
4. During unexpected terrorist attack, one of the popular websites crashed as many people

logged into the web-site in a short span of time to know the consequences of terrorist attack and for immediate guidelines from the security personnel. After analyzing the situation, the maintenance team of that website came to know that it was the consequences of unexpected load on the system which had never happened previously. Which type of performance testing should have been done during web-site development to avoid this unpleasant situation?

Background: Enhancements are introduction of new features to the software and might be released in different versions. Whenever a version is released, regression testing should be done on the system to ensure that the existing features have not been disturbed.

Problem Description: Consider the scenario of development of software for Travel Management System (TMS) discussed in previous assignment. TMS has been developed by Infosys and released to its customer Advance Travel Solutions Ltd. (ATSL). Integration testing, system testing and acceptance testing were carried out before releasing the final build to the customer. However, as per the customer feedback during the first month of usage of the software, some minor changes are required in the Enquiry Module of the TMS. The customer has approached Infosys with the minor changes for upgrading the software. The development team of Infosys has incorporated. Those changes, and delivered the software to testing team to test the upgraded software. Which among the following statement is true?

- a. Since minor changes are there, integration of the Enquiry Module and quick system testing on Enquiry module should be done.
- b. The incorporation of minor changes would have introduced new bugs into other modules, so regression testing should be carried out.
- c. Since the acceptance testing is already carried out, it is enough if the team performs sanity testing on the Enquire module.
- d. No need of testing any module.

Background: There are some metrics which are fundamental and the rest can be derived from these. Examples of basic (fundamental) measures are size, effort, defect, and schedule. If the fundamental measures are known, then we can derive others. For example if size and effort are known, we can get Productivity ($=\text{size}/\text{effort}$). If the total numbers of defects are known we can get the Quality ($=\text{defect}/\text{size}$) and so on.

Problem Description: Online loan system has two modules for the two basic services, namely Car loan service and House loan service.

The two modules have been named as Car_Loan_Module and House_Loan_Module. Car_Loan_Module has 2000 lines of uncommented source code. House_Loan_Module has 3000 lines of uncommented source code. Car_Loan_Module was completely implemented by Mike. House_Loan_Module was completely implemented by John. Mike took 100 person hours to implement Car_Loan_Module. John took 200 person hours to implement House_Loan_Module. Mike's module had 5 defects. John's module had 6 defects. With respect to the context given, which among the following is an INCORRECT statement?

Choose one:

1. John's quality is better than Mike.
2. John's productivity is more than Mike.
3. John introduced more defects than Mike.
4. John's effort is more than Mike.

LCC351

Web Technologies Lab

Credits : 2

Instruction 3P hrs per week

Duration of SEE 3 hours

CIE 25 marks

SEE 50 marks

1. Develop College Website using XHTML and CSS.
2. Develop HTML form with client validations using Java Script.
3. Publishing XML document using XSLT
4. XML document processing using SAX and DOM.
5. Text processing using Regular expressions and pattern matching.
6. Develop form processing application using CGI.pm
7. Develop CGI-Perl Web application with State and Session Tracking.
8. Develop a simple Java servlet application.
9. Develop Java servlet application with session tracking
10. Develop a simple JSP application.
11. Creation of an application access database with JDBC
12. Develop full fledged web application with database access spreading over to 3 sessions.

SIP321

Summer Internship*

Credits : 2

Instruction 6-week

CIE 50 marks

Program Description

The Internship Program allows MCA students to gain practical experience in the workplace before receiving their graduate degrees. The internship is a required academic course. The student identifies companies willing to hire him/her on a full time basis for a 6-week period (minimum required), usually in the summer. The Internship Program supervises the students and awards academic credits (2) upon successful completion of all the required assignments.

Intended Learning Outcomes

Upon successful completion of the internship, you should be able to

1. Communicate a practical understanding of how a technology actually operates
2. Demonstrate the ability to integrate and apply theoretical knowledge and skills developed in various courses to real-world situations in a business organization
3. Exhibit the ability to effectively work in a professional environment and demonstrate work ethic and commitment in a work-based environment
4. Demonstrate the ability to successfully complete internship assignments.
5. Reflect on personal and professional development needs and set strategic goals for advancing along an intended career path
6. Communicate effectively in a professional environment in both English and regional language, orally and in writing.

SCHEME OF INSTRUCTION
MASTER OF COMPUTER APPLICATIONS (MCA)
SEMESTER- IV

SNo	Course Code	Course Title	Hours/ Week		Scheme of Examination			No of Credits
					Max Marks	Duration (hrs)		
THEORY			L	P	CIE	SEE	SEE	Cr
1	PEC**	Professional Elective –III	3	-	30	70	3	3
2	PEC**	Professional Elective –IV	3	-	30	70	3	3
3	OE**	Open Elective	2	-	30	70	3	2
PRACTICALS								
4	Proj401	Project Work	-	24	50	100	3	12
Total			8	24	140	310	-	20

Professional Electives

Course Code- PEC**	Professional Elective – III
PEC411	Block Chain Technologies
PEC412	Big Data Analytics
PEC413	Cloud Computing
PEC413	Deep Learning

Course Code- PEC**	Professional Elective – IV
PEC421	Distributed Database Systems
PEC422	Digital Forensics
PEC423	Optimization Techniques
PEC424	Enterprise Architecture

**Course Code-
OE****

OE 411
 OE 412
 OE 413
 OE 414
 OE 415
 OE 416

Open Elective

Professional Ethics
 Constitution of India
 Disaster Management
 Organization Behaviour
 Intellectual Property & Cyber Law
 Environmental Science

PEC411

Block Chain Technologies

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the basic concept of Cryptographic Hash Functions, Hash Pointers
2. Study Elliptic Curve Digital Signature Algorithm.
3. A technical overview of decentralized digital currencies like Bitcoin, as well as their broader economic, legal and financial context.
4. To get an insight into the working of the Bitcoin network Wallet
5. Comprehend Bitcoin mining and distributed consensus for reliability.

Course Outcomes

1. Learn the basics of hash functions
2. Learn the importance of digital signature
3. Understand the structure of a blockchain.
4. Learn different ways of storing Bitcoin keys, security measures.
5. Learn how Bitcoin relies on mining.

UNIT – I

Introduction to Cryptography: Cryptographic Hash Functions, SHA-256, Hash Pointers and Data Structures, Merkle tree.

UNIT – II

Digital Signatures: Elliptic Curve Digital Signature Algorithm (ECDSA), Public Keys as identities, A Simple Cryptocurrency.

UNIT – III

Centralization vs Decentralization, Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work.

Mechanics of Bitcoin: Bitcoin Transactions, Bitcoin Scripts, Applications of Bitcoin Scripts, Bitcoin Blocks, The Bitcoin Network.

UNIT – IV

Storage and Usage of Bitcoins: Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.

UNIT – V

Bitcoin Mining: The Task of Bitcoin miners, Mining Hardware, Mining pools, Mining incentives and strategies.

Bitcoin and Anonymity: Anonymity Basics, Mixing, Zerocoin and Zerocash.
Applications of Block Chain Technologies.

Suggested Reading

1. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton Press, 2016.
2. Mastering Bitcoin: Programming the Open Blockchain by Andreas M. Antonopoulos Shroff, O'Reilly; 2nd Edition, 2017.

PEC412

Big Data Analytics

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand big data fundamentals
2. Understand Learn hadoop ecosystem
3. Understand mapreduce and hbase fundamentals
4. Understand database concepts related to big data
5. Understand NoSQL fundamentals

Course Outcomes

1. Learn how to handle big data
2. Learn hadoop ecosystem
3. Learn mapreduce and hbase fundamentals
4. Learn database concepts related to big data
5. Learn NoSQL fundamentals

UNIT- I

Getting an overview of Big Data: Introduction to Big Data, Structuring Big Data, Types of Data, Elements of Big Data, Big Data Analytics, Advantages of Big Data Analytics.

Introducing Technologies for Handling Big Data: Distributed and Parallel Computing for Big Data, Cloud Computing and Big Data, Features of Cloud Computing, Cloud Deployment Models, Cloud Services for Big Data, Cloud Providers in Big Data Market.

UNIT- II

Understanding Hadoop Ecosystem: Introducing Hadoop, HDFS and MapReduce, Hadoop functions, Hadoop Ecosystem.

Hadoop Distributed File System-

HDFS Architecture, Concept of Blocks in HDFS Architecture, Name nodes and Data nodes, Features of HDFS. MapReduce.

Introducing HBase- HBase Architecture, Regions, Storing Big Data with HBase, Combining HBase and HDFS, Features of HBase, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie.

UNIT-III

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework, Exploring the features of MapReduce, Working of MapReduce, Techniques to optimize MapReduce Jobs, Hardware/Network Topology, Synchronization, File system, Uses of MapReduce, Role of HBase in Big Data Processing- Characteristics of HBase.

Understanding Big Data Technology Foundations: Exploring the Big Data Stack, Data Sources Layer, Ingestion Layer, Storage Layer, Physical Infrastructure Layer, Platform Management Layer, Security Layer, Monitoring Layer, Visualization Layer.

UNIT- IV

Storing Data in Databases and Data Warehouses: RDBMS and Big Data, Issues with Relational Model, Non-Relational Database, Issues with Non-Relational Database, Polyglot Persistence, Integrating Big Data with Traditional Data Warehouse, Big Data Analysis and Data Warehouse.

UNIT-V

NoSQL Data Management: Introduction to NoSQL, Characteristics of NoSQL, History of NoSQL, Types of NoSQL Data Models-Key Value Data Model, Column Oriented Data Model, Document Data Model, Graph Databases, Schema-Less Databases, Materialized Views, CAP Theorem.

Suggested Reading

1. BIGDATA, BlackBookTM, DreamTechPress, 2016Edition.
2. Seema Acharya, SubhasniChellappan , “BIG DATA and ANALYTICS”, Wiley publications, 2016
3. NathanMarzandJamesWarren, “BIGDATA- PrinciplesandBestPracticesofScalableReal-TimeSystems”, 2010

PEC413

Cloud Computing

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the cloud computing services including resource virtualization
2. Study the scaling, planning and file system and storage
3. Understand database technology and security issues
4. Comprehend portability issues and programming model case study
5. Learn the enterprise architecture and its related information

Course Outcomes

1. Elaborate the cloud computing services and resource virtualization
2. Explain the scaling, planning and file system and storage
3. Describe the database technology and security issues
4. Elucidate portability issues and programming model case study
5. Discuss the enterprise architecture and its related information

Unit-I

Introduction, Benefits and challenges, Cloud computing services, Resource Virtualization, Resource pooling, sharing and provisioning, Case study of IaaS, PaaS and SaaS

Unit-II

Scaling in the Cloud, Capacity Planning, Load Balancing, File System and Storage, Containers

Unit-III

Multi-tenant Software, Data in Cloud, Database Technology, Content Delivery Network, Security Reference Model, Security Issues, Privacy and Compliance Issues

Unit-IV

Portability and Interoperability Issues, Cloud Management and a Programming Model Case Study, Popular Cloud Services

Unit-V

Enterprise architecture and SOA, Enterprise Software, Enterprise Custom Applications, Workflow and Business Processes, Enterprise Analytics and Search, Enterprise Cloud Computing Ecosystem.

Suggested Reading

1. Cloud Computing - Sandeep Bhowmik, Cambridge University Press, 2017.
2. Enterprise Cloud Computing - Technology, Architecture, Applications by Gautam Shroff, Cambridge University Press, 2016.
3. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.

PEC414

Deep Learning

Credits : 3

Instruction 3L hrs per week

Duration of SEE 3 hours

CIE 30 marks

SEE 70 marks

Course Objectives

1. Learn deep learning basics and optimization algorithms
2. Understand deep learning computation, CNNs and modern CNNs
3. Study recurrent neural networks and its modern versions
4. Learn computer vision
5. Comprehend GANs

Course Outcomes

1. Learn deep learning basics and optimization algorithms
2. Understand deep learning computation, CNNs and modern CNNs
3. Study recurrent neural networks and its modern versions
4. Learn computer vision
5. Comprehend GANs

Unit I

Introduction – A motivating example, the key components – data, models, and algorithms, kinds of machine learning, the road to deep learning, success stories, Linear regression, multilayer perceptrons, model selection, underfitting and overfitting, weight decay, dropout, forward propagation, backward propagation and computational graphs, numerical stability and initialization, considering the environment, predicting house prices on Kaggle

Optimization algorithms – optimization and deep learning, convexity, gradient descent, momentum, adagrad, RMSProp, Adadelta, Adam, learning rate scheduling

Unit II

Deep learning computation – layers and blocks, parameter management, deferred initialization, custom layers, file I/O, GPUs

Convolutional neural networks – from dense layers to convolutions, convolutions for images, padding and stride, multiple input and output channels, pooling, convolutional neural networks(LeNet)

Modern Convolutional neural networks – deep Convolutional neural networks(AlexNet), Networks using blocks(VGG), Networks with parallel concatenations(GoogleNet), batch normalization, residual networks(ResNet), densely connected networks(DenseNet)

Unit III

Recurrent neural networks – sequence models, text processing, language models and the dataset, recurrent neural networks, back propagation through time

Modern Recurrent neural networks – gated recurrent units(GRU), long short term memory(LSTM), deep recurrent neural networks, bidirectional recurrent neural networks, machine translation and the dataset, encoder-decoder architecture, sequence to sequence

Attention mechanisms – attention mechanism, sequence to sequence with attention mechanism, transformer

Unit IV

Computer vision – Image augmentation fine tuning, object detection and bounding boxes, anchor boxes, multiscale object detection, the object detection dataset, single shot multibox detection(SSD), region based CNNs(R-CNNs), semantic segmentation and the dataset, transposed convolution, fully convolutional networks(FCN), neural style transfer, image classification(CIFAR-10) on kaggle, dog breed identification (Imagenet dogs) on kaggle

Unit V

Generative adversarial networks – Generative adversarial networks, deep convolutional generative adversarial networks

Tools for deep learning – using jupyter, using amazon sagemaker, using AWS EC2 instances, using google colab, selecting servers and GPUs

Suggested Reading

1. Ian goodfellow, Yoshuabengio, Aaron courville, “Deep learning”
Zhang, Aston, et al. "Dive into deep learning." arXiv preprint arXiv:2106.11342 (2021).

PE 624CS

**DISTRIBUTED DATABASES SYSTEMS
(Professional Elective-II)**

Instruction: 3L hrs per week

CIE: 30 Marks

Credits: 3

Duration of SEE: 3 hours

SEE: 70 Marks

Course Objectives:

The aim of the course is to

- Enhance the previous knowledge of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, and showing the need for distributed database technology to tackle deficiencies of the centralized database systems;
- Introduce basic principles and implementation techniques of distributed database systems,
- Expose active and emerging research issues in distributed database systems and application development,
- Apply theory to practice by building and delivering a distributed database query engine, subject to remote Web service calls.

Course Outcomes:

After the completion of the course, the students are expected to

1. Get familiar with the currently available models, technologies for and approaches to building distributed database systems and services;
2. Have developed practical skills in the use of these models and approaches to be able to select and apply the appropriate methods for a particular case;
3. Be aware of the current research directions in the field and their possible outcomes;
4. Be able to carry out research on a relevant topic, identify primary references, analyze them, and come up with meaningful conclusions
5. Be able to apply learned skills to solving practical database related tasks.

UNIT- I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object-Based and Semistructured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems.

Relational Model: Structure of Relational Databases, Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra Operations, Null Values, Modification of the Database.

UNIT-II

Query Processing: Overview, Measures of query cost, Selection operation, sorting, Join operation, other operations, Evaluation of Expressions.

Query Optimization: Overview, Transformation of Relational expressions, Estimating statistics of expression results, Choice of evaluation plans, Materialized views.

UNIT-III

Parallel Systems: Speedup and Scaleup, Interconnection Networks, Parallel Database Architectures.

Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism, Intraoperation Parallelism, Design of Parallel Systems.

UNIT-IV

Distributed Databases: Reference architecture for DDB, Types of Data Fragmentation, Distribution Transparency for Read-only applications, Distribution Transparency for Update applications, Distributed Database Access Primitives, Integrity Constraints in DDB.

Distributed Database Design: A frame work for Distributed Database Design, The design of Database fragmentation, The allocation of fragmentation.

UNIT-V

Translation of Global Queries to Fragment Queries: Equivalence transformations for queries, Transforming global queries into fragment queries, Distributed grouping and aggregate function evaluation, Parametric queries.

Optimization of Access Strategies: Access Control Models, Database Security, A framework for query optimization, Join queries, General queries.

Suggested Reading:

1. Silberschatz A, Korth HF, Sudarshan S, *Database System Concepts*, McGraw-Hill International Edition, 5th Edition, 2006.
2. Ceri S, Pelagatti G, *Distributed Databases: Principles and Systems*, McGraw-Hill International Edition, 1984.

With effect from academic year 2023-2024

PEC422

Digital Forensics

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
2. Understand how to examine computing investigations
3. Understand data acquisition
4. Understand processing crimes
5. Understand forensics tools

Course Outcomes

1. Know how to apply forensic analysis tools to recover important evidence for identifying computer crime.
2. To be well-trained as next-generation computer crime investigators.
3. Learn data acquisition
4. Learn processing crimes
5. Learn forensics tools

Unit -I

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues.

Unit- II

Understanding Computing Investigations – Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations.

Unit-III

Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.

Unit-IV

Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case.

Unit-V

Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool.

Suggested Readings

1. Warren G. Kruse II and Jay G Heiser, “Computer Forensics: Incident Response Essentials”, Addison Wesley, 2002
2. Nelson, B, Phillips, A, Enfinger, F, Stuart, C., “Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.
3. Vacca, J, *Computer Forensics, Computer Crime Scene Investigation*, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

With effect from academic year 2023-2024

Optimization Techniques

PEC423

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Understand the optimization basics
2. Understand optimization using calculus
3. Understand dynamic programming and its applications
4. Understand integer programming
5. Understand advanced optimization techniques

Course Outcomes

1. Learn the optimization basics
2. Learn optimization using calculus
3. Learn dynamic programming and its applications
4. Learn integer programming
5. Learn advanced optimization techniques

Unit I

Introduction and Basic Concepts

Historical Development; Engineering applications of Optimization; Art of Modeling Objective function; Constraints and Constraint surface; Formulation of design problems as Optimization techniques –classical and advanced techniques

Unit II

Optimization using Calculus

Stationary points; Functions of single and two variables; Global Optimum Convexity and concavity of functions of one and two variables Optimization of function of one variable and multiple variables; Gradient vectors; Examples Optimization of function of multiple variables subject to equality constraints; Lagrangian function Optimization of function of multiple variables subject to equality constraints; Hessian matrix formulation; Eigen values Kuhn-Tucker Conditions; Examples

Unit III

Dynamic Programming

Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of Optimality Recursive equations –Forward and backward recursions; Computational procedure in dynamic programming (DP) Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP

Unit IV

Dynamic Programming Applications

Problem formulation and application in Design of continuous beam and Optimal geometric layout of a truss Water allocation as a sequential process Capacity expansion and Reservoir operation

Integer Programming

Integer linear programming; Concept of cutting plane method Mixed integer programming; Solution algorithms; Examples

Unit V

Advanced Topics in Optimization

Piecewise linear approximation of a nonlinear function Multi objective optimization –Weighted and constrained methods; Multi level optimization Direct and indirect search

Methods Evolutionary algorithms for optimization and search

Applications in civil engineering

Suggested Reading

1. S.S. Rao, "Engineering Optimization: Theory and Practice", New Age International P)Ltd., New Delhi, 2000.
2. G. Hadley, "Linear programming", Narosa Publishing House, New Delhi, 1990.
3. H.A. Taha, "Operations Research: An Introduction", 5th Edition, Macmillan, New York, 1992.
4. K. Deb, "Optimization for Engineering Design-Algorithms and Examples", Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.

K. Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management", PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.288, 2010.

With effect from academic year 2023-2024

PEC424

Enterprise Architecture

Credits : 3

Instruction 3L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the fundamentals of EA
2. Study the business architecture
3. Understand the organizational structure of EA
4. Comprehend enterprise engineering
5. Gain insights into cloud computing opportunities for EA

Course Outcomes

1. Learn the fundamentals of EA
2. Study the business architecture
3. Understand the organizational structure of EA
4. Comprehend enterprise engineering
5. Gain insights into cloud computing opportunities for EA

Unit I

Introduction to EA -System analysis, general system theory, definitions and objectives of considerations, Properties of EA, system approach to EA development, principle definitions

Unit II

Business architecture, definition and features, BSC – balanced score card basics and its reflection in EA, Strategic governance, Event Causality effects in EA under scope of BSC

Unit III

Organizational structure of EA and basic models, Information and technology architecture basics, Introduction to EA structuring and modeling, Business architecture (inc. business process modeling, IBM Component business model), Information architecture, Technology architecture and integration between the layers model

Unit IV

Introduction to enterprise engineering (EE), Enterprise transformations (waterfall and agile), EAP, EA methodologies: PRISM, ARIS Framework, Zachmann Framework , FEAF, DODAF and TOGAF, Introduction to Service orientation in Enterprise Engineering (SOA, SoEA), Technological infrastructure for Big Data handling in EA

Unit-V

Cloud Computing Opportunities for EA, Flexible (agile) business and information architectures (SoEA).

Introduction to Spark, Spark Data Frames, SQL, Datasets through worked examples. Spark's low level APIs, RDDs, execution of SQL & Data Frames.

How Spark Runs on a Cluster.

Structured Streaming, Spark's Stream – Processing Engine.

Suggested Reading

1. Designing Enterprise Architecture Frameworks: Integrating Business Processes with IT Infrastructure by N Zarvić, R Wieringa. Apple Academic Press (19 April 2016), 360 p. URL: <https://doi.org/10.1201/b16417>
2. Neubauer M., Stary CH., S-BPM in the Production Industry. Stakeholder approach, Springer Open, 2017. URL: <https://www.springer.com/gp/book/9783319484655>
3. A systematic literature review on Enterprise Architecture Implementation Methodologies by Babak D., Mohd N. Elsevier (June 2015), p. 1-20. URL: <https://doi.org/10.1016/j.infsof.2015.01.012>
5. Spark : The Definite Guide – Bill Chambers, MateiZaharia, 2018.

With effect from academic year 2023-2024

OE431

Professional Ethics

Credits : 2

Instruction 2L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the developments of legal profession in India
2. Study the seven lamps of advocacy
3. Understand disciplinary proceedings
4. Comprehend the accountancy for lawyers
5. Gain insights into safety and risk

Course Outcomes

1. Explain the developments of legal profession in India
2. Describe the seven lamps of advocacy
3. Elaborate disciplinary proceedings
4. Elucidate the accountancy for lawyers
5. Discuss insights into safety and risk

UNIT-I

Development of Legal Profession in India — Advocates Act, 1961 — Right to Practice — a right or privilege? -- Constitutional guarantee under Article 19(1) (g) and its scope — Enrolment and Practice — Regulation governing enrolment and practice — Practice of Law — Solicitors firm — Elements of Advocacy.

UNIT-II

Seven lamps of advocacy — Advocates duties towards public, clients, court, and other advocates and legal aid ; Bar Council Code of Ethics.

UNIT-III

Disciplinary proceedings --- Professional misconduct — Disqualifications — Functions of Bar Council of India/State Bar Councils in dealing with the disciplinary proceedings — Disciplinary Committees -- Powers and functions - Disqualification and removal from rolls.

UNIT-IV

Accountancy for Lawyers - Nature and functions of accounting — Important branches of accounting — Accounting and Law – Bar - Bench Relations.

UNIT- V

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Suggested Readings

1. Myneni S.R, Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation, Asia
2. Gupta S.P, Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation, Asia Law House, Hyderabad.
3. Kailash Rai, Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation, Allahabad Law Agency.
4. Siroh, Professional Ethics, Central Law Publications, Allahabad.
5. Ramachandra Jha, Selected Judgements on Professional Ethics, Bar Council of India Trust.

With effect from academic year 2023-2024

OE432

Constitution of India

Credits : 2

Instruction 2L hrs per week

Duration of SEE 3 hours

CIE 30 marks

SEE 70 marks

Course Objectives

1. Learn the basics of the constitution
2. Understand the structure of the union government
3. Comprehend the state government structure
4. Gain insights into local administration
5. Study about the election commission

Course Outcomes

1. Explain the basics of the constitution
2. Elucidate the structure of the union government
3. Elaborate the state government structure
4. Describe the local administration
5. Discuss the election commission

Unit 1 – The Constitution - Introduction

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit 2 – Union Government

- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

Unit 3 – State Government

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 4 – Local Administration

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 5 – Election Commission

- Role and Functioning
- Chief Election Commissioner
- State Election Commission

Suggested Readings

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites

1. <https://www.constitution.org/cons/india/const.html>
2. <http://www.legislative.gov.in/constitution-of-india>
3. <https://www.sci.gov.in/constitution>
4. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

With effect from academic year 2023-2024

OE433

Disaster Management

Credits : 2

Instruction 2L hrs per week

Duration of SEE 3 hours

CIE 30 marks

SEE 70 marks

Course Objectives

1. To learn about various types of natural and man-made disasters.
2. To know pre- and post-disaster management for some of the disasters.
3. To know about various information and organisations in disaster management in India.
4. To get exposed to technological tools and their role in disaster management.

Course Outcomes

After competing this course, student will be

1. Acquainted with basic information on various types of disasters
2. Knowing the precautions and awareness regarding various disasters
3. Decide first action to be taken under various disasters
4. Familiarised with organisation in India which are dealing with disasters
5. Able to select IT tools to help in disaster management

Unit – I: Understanding Disaster

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity, Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit- III: Disaster Management Cycle and Framework

Disaster Management Cycle – Paradigm Shift in Disaster Management.
Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India

Disaster Profile of India – Mega Disasters of India and Lessons Learnt.
Disaster Management Act 2005 – Institutional and Financial Mechanism,
National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies

Unit– V: Applications of Science and Technology for Disaster Management

Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters
S&T Institutions for Disaster Management in India

Suggested Readings

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

With effect from academic year 2023-2024

OE434

Organization Behaviour

Credits : 2

Instruction 2L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn management process and functions
2. Study decision making and negotiations
3. Comprehend psychological contract
4. Understand models of organization behaviour
5. Gain insights into organization design

Course Outcomes

1. Explain management process and functions
2. Discuss decision making and negotiations
3. Describe psychological contract
4. Elaborate models of organization behaviour
5. Elucidate the organization design

UNIT I

Management Process and Functions, Scientific and Modern Management, 3D Model of Managerial Behavior - MBO - MBWA - Line and Staff - The Peter's Principle - Parkinson's Law - Approaches to Organization Structure-Management - Classical, Human Relations, Systems and Contingency Approaches, Hawthorne's Experiments - Human Engineering.

UNIT II

Decision Making and Negotiations: Approaches to Decision making - Rational, Behavioral, Practical, and Personal Approaches - Open and Closed Models of Decision Making, Types and steps in planning, Authority, Responsibility, Centralization, Decentralization and Recentralization, Bureaucracy.

UNIT III

Psychological contract - Personality Traits, Big 5 personality traits, MBTI inventory, the Process of Perception - Perceptual distortions and errors, Kelly's personal construct Theory, Motivation-Content Theories: Maslow, Alderfer, Herzberg, McClelland. Process Theories: Vroom, Potter and Lawler, Equity Theory - Goal Theory - Attribution Theory.

UNIT IV

Models of Organization Behavior - Autocratic, Custodial, Supportive, Collegial and System Models, Transactional Analysis, Johari Window. Group Dynamics: Typology of Groups - Conflicts in groups - The nature, of conflict - Reactions to conflict - A model of conflict. Trait and Behavioral Approaches to Leadership, Managerial Grid, Path-Goal Theory, Vroom's Decision Tree Approach to Leadership - Hersey and Blanchard Model.

UNIT V

Organization Design, Organization culture and organization climate, Stress Management and Counseling, Management of change and organization development. Communication - Emerging aspects of OB.

Suggested Readings

1. Harold Koontz and Heinz Weihrich, Essentials of Management, 9th Edition, McGraw Hill Education, 2015.
2. Curtis W. Cook and Phillip L. Hunsaker, Management and Organizational Behavior, 3rd Edition, McGraw-Hill, 2010.

With effect from academic year 2023-2024

OE435

Intellectual Property and Cyber Law

Credits : 2

Instruction 2L hrs per week
CIE 30 marks

Duration of SEE 3 hours
SEE 70 marks

Course Objectives

1. Learn the fundamentals of intellectual property
2. Study the basics of international instruments of IPR
3. Understand the laws concerning copyright in India
4. Comprehend the IP in trademarks
5. Gain insights into the concept of patent

Course Outcomes

1. Explain the fundamentals of intellectual property
2. Elaborate the basics of international instruments of IPR
3. Describe the laws concerning copyright in India
4. Discuss the IP in trademarks
5. Explain the concept of patent

UNIT-I

Meaning, Nature, Classification and protection of Intellectual Property, The main forms of Intellectual Property, Copyright, Trademarks, Patents, Designs (Industrial and Layout), Geographical Indications Plant Varieties Protection and Biotechnology

UNIT-II

Introduction to the leading International instruments concerning Intellectual Property Rights, The Berne Convention, Universal Copyright Convention, The Paris Union, Patent Cooperation Treaty, The World Intellectual Property Organization (WIPO) and the UNEESCO, International Trade Agreements concerning IPR, WTO, TRIPS.

UNIT-III

Select aspects of the Law of Copyright in India The Copy Right Act,1957 Historical evolution, Meaning of copyright, Copyright in literary, dramatic and musical works, computer programmes and cinematograph films, Neighbouring rights, Rights of performers and broadcasters, etc., Ownership and Assignment of copyright, Author's special rights, Notion of infringement, Criteria of infringement Infringement of copyright in films, literary and dramatic works, Authorities under the Act, Remedies for infringement of copyright.

UNIT-IV

Intellectual Property in Trademarks and the rationale of their protection - The Trade Marks Act. 1999 —Definition of Trademarks — Distinction between Trademark and Property Mark - Registration — Passing off — Infringement of Trademark — Criteria of Infringement — Remedies. The Designs

Act, 2000 -- Definition and characteristics of Design — Law in India — Protection and rights of design holders -- Copyright in design — Registration — Remedies for infringement.

UNIT-V

Patents — Concept of Patent — Historical overview of the Patents Law in India — Patentable Inventions —Kinds of Patents — Procedure for obtaining patent — The Patents Act, 1970 — Rights and obligations of a patentee — Term of patent protection — Use and exercise of rights — Exclusive Marketing Rights — Right to Secrecy — The notion of 'abuse' of patent rights — Infringement of patent rights and remedies available.

Suggested Readings

1. P. Narayanan, Patent Law, Eastern Law House, 1995.
2. Roy Chowdhary, S.K. & Other, Law of Trademark, Copyrights, Patents and Designs, Kamal Law House, 1999.
3. Dr. G.B. Reddy, Intellectual Property Rights and the Law ,5th Edition, Gogia Law Agency, 2005.

With effect from academic year 2023-2024

OE436

Environmental Science

Credits : 2

Instruction 2L hrs per week

Duration of SEE 3 hours

CIE 30 marks

SEE 70 marks

Course Objectives

1. Learn the scope and importance of environmental studies
2. Study about the environment and natural resources
3. Understand the environmental pollution
4. Comprehend the regional and sectoral issues concerning environment
5. Gain insights into social issues and the environment

Course Outcomes

1. Explain the scope and importance of environmental studies
2. Elaborate the environment and natural resources
3. Describe the environmental pollution
4. Discuss the regional and sectoral issues concerning environment
5. Explain the social issues and the environment

UNIT-I

Environmental Studies: Introduction - Definition, Scope and Importance - Basic principle of ecosystem functioning - Concept of ecosystem, structure and functioning of ecosystem, introduction and characteristic features, structures and functions, different ecosystems.

Biodiversity and its conservation: Introduction - Bio-geographical classification of India. Value of biodiversity - consumptive and predictive use, social, ethical and optional values. Biodiversity - Global, National and local levels. Hot spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of biodiversity - In-situ and Ex-situ conservant.

UNIT-II

Environmental and Natural Resources: Forest resources - Use and over-exploitation, Deforestation, Timber extraction, Mining and dams - their effects on forests and tribal' people. Water resources - Use and over-utilization of surface and ground water, floods, droughts, conflicts over water, dams - effects of extracting and using mineral resources. Food resources - World food problems - change caused by agricultural and overgrazing, effects of modern agricultural fertilizer pesticide problems, water logging and salinity.

Environmental Valuation: Welfare measure and environmental values, definition and classification of environmental values, valuation methods. Environmental Economics: Economic approach to environmental preservation and conservation, property rights and externalities, management of natural resources.

UNIT-III

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution.

Environmental Problems in India: Effects of human activities on the quality of life, Water and River, Ground water, Wasteland reclamation.

UNIT-IV

Regional and Sectoral Issues: Urbanization, Agro-forestry, Dry lands, Goods and services, Mountain development, River basin water resources management. sustainable tourism, and Coastal zone management. Environment and Development: The economy and environment interaction, State of the Environment - Economics of development; Preservation and conservation.

Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles - Role of an individual in prevention of pollution.

Human Population and the Environment: Population growth and environment - Human Rights.

UNIT-V

Social Issues and the Environment: Sustainable Development - Resettlement and rehabilitation of people and its problems and concerns.

Environmental ethics: Issues and possible solutions-Consumerism and waste products - Public awareness. Sustainable resources management. Design of Environmental Policy -- Direct regulation by Government - Command and control instrumentation.

Suggested Readings

1. B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji & K. Purushottam Reddy, An Introduction to Environmental Studies, Maruti Publications.
2. C.Manohar Chary and P.Jayaram Reddy, Principles of Environmental Studies, B.S. Publications, Hyderabad.
3. Y.Anjaneyulu, Introduction to Environmental Science, B.S. Publications, Hyderabad.

With effect from academic year 2023-2024

Proj401

Project Work

Credits : 12

Instruction 24hrs per week

Duration of SEE 3 hours

CIE 50 marks

SEE 100 marks

Project has to be carried out by each student individually in a period of 15 weeks of duration. Students should submit a synopsis at the end of 2nd week in consultation with the Project Guide. The synopsis should consist of definition of the problem, scope of the problem and plan of action. After completion of eight weeks students are required to present a Project Seminar on the topic covering the aspects of analysis, design and implementation of the project work.

At the end of the semester the students are required to present themselves for a University Viva-voce examination. Evaluation guidelines for the award of SEE marks are mentioned in the Rules and Regulations book.

A committee consisting of two faculty members of the respective college along with a guide will evaluate the project and award CIE marks.

Each student will be required to:

1. Submit one page of synopsis on the project work for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the project.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of CIE marks which will be on the basis of performance in all the 3 items stated above.

The project seminar presentations should include the following components of the project:

- Problem definition and specification.
- Literature survey, familiarity with research journals.
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar (activity) charts, Presentation both oral and written.

Course Objectives:

The aim of the course is to

- Enhance the previous knowledge of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, and showing the need for distributed database technology to tackle deficiencies of the centralized database systems; Introduce basic principles and implementation techniques of distributed database systems
- Expose active and emerging research issues in distributed database systems and application development, Apply theory to practice by building and delivering a distributed database query engine,
- subject to remote Web service calls. Course Outcomes: After the completion of the course, the students are expected to 1. Get familiar with the currently available models, technologies for and approaches to building distributed database systems and services; 2. Have developed practical skills in the use of these models and approaches to be able to select and apply the appropriate methods for a particular case; 3. Be aware of the current research directions in the field and their possible outcomes; 4. Be able to carry out research on a relevant topic, identify primary references, analyze them, and come up with meaningful conclusions 5. Be able to apply learned skills to solving practical database related tasks.