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.
 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.

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, Serializablity, and Recoverablity, 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 W AL, Check pointing, 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. Raghu Ramakrishnan, Johannes Gehrke, "*Database Management Systems*", 3rd Edition, McGraw Hill, 2003.
 2. Abraham Silberschatz, Henry F Korth, S Sudharshan, "*Database System Concepts*", 6th Edition, McGraw-Hill International Edition, 2011
3. Peter Rob, Carlos Coronel, "*Database System Concepts*", Cengage Learning, 2008
4. 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 Liner 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 x n or m x 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.
4. 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*

I. SQLIPL- SQL:

1. Creation of database (exercising the commands for creation)

2. Simple to complex condition query creation using SQL plus

3. Demonstration of blocks, cursors & database triggers.

II. Forms / Reports :

4. Creation of forms for the case study assigned.

5. Creation of Reports based on different queries.

6. Creating password and security features for applications.

7. Usage of file locking and table locking facilities in applications.

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

Note :

(i) Use Case Studies as Library Information Studies, Pay roll System, Bank Information System, Reservation System, Inventory System, etc.

(ii) 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.

(iii) 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

1. Printing file flags for specified descriptor.

2. Print type of file for each command line arguments.

3. Recursively descends a director hierarchy counting file types.

4. Program using process related system calls.

5. Programs to create threads.

6. Program using Signals.

7. Echo Server-using pipes.

8. Echo Server-using messages.

9. Producer& Consumer Problem using Semaphores and Shared Memory.

10. Producer & Consumer Problem using message passing.

11. Readers and Writers Problem using message passing.

12. Dining Philosopher's problem using semaphores.

13. Program using File Locking.

14. Understanding and submitting and assignment on RC scripts.

15. 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, McCleland. 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:

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 Organisational Behaviour,* 3rd Edition, McGraw-Hill,2010.

3. Robbins & Judge, *Organisational Behaviour*, Prentice Hall of Indi, 2010.

4. Gregory Moorhead and Ricky W. Griffin, *Organisational Behaviour*, 2010

5. VSP Rao, V. Harikrishna, *Management - Text and Cases, Excel Books* ,2010.

6. K. Aswathappa, *Organisational Behaviour - Text, Cases and Games*, Himalaya Publishing House, 2010.

7. Udai Pareek, *Understanding Organisational Behaviour*, Oxford University Press,2010.

8. Lauriel J Mullins, *Management & Organisational Behaviour*, Pearson, 2010.

9. Robin Finchem and Peter Rhodes, *Principles of Organisational Behaviour*, Oxford University Press, 2010.

10. 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 Law House, Hyderabad.
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.

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 Costal 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.

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.	PC401IT	Data Mining	3	1	0	4	30	70	3
2.	PC402IT	Computer Networks	3	0	0	4	30	70	3
3.	PC403IT	Unix Programming	3	0	0	4	30	70	3
4.	PC404IT	Web Programming	3	0	0	4	30	70	3
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
		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

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 Neutral 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) - 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, namespaccs, 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, test 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 ONMUOUSEMOVE, 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 verses 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 verses 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:

1. Andrew S. Tanenbaum and Van Steen, *Distributed Systems* . PHI, 2nd Edition, 2010.
2. 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)

   a) Demonstrate user-defined functions
   b) Demonstrate Control Structures
   c) Demonstrate Caching a Template Fragment
   d) Programs based on object oriented design.

   6. Examples using IPC
   7. Echo Server using TCP (Concurrent or Iterative) and UDP
   8. Time of the day server
   9. Talker and Listener
   10. Ping routine
   11. Trace route
   12. 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.

   a) Headers
   b) Linking Images.
   c) Images as anchor.
   d) Text Formatting.
   e) HTML Table Formatting.
   f) 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.

7. Demonstrating object hierarchy using collection children.

8. Using HTML Events.

9. Using Transition & Filters like Flip filter, Chrome filter, Shadow filter etc.,

10. VB script classes and regular expression.

11. Installing Web Server (PWS or IIS).

12. Guest book Active Server pages.

13. 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:

- Grouping of students (a maximum of three in group)
- Allotment of project guides
- 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 Al, 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.

Uncertainity Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainity 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:

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

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:
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.

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, Chomosky'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:
1. 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.