School of Computer Science, Engineering& Applications

Bharathidasan University

Tiruchirappalli - 620023



MCA Computer Applications - Course Structure and Syllabus

(Applicable to the candidates admitted from the academic year 2024-2025 onwards)

BHARATHIDASN UNIVERSITY
SCHOOL OF COMPUTER SCIENCE, ENGINEERING&APPLICATIONS

MASTER OF COMPUTER APPLICATIONS
(CHOICE BASED CREDIT SYSTEM)
REGULATIONS
(w.e.f. 2024 - 2025)

1. **Aim of the Course** The course strives to inculcate job-oriented and value based quality education in Information Technology and Commercial Application Development. . At the end of the course, the students will be well-versed, particularly in core subjects with quality in inter-personal and professional skills.

2. **Eligibility for Admission** A Candidates who has passed B.Sc.(Computer Science, Computer Technology, Information Technology,Information Science, Information Systems, Software Science, Software Development, BCA of this University or from a recognized University.

3. **Duration of the Course**The Course duration shall be for two years consisting of four semesters. In order to be eligible for the award of the degree the candidate shall successfully complete the course in a maximum period of four years from the date of enrolment for the first semester of the course.

4. **Choice Based Credit System**The University follows the 'Choice Based Credit System (CBCS)' for all its programmes. Each credit is worth 12 hours of student study time, comprising all learning activities. Thus a four-credit course involves 48 study hours. This helps the student to understand the academic effort and to successfully complete a course.

5. Structure of the Course and Evaluation Pattern

Internal Marks:**25** External Marks: **75**

The duration of University examination for both theory and practical subjects shall be 3 hours. The maximum marks for each theory and practical course is 100. Continues Internal Assessment (CIA) will be 25. The university theory examination will be conducted for 75 marks, which will be add with continues internal assessment to make 100 marks for the course. For the conduct of University examinations in theory, the question paper for the theory examination will be set by the external examiner and for practical examination, the question paper will be set by both internal and external examiners appointed by the Department.

6. Attendance

- Students should gain at least 75% attendance in each course.
- In each semester every candidate must compulsorily register for the examination in all the courses pertaining to that semester.
- Candidate who has less than 75% attendance of the working days in a semester will be permitted to take the ESE pertaining to that semester unless he/she gets condonation certificate.
- On the day on which a course is concluded, the course teacher of the course shall intimate the Head of the Department, the particulars of all the students who have shortage of attendance in the course offered by him/her.
- The Head of the Department should announce the names of all the students who will not be eligible to take the end semester examination in the various courses due to shortage of attendance.
- Condonation of shortage of attendance shall be given as per the provisions given below:

The Head of the Department may condone lack of attendance for a student in a course when the student had put in at least 65% attendance for the course concerned and pays a condonation fee of suitable amount to be prescribed by the University from time to time. A candidate who has put in less than 65% attendance must repeat the course.

7. Procedures for Awarding Marks for Internal Assessment

THEORY COURSES

For regularity and discipline - 5 Marks

For two assignment (Equal weightage) - 5 Marks

For two tests to be conducted (Equal weightage) - 5 Marks

Model examination - 10 Marks

Total - 25 Marks

PRACTICAL COURSES

For regularity and discipline - 5 Marks

Completion of all Experiments prescribed for the course - 5 Marks

Observation Note - 5 Marks

For model Examination at the end of the Semester - 10 Marks

Total - 25 Marks

In the case of CIA, a candidate who secures not less than 40% of total marks prescribed forany course shall be declared to have passed for that course, failing which the candidate has toredo the academic activities prescribed for the continuous internal assessment (CIA).

8. Pattern of Question Paper (Theory)

Time 3 hours Max Marks: 75

Section - A: (10 X 2 = 20 Marks)

All questions are to be answered. Two questions from each Unit

Section - B:(5X 5 = 25 Marks)

Five Questions are to be answered, Two questions from each unit in the either orpattern

Section - C: (3 x 10 = 30 Marks)

Three Questions are to be answered out of five questions – one question from eachUnit

9. PassingMinimumforacourse

A candidate shall be declared to have passed a certain course if he/she secures not less than 40%marks in the internal and external(ESE), and not less than 50% in the aggregate.

A candidate shall be declared to have passed in the project work if he/she gets not less than 40% inthe valuation of dissertation and not less than 50% in the aggregate of both the marks for valuation ofdissertationand viva-voceexamination to pass in project work.

10. SupplementaryExaminations:

Any candidate, for whom, when the results of the exam conducted in April/May of the end of thesemester are published there is just one course for which credit is to be earned and it is from the finalsemester, will be eligible to appear for the supplementary exam which may be conducted in thesupplementaryJuly/August providedthat he/sheappears for theESE forthat coursesin April/May.

Master of Computer Application(MCA)-Programme Outcomes

S.No	Programme Outcome
PO1	Computational Knowledge: Apply knowledge of computing fundamentals and domain knowledge.
PO2	Problem Analysis: Identify, formulate and solve complex computing problems reaching substantiated conclusions.
PO3	Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.
PO4	Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities
PO5	Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and
PO6	Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity
PO7	Project management and finance: Understand and apply computing, management principles to manage multidisciplinary projects
PO8	Communication Efficacy: Communicate effectively with the computing community, and with society

Master of Computer Application (MCA) - Program Specific Outcome

S.No	Programme Specific Outcome
PSO1	Apply the knowledge of computer application to find solutions for real-life application
PSO2	Ability to analyze, design, develop and maintain the software application with latest technologies
PSO3	Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.
PSO4	Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises
PSO5	Develop techniques to enhance ability for lifelong learning.
PSO6	Develop class environment congenial and competitive for generation of ideas, innovation and sharing.
PSO7	To make graduates understand cross cultural, societal, professional, legal and ethical issues prevailing in industry
PSO8	Ability to research, analyze and investigate complex computing problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.

MCA Programme - Course Structure and Syllabus under CBCS

(Applicable to the candidates admitted from the academic year 2024-2025 onwards)

Course Number	Course Code	Course Name	L	P	C	Marks		Total
						Int.	Ext.	
Semester I								
MCA24101	CC- I	Mathematics for Computing	5	0	5	25	75	100
MCA24102	CC- II	Data Structures and Algorithm	5	0	4	25	75	100
MCA24103	CC-III	Advanced Operating System	4	0	4	25	75	100
MCA24104	CC-IV	Database Technologies	4	0	4	25	75	100
MCA24105	CC-V	Accounting and Financial Management	4	0	4	25	75	100
MCA24106P	CC-VI	Lab I – Data Structures and Algorithm	0	3	2	25	75	100
MCA24107P	CC-VII	Lab – II Database Technologies	0	3	2	25	75	100
24VAC01	VAC – I	Value Added Course – I	2	0	0	25	75	100
		Total	**30**		**25**	**-**	**-**	**700**
Semester II								
MCA24201	CC-VIII	Optimization Techniques	5	0	4	25	75	100
MCA24202	CC-IX	Python Programming	4	0	4	25	75	100
MCA24203	CC-X	Cryptography& Networks Security	5	0	5	25	75	100
MCA24204	EC-I	Elective – I	4	0	4	25	75	100
MCA24205	EC- II	Elective – II	4	0	4	25	75	100
MCA24206P	CC-XI	Lab- III Python Programming	0	3	2	25	75	100
MCA24207P	CC-XII	Lab - IV Network Security	0	3	2	25	75	100
EDC-I		Extra Disciplinary Course – I	2	0	2	25	75	100
		Total	**30**		**27**	**-**	**-**	**800**
		Summer Internship						

Semester III								
MCA24301	CC-XIII	Mobile Application Development	4	0	5	25	75	100
MCA24302	CC-XIV	Artificial Intelligence & Machine Learning	4	0	5	25	75	100
MCA24303	CC-XV	Cloud Computing	4	0	4	25	75	100
MCA24304	EC-III	Elective – III	4	0	4	25	75	100
MCA24305	EC-IV	Elective – IV	4	0	4	25	75	100
MCA24306P	CC- XVI	Lab – V:MobileApplication Development	0	3	2	25	75	100
MCA24307P	CC-XVII	Lab- VI: Artificial Intelligence & Machine Learning	0	3	2	25	75	100
EDC-II		Extra Disciplinary Course – II	2	0	2	25	75	100
24VAC02	VAC – II	Value Added Course – II	2	0	0	25	75	100
		Total	**30**		**28**	**-**	**-**	**800**
Semester IV								
MCA24401	CC- XIX	Major Project	-	-	**10**	-	-	**100**
		Grand Total			**90**	**-**	**-**	**2400**

Online Courses (Extra Credit Course)

MCA24402	Online Course – I	MOOCs /SWAYAM/NPTEL

List of Elective Courses

Elective I		Elective II	
1	Open Source Technologies(A)	1	Professional Ethics(A)
2	Computer Graphics and Animation(B)	2	Organization Behavior(B)
3	Service Oriented Architecture and Web Services(C)	3	Management Information System(C)

Elective III		Elective IV	
1	Block Chain Technologies(A)	1	Interactive Technology(A)
2	Digital Forensics(B)	2	Computer Vision(B)
3	Soft Computing(C)	3	Internet of Things(C)

List of Value Added Courses

Course Number	Course Code	Course Name
24VAC01	VAC-I	Soft Skills: Professional English
24VAC02	VAC-II	Website Development

Mandatory Bridge Courses for Students of Non-Computer Science Stream

Semester	Course Number	Course Name	Credits	Marks		Total
				Int.	Ext.	
I	24BDCO1	Programming Languages	2	25	75	100
II	24BDCO2	Principle of Computing	2	25	75	100
III	24BDCO3	Web Programming	2	25	75	100
Bridge Courses Credits: 6						

Recommended Credits Distribution:

(i) Computer Science (Total should not be less than 90 Credits)

(ii) Non-Computer Science (Total should not be less than 96(90+6) Credits)

(iii) Online Courses (Extra Credit Course) credits are included in the Cumulative Mark Statement but credits are not included in CGPA.

Course Type	Course	Total Credits
Core (Theory)	11	48
Core (Practical)	6	12
Core (Major Project)	1	10
Elective	4	16
Extra Disciplinary Course	2	4
Value Added Course	2	-
Bridge Courses	3	6
Online Course (Extra Credit Course)	1	-
Total	**30**	**90+6**

Course Number:MCA24101 **CC-I**

L-P:5-0 **Credits: 5**

MATHEMATICS FOR COMPUTING

Objectives:

- To make students understand the basic principal ofProbability.
- To understand about the Probability Distribution of aVariable.
- To familiarize the students with Moments and GeneratingFunctions.
- To expose the Mathematic Logicconcepts.
- To familiarize the students with Permutations andCombination

UNIT I:

Probability: Introduction – Sample Space – Probability Axioms- Probability on Finite Sample Spaces, Conditional Probability and Bayes Theorem, Independence of Events.

UNIT II:

Random Variables and Their Probability Distributions: Introduction - Random Variables - Probability Distribution of Random Variable - Discrete and Continuous Random Variables - Functions of a Random Variable.

UNIT III:

Moments and Generating Functions: Introduction - Moments of a Distribution Function - Generating Functions - Some Moment Inequalities - Multiple Random Variables - Independent Random Variables - Functions of Several Random Variables.

UNIT IV:

Mathematical Logic: Connectives – Tautologies - Contradictions - Inverse, Converse, and Contra-positive - Normal Forms - Rules of Inference - Principle Conjunctive and Disjunctive Normal Forms, Equivalence of Statements.

UNIT V:

Permutations and Combination: The Sum Rule and Product Rule – Permutations – Combinations

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Reference Books:

1. VIJAY K. ROHATGI A. K. Md. EHSANES SALEH, –An Introduction to Probability and Statistics‖, Third Edition,Wiley-2015
2. Tim Hill, –Essential Permutations&Combinations: A Self-TeachingGuide‖Questing Vole Press -2018
3. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_propositional_logic.htm
4. https://faculty.math.illinois.edu/~vddries/main.pdf

Outcomes:

- Students can able to understand the basic principles ofProbability.
- Students can able to acquire knowledge about the ProbabilityDistribution.
- Students can get familiarize with Mathematic Logicconcepts.
- Students can get clear idea about Permutations andCombination
- Students can get exposure on Discrete and Continuous RandomVariables.

Course Number:MCA24102 **CC-II**

L-P:5-0 **Credits: 4**

DATA STRUCTURES AND ALGORITHM

Objectives:

- To understand the concept of Linear data structure like stack, list andqueue
- To understand non-linear data structure like Tree andGraph.
- To introduce the fundamentals of Data Structures, Abstract concepts and how these concepts are useful in problemsolving.
- To understand the working principle of various Algorithm design and Analysis Techniques.
- To use the design techniques introduced i.e. dynamic programming, greedy algorithm etc. to design algorithms for more complex problems and analyze theirperformance.

UNIT I:

Linear Structures: AbstractData Types (ADT) – List ADT – array-based implementation – linked list implementation –cursor-based linked lists – doubly-linked lists – applications of lists – Stack ADT – Queue ADT –circular queue implementation – Applications of stacks and queues

UNIT II:

Tree Structures: Implementation of trees-Tree traversal with application-Binary Trees- Binary search Tree- AVL trees-Splay Trees- B-Tree

UNIT III:

Heaps and Indexing: Binary Heaps- *d*-heaps-leftist heaps-skew heaps-Hashing-Hash Function-Separate Chaining-Hash table without linked list- Rehashing-universal hashing-extendible hashing

UNIT IV:

Graphs: Definitions – Topological sort – shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Applications of Depth-first traversal – biconnectivity – Euler circuits –applications of graphs

UNIT V:

Algorithm Design And Analysis: Greedy algorithms – Divide and conquer – Dynamic programming – Randomized algorithms – backtracking algorithm

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

1. M. A. Weiss, –Data Structures and Algorithm Analysis in C++|, Pearson Education Asia, fourth edition,2014.

References:

1. ISRD Group,–DataStructuresusingC|, Tata McGraw-HillPublishingCompanyLtd., 2006.
2. An Introduction to Data Structures and Algorithms, James A StorenSpringer Science,2012.
3. Data Structures and Algorithms made easy, NarasimhaKarumanchi,CreateSpace Independent Publishing Platform,2011.
4. Data Structures Using C - Langsam, Augenstien, Tenenbaum,PHI
5. Data structures and Algorithms, V.Aho, Hopcropft, Ullman ,LPE
6. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH

E-Resources:

1. http://nptel.ac.in/.
2. https://epgp.inflibnet.ac.in/

Outcomes:

- Solve problems using linear datastructure
- Develop to solve real world problems using non-linear datastructure.
- Employ graphs to model problems, when appropriate. Synthesize new graphalgorithms and algorithms that employ graph computations as key components, and analyzethem
- Apply working principle of various Algorithm design and AnalysisTechniques.
- Apply dynamic programming, greedy algorithm to solve complexproblem

Course Number:MCA24103 **CC-III**

L-P:4-0 **Credits: 4**

Advanced Operating System

Objectives:

- To study the characteristics of Multiprocessor and Multicomputer
- To understand the advance concepts of distributed operatingsystems
- To get an insight into the various issues and solutions in distributed operatingsystems
- To learn about data base operatingsystems
- To gain knowledge on the design concepts of mobile operatingsystems

UNIT I:

Multiprocessor Operating Systems: System Architectures- Structures of OS – OS design issues – Process synchronization – Process Scheduling and Allocation- memory management.

UNIT II:

Distributed Operating Systems: System Architectures- Design issues – Communication models – clock synchronization – mutual exclusion – election algorithms- Distributed Deadlock detection

UNIT III:

Distributed scheduling - Distributed shared memory - Distributed File system – Multimedia file systems - File placement - Caching

UNIT IV:

Database Operating Systems: Requirements of Database OS – Transaction process model – Synchronization primitives - Concurrency control algorithms

UNIT V:

Mobile Operating Systems: ARM and Intel architectures - Power Management - Mobile OS Architectures - Underlying OS - Kernel structure and native level programming – Runtime issues- Approaches to power management

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Textbook:

1. MukeshSinghal and Niranjan G. Shivaratri, –Advanced Concepts in Operating Systems Distributed, Database, and Multiprocessor Operating Systems‖, Tata McGraw-Hill, 2001

References:

1. A S Tanenbaum, Distributed Operating Systems, Pearson Education Asia,2001
2. Source Wikipedia, Mobile Operating Systems, General Books LLC,2010
3. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Wiley, Eighth Edition,2008.

E-Resources:

1. http://www.uobabylon.edu.iq/download/M.S%202013-2014/Operating_System_Concepts,_8th_Edition%5BA4%5D.pdf
2. http://index-of.es/Varios-2/Modern%20Operating%20Systems%204th%20Edition.pdf

Outcomes:

Upon completion of this course, the student should be able to

- Knowledge about advance concepts inOS
- Demonstrate the various issues in distributed operatingsystems
- Identify the different features of data base operatingsystems
- Ability to develop modules for Mobiledevices
- Ability to develop OS for distributed operatingsystem

Course Number:MCA24104 **CC- IV**

L-P: 4-0 **Credits: 4**

Database Technologies

Objectives:

- To explore the features of a Database Management Systems
- To understand the basic concepts and terminology related to DBMS and Relational Database Design
- To interface a database with front end tools
- To understand the database design and normalization techniques
- To understand the internals of a database system
- To understand the concept of transaction management in the database

UNIT I:
DatabaseSystem Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT II:
SQL: Queries, Constraints, Triggers:form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases. Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT III:
Overview of XML, DTD, XML schema languages, XML query, XML related technologies, and XML databases.

UNIT IV:
NOSQL Databases and Big Data Storage Systems - Introduction to NOSQL Systems - CAP Theorem - Document-Based NOSQL Systems and MongoDB - NOSQL Key-Value Stores - Column-Based or Wide Column NOSQL Systems - NOSQL Graph Databases and Neo4j.

UNIT V:
Trends in Database Technology: Distributed Databases, Multimedia Databases, Mobile Databases, Temporal Databases and Spatial and Cloud Databases.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):
Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. RamezElmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Pearson Education, New Delhi, 2010.
2. Abraham Silberschatz, Henry F Korth and Sudharshan S, "Database System Concepts", Tata McGraw Hill, New Delhi, 2010.
3. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2016
3. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", McGraw Hill, New Delhi, 2003.
4. Gupta G K, "Database Management Systems", Tata McGraw Hill, New Delhi, 2011.

References:

1. AtulKahate, "Introduction to Database Management Systems", Pearson Education, New Delhi, 2009.

Web Resources :

1. https://www.studytonight.com/dbms
2. www.khanacademy.org › computer-programming › sql
3. https://docs.microsoft.com/en-us/azure/architecture/data-guide/big-data/non-relational-data

Outcomes:

Upon completion of this course, the students will be able to:

- Comprehend the internal working of a database system
- Design database and apply normalization techniques
- Design and develop a database using SQL
- Know about the Transaction management, and database administration techniques
- Understand NOSQL technology

Course Number:MCA24105 **CC-V**

L-P:4-0 **Credits: 4**

ACCOUNTING AND FINANCIAL MANAGEMENT

Objectives:

- Acquire a reasonable knowledge inaccounts
- Analysis and evaluate financial statements
- To possess a managerial outlook at Accounts**.**
- To create Ledger to manage Accounts
- To prepare trial balance sheet

UNIT I:

Meaning and definition of Book-keeping and Accounting – Accounting concepts and conventions –Double Entry and Single Entry Systems of Book-keeping – Advantages and Disadvantages - Journal – Ledger – Subsidiary Books – TrialBalance

UNIT II:

Final accounts of Sole Trader: Trading A/c – Profit & Loss A/c – Balance Sheet – Adjustments: Outstanding and prepaid expenses – Accrued Income and Income Received in Advance – Bad debts – Provision for Bad debts and Provision for discounts – Depreciation.

UNIT III:

Analysis and interpretation of financial statements with ratios

UNIT IV:

Cost Accounting- Methods and Techniques of Cost Accounting- classifications of cost- Material - Cost- Labour Cost – Overhead- fixed and variable cost- Cost- volume – profit analysis- marginal Costing and decision making- Budgeting and budgetary control – types of budgets- Preparation of various functional budgets- Preparations of cash budgets- flexible budgets- Advantages of Budgeting and Budgetary control.

UNIT V:

Financial Packages and Practical Applications: Tally Package — Fundamentals – Differences Between Computer Accounting and Manual Accounting – Architecture and Customization of Tally – Features of Tally Configuration of Tally – Tally screens and menus – creation of groups – Creation of ledgers – deleting and editingledgers.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. T.S.Grewal,—DoubleEntryBookKeeping‖,AllIndiaSultanChand(RecentEdition)
2. S.N.Maheswari—PrinciplesofManagementAccounting—,SultanChand,NewDelhi(Recent
3. Edition)
4. Shukla,Grewal&Gupta,-AdvancedAccounts—SultanChand
5. K. K. Nadhani, —Implementing Tally5.4

Reference Books:

1. S.K. Gupta & R.K. Sharma - Practical Problems in Management Accounting (Recentedition)
2. KhanandJain—FinancialManagement‖TataMcGrawHill(RecentEdition).
3. Computerized Accounting under Tally Publications‖, DevaPublications.

Outcomes:

- Students can able to acquire a reasonable knowledge inAccounts
- Students can able to analysis and evaluate financialstatements
- Students can able to possess a managerial outlook atAccounts**.**
- Students can able to create Ledger to manageAccounts
- Students can able to prepare trial balancesheet

Course Number:MCA24106P **CC-VI**

L-P:0-3 **Credits: 2**

LAB I - DATA STRUCTURES AND ALGORITHM

Objectives:

- To understand the concept of Linear data structure like stack, list andqueue
- To understand non-linear data structure like Tree andGraph.
- To introduce the fundamentals of Data Structures, Abstract concepts and how these concepts are useful in problemsolving.
- To understand the working principle of various Algorithm design and Analysis Techniques.
- To use the design techniques introduced i.e. dynamic programming, greedy algorithm etc. to design algorithms for more complex problems and analyze theirperformance.

List of Exercises:

1. Array implementation of Stack and QueueADTs
2. Array implementation of ListADT
3. Linked list implementation of List, Stack and Queue ADTs
4. Implementation of Binary Trees and operations of BinaryTrees
5. Implementation of Binary SearchTrees
6. Implementation of AVLTrees
7. Implementation of Heaps using PriorityQueues.
8. Hashing with Separate Chaining
9. Graph Representation and Traversal Algorithms
10. Applications ofGraphs

Outcomes:

- Solve problems using linear datastructure
- Develop to solve real world problems using non-linear datastructure.
- Employ graphs to model problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyzethem
- Apply working principle of various Algorithm design and AnalysisTechniques.
- Apply dynamic programming, greedy algorithm to solve complexproblem

Course Number:MCA24107P **CC-VII**

L-P:0-3 **Credits: 2**

LAB –II Database Technologies

Objectives:

- To give a formal foundation on the relational model ofdata.
- To give an introduction to systematic database design approaches covering conceptual design.
- To present the concepts and techniques relating to query processing bySQL.
- To explore the features of a Database ManagementSystems.
- To understand the internals of a databasesystem.

List of Exercises:

1. Working with DDL, DML andDCL
2. Inbuilt functions inRDBMS.
3. Nested Queries & JoinQueries.
4. Set operators & Views inSQL.
5. Controlstructures.
6. Working with Procedures andFunctions
7. Triggers
8. Dynamic & EmbeddedSQL
9. Working withXML
10. Forms &Reports

Outcomes:

- Design and implement a database schema for a given problem domain and normalize the database.
- Populate and query a database using SQL DML/DDLcommands
- Ability to use databases for building client serverapplications.
- Ability to comprehend the internal working of a databasesystem.
- Ability to design and develop a database usingSQL.

Course Number:MCA24201 **CC-VIII**

L-P:5-0 **Credits: 4**

OPTIMIZATION TECHNIQUES

Objectives:

- To make students understand about the basic of LinearProgramming.
- To understand the estimation of various cost for projectmanagements.
- To familiarize the students with Inventory controlproblems.
- To expose Dynamic programming approach for Priority Managementemployment.
- To expose the students with different ways of Transportation Algorithms and its Solutions.

UNIT I:

Introduction to Operations Research: Basics definition - scope – objectives - phases - models - limitations of Operations Research - Linear Programming Problem - Formulation of LPP - Graphical solution of LPP - Simplex Method - Artificial variables - big-M method - two-phase method - degeneracy - nbound solutions - Introduction to optimization - gradient descentmethod - convex optimization.

UNIT II:

Transportation and its variants: Definition, Transportation Algorithms and Solutions, Assignment Model, Hungarian Method, Traveling Salesman Problem, The Transshipment Model – Queueing Theory: - Characteristic of Queuing System, Steady State M/M/I ModelFinite

UNIT III:

Inventory Theory: Cost Involved in Inventory Problems, Single Item Deterministic Models, and Economic Size Model with and without Shortages having Production Rate Infinite and Finite.

UNIT IV:

PERT and CPM: Arrow Networks, Time Estimates, Various Expected Times, Critical Path, Critical Path Computations, Various Floats of Activities, Updating Projects Operation Time Cost

UNIT: V

Dynamic programming: Dynamic programming. Characteristics of dynamic programming – Dynamic programming approach for Priority Management employment smoothening – capital budgeting – Stage Coach/Shortest Path – cargo loading and Reliability problem

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Reference Books:

1. J.KSharma,–OperationsResearchTheoryandApplications,4Edition,MacmillanPublisher, India Ltd,2009

2. Srivastava, U.K., Shenoy, G.V., and Sharma, S.C. (2009). Quantitative Techniques for Managerial Decision, 2nd Edition; New Delhi: New AgeInternational

Outcomes:

- Students can able to understand the basic concept of Linear Programming.
- Students can able to estimate cost for various projectmanagements.
- Students can get familiarize with Inventory controlproblems.
- Students can able get exposure on Dynamic programmingapproach.
- Students can able to expose different ways of TransportationAlgorithms.
- Students can able to understand the working principle of TransportationAlgorithms

Course Number:MCA24202 **CC-IX**

L-P:4-0 **Credits: 4**

Python Programming

Objectives:

- To acquire programming skills in corePython.
- To study data structures inPython.
- To get familiar in modules and packages.
- To develop the skill of designing web applications inPython.
- To develop the ability to write database applications inPython.

UNIT I:

Introduction To Python Programming: Python interpreter and interactive mode; values and types variables, expressions, statements, Order of operations, comments, debugging; modules and functions: function Calls, adding new functions, Definitions and Uses, flow of execution, parameters and arguments, Fruitful functions. Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, range, break, continue, pass; recursion; Strings: string slices, immutability, string functions and methods, string module; Lists asarrays.

UNIT II:

Lists, Tuples, Dictionaries: Lists: Traversing a List, list operations, list slices, list methods, Map, Filter and Reduce, list loop, mutability, aliasing, cloning lists, list parameters; Dictionaries: operations and methods; advanced list processing - list comprehension; Tuples: tuple assignment, tuple as return value

UNIT III:

Files, Modules, Packages: Files and Input/output; text files, reading and writing files, format operator; command line arguments, Errors and Exception; detecting and handling exception, raising exception and Assertions, Modules; importing modules, Features, Packages: PANDAS and NUMPY

UNIT IV

Network And Web Programming: Network programming; Socket communication, socket server module, Internet client programming, Transferring files, Electronic mail and related modules, Web Programming: Creating simple web client, Process client data and building CGIapplications

UNIT V:

Database And Gui Programming : Introduction to tkinter, Top Level Windows, Dialogs, Message and Entry, Event Handling, Menus, List boxes and Scrollbars, Text, SQL Database interfaces with sqlite: Basic operations and table load scripts

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

TextBooks:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‖, 2nd edition, Updated for Python 3, Shroff/OReilly Publishers,2016
2. WesleyJ. Chun,–CorePythonProgramming‖2ndEdition, Pearson Education, 2007

References:

1. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.,2011.
2. Mark Lutz ,Learning Python, O Reily, 4th Edition,2009,
3. Magnus Lie Hetland, –Beginning Python: From Novice To Professional‖, Second Edition, 2005
4. Mark Summerfield –ProgramminginPython 3‖, Pearson Education, 2010

E-Resources:

1. http://www.network-theory.co.uk/docs/pytut
2. http://docs.python.org/tutorial/
3. http://index-of.es/Python/Core.Python.Programming.2nd.Edition.Wesley.Chun.2006.pdf

Outcomes:

After completing the course students able to,

- Understand the basics of python programming.
- Explain the use of the built-in data structures list, sets, tuples anddictionary.
- Make use of modules and create pythonmodules
- Build real world applications using network and web programming inpython
- Create data base applications and GUI based applications inpython

Course Number:MCA24203 **CC-X**

L-P:5-0 **Credits: 5**

CRYPTOGRAPHY&NETWORK SECURITY

Objectives:

- To understand the basics of Cryptography and Network Security.
- To be able to secure a message over the in secure channel by various means.
- To learn about how to maintain the Confidentiality, Integrity, and availability of data.
- To understand various protocols for network security to protect against the threats in the networks.

UNIT I:IntroductiontoCryptographyandBlockCiphers

Introductiontocryptography-Conventional Encryption: Conventional encryption model - classical encryption techniques -substitution ciphers and transpositionciphers –cryptanalysis– steganography - stream andblock ciphers - Block ciphers principals - - data encryption standard(DES) - DES Encryption and Decryption-DES example–Strength of DES– AES Structure and Transformation functions.

UNIT II:ModularArithmetic

Randomnumber generation - Introduction to Groups - ring and field - prime and relative prime numbers -modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm –ChineseRemainder theorem-discretealgorithms.

UNIT III: Publickey CryptographyandAuthentication Requirements

Principles of public key cryptosystems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm –the introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – securityof hashfunctions and MACS.

UNIT IV: IntegritychecksandAuthentication Algorithms

SecurehashAlgorithm(SHA)DigitalSignatures:DigitalSignatures-authenticationprotocols-digitalsignaturestandards(DSS)- Authentication Applications: X.509 - directory authenticationservice-electronicmail security-prettygood privacy(PGP) -S/MIME.

UNIT V: IPSecurityandWireless Network Security

IP Security: Architecture - Authentication header - Encapsulating security payloads – combiningsecurityassociations –Wireless Network Security: Wireless Security - Mobile Device Security

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. William Stallings, "Cryptography and Network security Principles and Practices",Pearson/PHI.
2. AtulKahate, " Cryptography and Network security",TMCH, Second Edition.

ReferenceBooks:

1. W.Mao,"ModernCryptography–TheoryandPractice",PearsonEducation.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing –Prentice HallofIndia.

E-Resources:

1. http://nptel.ac.in/courses/106105031/lecturebyDr.DebdeepMukhopadhyayIITKharagpur
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system-engineering-spring-2009/video-lectures/lecturebyProf.Robert MorrisandProf.SamuelMaddenMIT.

Outcomes:

Aftersuccessfulcompletion ofthecourse,thelearnerswouldbeableto

- Providesecurityof thedata over thenetwork.
- Doresearchinthe emergingareasof cryptography andnetworksecurity.
- Implementvariousnetworkingprotocols.
- Protectanynetworkfromthreatsin the world.

Course Number: MCA24206P **CC-XI**

L-P:0-3 **Credits: 2**

Lab III: Python Programming Lab

Objectives:

- To acquire programming skills in corePython.
- To understand the data structures inPython.
- To develop the skill on files andmodules.
- To develop the skill of designing Graphical user Interfaces inPython.
- To develop the ability to write database applications inPython.

List of Exercises

1. Exercise programs on basic control structures &loops.
2. Exercise programs on PythonScript.
3. Exercise programs onLists.
4. Exercise programs onStrings.
5. Exercise programs onfunctions.
6. Exercise programs on recursion & parameter passingtechniques.
7. Exercise programs on searching & sortingTechniques.
8. Exercise programs onFiles
9. Exercise Program onModules
10. Exercise Program on Exception handling
11. Exercise programs on Networking
12. Exercise programs on GUI,Graphics
13. Exercise Programs on Data baseConnection

Outcomes:

At the end of the course, student will be able to

- Understand the basics of python programming.
- Explain the use of the built-in data structures list, sets, tuples anddictionary.
- Make use of functions, strings and itsapplications.
- Demonstrate the use of modules, packages and its applications
- Build the real world applications using data base, GUI andNetwoking

Course Number: MCA24207P **CC-XII**

L-P:0-3 **Credits: 2**

LAB IV- NETWORK SECURITY

Objectives:

- To Know the Concepts Behind the Network SecurityAlgorithms
- To Understand the Logic of Network SecurityAlgorithms
- To Know the Implementation of Network SecurityAlgorithms
- To apply Present Compatible Programming Language for Network SecurityAlgorithms
- To Test Whether the Result of the Program is Correct orNot

List of Programs:

1. Write a Program to do Encryption and Decryption using CeasarCipher

2. For a Given Text, Perform Encryption and Decryption using Data EncryptionStandard

3. Write a Program to do Encryption and Decryption using Advanced EncryptionStandard

4. For a Text of 30 Words, Perform Encryption and Decryption using RSA (Rivest–Shamir–AdlemanAlgorithm)

5. Write a Program to do Encryption and Decryption using BlowfishAlgorithm

6. Write a Program that Performs Encryption and Decryption using VigenereCipher

7. Write a Program to do Encryption and Decryption using DigitalSignature

8. For a Given Text, Perform Encryption and Decryption using SubstitutionCipher

9. For a Given Numerical and Textual Data, Perform Web Security

E-Resources :

1. https://www.youtube.com/watch?v=exw3JZl7Fl4
2. https://www.youtube.com/watch?v=obe5Oywq7ME
3. https://www.coursera.org/lecture/asymmetric-crypto/rsa-encryption-and-decryption-bv1j0
4. https://www.youtube.com/watch?v=ap9dTNOqk1E
5. https://www.youtube.com/watch?v=AteFI6QS1hc
6. https://www.youtube.com/watch?v=tGhh9_VWrQg
7. https://www.youtube.com/watch?v=HiKuC96b5cw
8. https://www.youtube.com/watch?v=704dudhA7UI

Outcomes:

A Student Passing this Programming Lab should be able to:

- Understand and apply the Network Security Principles and methods for delivering and maintaining Security inapplications,
- Evaluate and Logic in Network Security Algorithms to establish appropriate strategies for development anddeployment.
- Understand the Art of Network SecurityProgramming
- Develop and apply Current Standard-Compliant Programming Techniques for the Successful Deployment of SecurityApplications.
- Understand the Testing and Debugging of the ProgramWritten

Course Number: MCA24301 **CC-XIII**

L-P: 4-0 **Credits: 5**

MOBILE APPLICATION DEVELOPMENT

Objectives:

- A good understanding on the MobileEnvironment
- To Know the Architecture of the MobileApplication
- To Understand the Features of Android
- To acquired mobile application development skills with Android
- To develop the ability to write database applications usingAndroid

UNIT I:

Introduction to Mobile Applications: Native and web applications - Mobile OS and Databases. Introduction to Android: History - Features – OSS – OHA - Versions - Android devices - Setting up software – IDE. Introduction to iOS – iOS features –user interface - Using Wifi – iPhone marketplace.

UNIT II:

Android Architecture: Android Stack - Linux Kernel - Android Runtime - Dalvik VM - Application Framework - Android emulator - Android applications development -Virtualization – APIs – Android File system – A Basic Android Application - Deployment. Android Activities: The Activity Lifecycle – Lifecycle methods – Creating Activity.

UNIT III:

Intents – Intent Filters – Activity stack. Android Services: Simple services – Binding and Querying the service – Executing services. Broadcast Receivers: Creating and managing receivers – Receiver intents. Content Providers: Creating and using content providers – Content resolver.

UNIT IV:

Android UI - Android Layouts – Attributes – Layout styles - Linear – Relative – Table – Grid – Frame – Menus - Lists and Notifications - Input Controls: Buttons - Text Fields – Checkboxes - alert dialogs

UNIT V:

Working with databases: SQLite – coding for SQLite using Android - Publishing and Internationalizing mobile applications - mobile application deployment: Game, Clock, Calendar, Convertor, Phone book.

Text Book:

1.Barry Burd,–AndroidApplicationDevelopment–All-in-oneforDummies|,2ndEdition,Wiley India, 2016.

References :

1. LaurenDarcey,ShaneConder,–SamsTeachYourselfAndroidApplicationDevelopmentin24 hours‖, 2nd edition, Pearson Education,2013.

2. Jerome(J.F)DiMarzio,–Android–AProgrammer"sGuide|,McGrawHillEducation,8threprint,2015.

3. DavidMark,JackNutting,JeffLaMarcheandFredericOlsson,–BeginningiOS6Development: Exploring the iOS SDK,Apress,2013.

4. http://www.developer.android.com

Outcomes:

- To explain the features and challenges of mobile devices.
- To know the differences between native app development, web app development and hybrid app development
- To apply the UI components, multimedia usage, permissions, Storage usage, read and write operations in storage
- To understand and apply the UI design for the given problem
- To design an application based on the user requirements

Course Number: MCA24302 **CC-XIV**

L-P: 4-0 **Credits: 5**

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Objectives:

- To understand the various characteristics of Intelligentagents
- To learn the different search strategies inAI
- To learn to represent knowledge in solving AIproblems
- To understand supervised and unsupervisedlearning.
- To know the various applications ofAI.

UNIT I:

Introduction –Foundation of Artificial Intelligence –Intelligent Agents– structure of agents – Definitions of a rational agent, reflex, model-based, goal-based, and utility-based agents, the environment in which a particular agent operates.

UNIT II:

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning – StochasticGames

UNIT III:

Knowledge Representation: First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV:

Machine Learning: Supervised learning- learning decision trees- Linear Regression and Classification- Nonparametric Models - Unsupervised learning – Reinforcement learning- Passive Reinforcement Learning - Active ReinforcementLearning-

UNIT V:

Applications of Artificial Intelligence- Deep learning for Natural Language Processing, Computer vision-classifying images,Robotics.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. 1 S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach, PrenticeHall, Third Edition,2010.
2. I.Bratko,―Prolog:ProgrammingforArtificialIntelligence‖,Fourthedition,Addison-Wesley Educational Publishers Inc.,2011.

References:

1. M. Tim Jones, ―Artificial Intelligence: A Systems Approach (Computer Science),Jones and Bartlett Publishers, Inc.; First Edition,2008
2. Nils J. Nilsson, ―The Quest for Artificial Intelligence, Cambridge UniversityPress, 2009.
3. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using theISO Standard, Fifth Edition, Springer,2003.
4. Gerhard Weiss, ―Multi Agent Systems, Second Edition, MIT Press,2013.
5. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press,2010.

E-Resources :

1. http://nptel.ac.in/.
2. https://epgp.inflibnet.ac.in/

Outcome:

- Gained knowledge on IntelligentAgents
- Learnt problem solving techniques of ArtificialIntelligence.
- Design applications for NLP that use ArtificialIntelligence.
- To apply supervised and unsupervised learning techniques on real timeproblems.
- Gained knowledge on applications of Artificial Intelligence

Course Number:MCA24303 **CC-XV**

L-P: 4-0

Credits:4

CLOUD COMPUTING

Objectives:

- To Introduce the Fundamentals of Cloud Computing.
- To be Familiar with the CloudArchitecture
- To Understand about Cloud Service Models
- To Know the Concept of Virtualization in CloudComputing
- To Know About the Different Cloud ServiceProviders

UNIT I:

COMPUTING PARADIGMS: High-performance computing, parallel computing, distributed computing, cluster computing, grid computing, cloud computing, bio-computing, mobile computing quantum computing, and optical computing.Nano-computing.

UNIT II:

CLOUD COMPUTING FUNDAMENTALS: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT III:

CLOUD COMPUTING ARCHITECTURE AND MANAGEMENT: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud application, Migrating, Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT IV:

CLOUD SERVICE MODELS: Infrastructure as a Service, Characteristics of IaaS, Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers. Other Cloud ServiceModels

UNIT V:

CLOUD SERVICE PROVIDERS :EMC, EMC IT, Captiva Cloud Toolkit, Google Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,Service, Microsoft Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft Aneka Platform

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

1. Essentials of Cloud Computing :K.Chandrasekhran , CRC press, 2014

Reference Books:

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James BrobergandAndrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing , Kai Hwang, GeofferyC.Fox, Jack J.Dongarra,Elsevier, 2012.

E-Resourses

1. http://index-of.co.uk/Cloud-Computing-Books/Essentials%20of%20cloud%20computing%20(2015).pdf

2. http://dhoto.lecturer.pens.ac.id/lecture_notes/internet_of_things/CLOUD%20COMPUTING%20Principles%20and%20Paradigms.pdf

Outcomes:

At the End of the Course the Student Should be able to

- Compare the Strengths and Limitations of CloudComputing.
- Identify the Architecture, Infrastructure and Service Models in CloudComputing.
- Understanding the Virtualization Concepts in the CloudEnvironment.
- Understanding the Cloud Service Providers in the MarketToday

Course Number: MCA24306P **CC-XVI**

L-P:0-3 **Credits:2**

LAB – V : MOBILE APPLICATION DEVELOPMENT

Objectives:

- To Know the components and structure of mobile application development frameworks for Android and windows OS basedmobiles
- To Understand how to work with various mobile application development frameworks
- To learn the basic and important design concepts and issues of development of mobileapplications.
- To Know how to Debug theErrors
- To Understand the capabilities and limitations of mobiledevices

List of Experiments:

1. Develop an application that uses GUI components, Font andColours.
2. Develop an application that uses Layout Managers and eventlisteners.
3. Develop a native calculatorapplication.
4. Write an application that draws basic graphical primitives on thescreen.
5. Develop an application that makes use ofdatabase.
6. Implement an application that implements Multithreading
7. Develop a native application that uses GPS locationinformation
8. Implement an application that writes data to the SDcard
9. Implement an application that creates an alert upon receiving amessage
10. Write a mobile application that creates alarmclock

Outcomes:

- To Design and Implement various mobile applications usingemulators
- To Deploy applications to hand-helddevices
- To understand and apply the UI design for the givenproblem
- To design an application based on the userrequirements

Course Number:MCA24307P **CC-XVII**

L-P:0-3 **Credits:2**

LAB- VI: ARTIFICIAL INTELLIGENCE & MACHINELEARNING

Objectives:

- To introduce students to the basic concepts and techniques of MachineLearning.
- To develop skills of using recent machine learning software for solving practical problems.
- To gain experience of doing independent study andresearch.
- To understand students how computers to perform intellectual tasks as decision making, problem solving, perception, understanding humancommunication
- To apply k-Nearest Neighbour algorithm forclustering

Write java/Python programmes to implement the following:

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python
3. Write a Program to Implement a Star Search Algorithm using Python
4. Write a Program to Implement Tic-Tac-Toe game.
5. Write a Program to Implement N-Queens Problem using Python.
6. Write a Program to Implement Support Vector Machine Algorithm
7. Write a Program to Implement K-Nearest Neighbor Algorithm
8. Write a Program to Implement Natural Language Processing Toolkit
9. Write a Program to Implement Naïve Bayesian Classifier
10. Write a Program to Implement Back propagation Algorithm

Outcomes:

- Apply Bayesian networks for real timeproblem.
- Develop program for clustering using k-Nearest Neighbouralgorithm
- Develop program to perform intellectual tasks as decision making, problem solving, perception, understanding humancommunication
- Implement naïve Bayesian Classifier model forprediction
- Gained knowledge on machine learningsoftware

ELECTIVE COURSES

Course Number: MCA24204 **EC-I**
L-P: 4-0 **Credits: 4**

OPEN SOURCE TECHNOLOGIES (A)

Objectives:

- To introduce open technologies and open hardware and develop applications usingPHP.
- To familiarize the students with Open source operating systems Linux and itsconcepts.
- Explore Apache technology and securitysystems.
- Introduce MySQL and itsfunctions.
- Make familiarize with Apacheservers.

Unit I:
Introduction to Open Source: Introduction: Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions

Unit II:
Overview of Linux: Introduction: Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions creation – Shell Introduction – String Processing – Investigating and Managing Processes – Network Clients – Installing Application

Unit III:
Exploring Apache : Introduction – Apache Explained – Starting, Stopping, and Restarting Apache – Modifying the Default Configuration – Securing Apache – Set User and Group – Consider Allowing Access to Local Documentation – Don't Allow public_html Web sites – Apache control with .ht access

Unit IV:
Manipulating MY SQL Database : Introduction to MY SQL – The Show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

Unit V:
Working with PHP:PHP Introduction- General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access .

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. James Lee and Brent Ware, –Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP‖, Pearson Education, Fourth Edition, 2009.

Reference Books:

1. Gerner, Jason,–Professional LAMP: Linux, Apache, MySQL, And PHP Web Development‖ Indianapolis, IN: Wiley Pub., 2006.

E-References:

1. https://www.pdfdrive.com/professional-lamp-linux-apache-mysql-and-php-web-development-d47809304.html

Outcomes:

At the end of the course, the student will be able to:

- Explain the internal structure ofLinux,
- Write desktop and web applications usingPHP,
- Design for extendibility and codereuse
- Develop applications for open sourcehardware

Course Number: MCA24204 **EC-I**

L-P: 4-0 **Credits:4**

COMPUTER GRAPHICS AND ANIMATION (B)

Objectives:

To impart knowledge to make the students

- To learn basic understanding of ComputerGraphics
- To get clear idea about various graphicalgorithms.
- To understand the 2D and 3D transformations, models and generationtechniques
- To understand the Multimedia animation and DesktopComputing
- To develop skills on animation drawingtools

UNIT I:

Output Primitives: Points and Lines, Line-Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Line Function, Circle Generation Algorithms, Ellipse Generation AlgorithmsAttributes of output Primitives: Line Attributes, Color and Gray Scale levels, Area Fill Attributes, Character Attributes, Bundled Attributes, Antialiasing.

UNIT II:

Two Dimensional Geometric Transformations: Basic Transformations, Matrix Representation and Homogenous Coordinates, Composite Transformations, Other Transformations.Two Dimensional Viewing: The Viewing pipeline, Viewing Coordinates Reference Frame, Window to Viewport Coordinate Transformations, Two Dimensional Viewing Functions, Clipping Operations, Point Clipping,Line Clipping: Cohen-Sutherland Line Clipping, Polygon Clipping: Sutherland- Hodgeman Polygon Clipping.

UNIT III:

Three Dimensional Concepts: Three Dimensional Display Methods. Three Dimensional Object Representations: Polygon Surfaces, Quadric Surfaces, Superquadrics.Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling, Other Transformations, Composite Transformations, Three Dimensional Transformation Functions.

UNIT IV:

Introduction to Animation – Principles of Animation - Pipeline – Moving Camera Character - Designing and Framework for View Dependent Animation – The View Space – Distance ofViewpoint

UNIT V:

View Dependent Animation from Sketches – Overview of pipeline – Inputs – Recovering the Camera – Posing the Character – Animating the Character- View Dependent Animation from Multimodal Inputs – Challenges in Multimodal Authoring of Animation – Creating a View Space from Video

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. DonaldHearnandPaulineBakerM,–ComputerGraphics",PrenticeHall,NewDelhi, 2007

2. ParagChaudhuri, PremKalraand SubhashisBanerjee, –View Dependent Character Animation‖, Springer-Verlag London Limited,2007

References:

1. Foley, Vandam, Feiner and Hughes, ―Computer Graphics: Principles and Practice‖,2nd Edition, Pearson Education,2003.

2. Jeffrey McConnell, ―Computer Graphics: Theory into Practice‖, Jones and BartlettPublishers,2006.

3. Hill F S Jr., "Computer Graphics", Maxwell Macmillan ,1990.

4. Anatomy of the Artist – Thompson & Thompson (RecentEdition)

E-Resources:

1. https://www.blender.org/support/tutorials/
2. https://www.docme.su/doc/1765678/parag-chaudhuri--prem-kalra--subhashis-banerjee---view-de...

Outcomes:

At the end of the course, students will be able to:

- Develop software tools such as games and animation
- Create interactive computer graphics usingOpenGL
- Understand a typical graphics pipeline and made pictures with their computer.

Course Number:MCA24204 **EC -I**

L-P:4-0 **Credits: 4**

SERVICE ORIENTED ARCHITECTURE AND WEB SERVICES(C)

Objectives:

The student should be made to:

- Learn XMLfundamentals.
- Be exposed to build applications based onXML.
- Understand the key principles behindSOA.
- Be familiar with the web services technology elements for realizingSOA.
- Learn the various web servicestandards.

UNIT I: INTRODUCTION TO XML

XML document structure – Well-formed and valid documents – Namespaces – DTD – XML Schema – X-Files.

UNIT II: BUILDING XML- BASED APPLICATIONS

Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

UNIT III: SERVICE ORIENTED ARCHITECTURE

Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA — Principles of Service orientation – Service layers.

UNIT IV: WEB SERVICES

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Orchestration – Choreography –WS Transactions.

UNIT V: BUILDING SOA-BASED APPLICATIONS

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines - Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security – SOA support in J2EE

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Ron Schmelzeret al. –XMLandWeb Services‖,PearsonEducation, 2008.
2. Thomas Erl, –Service Oriented Architecture: Concepts, Technology, and Design‖, Pearson Education,2005.

Reference Books:

1. Frank P.Coyle, –XML,WebServicesandtheData Revolution‖,PearsonEducation, 2002
2. Eric Newcomer, Greg Lomow, –Understanding SOA with Web Services‖, Pearson Education,2005
3. SandeepChatterjeeandJames Webber, –Developing Enterprise Web Services: An Architect's Guide‖, Prentice Hall,2004.
4. JamesMcGovern,SameerTyagi,MichaelE.Stevens,SunilMathew,–JavaWebServices Architecture‖, Morgan Kaufmann Publishers,2003.

Outcomes:

Upon successful completion of this course, students will be able to:

- Build applications based onXML.
- Develop web services using technologyelements.
- Build SOA-based applications for intra-enterprise and inter-enterpriseapplications.

Course Number:MCA24205 **EC-II**
L-P:4-0 **Credits: 4**

PROFESSIONAL ETHICS (A)

Objective:

- To create awareness on professional ethics and Human Values
- To create awareness on Engineering Ethics providing basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals andVirtues
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, IndustrialStandards

UNIT I: HUMAN VALUES

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stressmanagement.

UNIT II: ENGINEERING ETHICS

Senses of ‒Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas– Moral Autonomy – Kohlberg's theory – Gilligan"s theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion
– Uses of EthicalTheories.

UNIT III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV: SAFETY, RESPONSIBILITIES AND RIGHTS

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.

UNIT V: GLOBAL ISSUES

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers - Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code ofConduct.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Mike W. Martin andRolandSchinzinger, –Ethics in Engineering‖, Tata McGraw Hill, New Delhi,2013.
2. R. Subramanian, –ProfessionalEthics‖,OxfordUniversityPress,NewDelhi, 2013.
3. GovindarajanM, Natarajan S, SenthilKumar V. S, –Engineering Ethics‖, Prentice Hall of India, New Delhi,2004.

Reference Books:

1. Daniel Albuquerque, –Business Ethics‖,OxfordUniversityPress,NewDelhi, 2013.
2. Edmund G.SeebauerandRobert L. Barry, –Fundamentals of Ethics‖, OxfordUniversity Press, New Delhi,2012.
3. Laura P. Hartman and Joe Desjardins, –Business Ethics: Decision Making for Personal Integrity and Social Responsibility‖ McGraw Hill education, India Pvt. Ltd.,New Delhi2013.
4. World Community Service Centre, "Value Education", Vethathiri publications, Erode,2011.

E-References:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

Outcomes:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in thesociety
- Can analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual PropertyRights
- Inculcate knowledge and exposure on Safety and Risk, RiskBenefit
- Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and humanvalues.

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Course Number:MCA24205 **EC -II**

L-P:4-0 **Credits: 4**

ORGANIZATION BEHAVIOR (B)

Objectives:

- To discuss the development of the field of organizationalbehavior
- To analyze and compare different models used to explain individual behavior related to motivation andrewards
- To identify the processes used in developing communication and resolvingconflicts
- To explain group dynamics and demonstrate skills required for working in groups (team building)
- To identify the various leadership styles and the role of leaders in a decision making process.

Unit I: Introduction

Introduction to Organizational Behavior - Related Disciplines - Theoretical Framework - Organizational Approaches - Modern Organizational Scenario: Impact of Globalization and e-business

Unit II: Personality & Attitudes

Individual Behavior - Perception - Process - Changes - Personality and Attitudes - Job Satisfaction

Unit III: Motivation

Motivation: Needs, Content And Process: Motivation: Content Theories - Process Theories - Contemporary Theories - Motivation Applied - Job Design And Goal Setting. Leadership - Background - Process- Styles - Activities – Skills

Unit IV: Behaviour of groups

Group Dynamics - The Nature of Informal Organizations - Formal Groups - Interactive Conflict: Interpersonal Conflict - Intergroup Behavior and Conflict - Negotiation Skills: Going Beyond Conflict Management - Traditional Negotiation Approaches - Contemporary Negotiation Skills.

Unit V: Communication

Communication - Role and Background - Interpersonal Communication - Informal Communication- The Decision Making Process- Participative Decision Making Techniques - Organization Design - Culture - Organization Change and Development.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Fred Luthans, "Organizational Behavior", 12th edition, McGraw Hill, 2011.

References:

1. Stephen P. Robbins, TimothyA. Judge,–Organizational Behavior|, 14th Edition, Pearson Education,2012.
2. RobertKreitner,AngeloKinicki,–OrganizationalBehavior|,8thEdition,McGrawHill, 2007.
3. John W. Newstorm and Keith Davis, "Organizational Behavior", TMG, Tenth Edition, 2002

E-Resources:

1.https://bdpad.files.wordpress.com/2015/05/fred-luthans-organizational-behavior-_-an-evidence-based-approach-twelfth-edition-mcgraw-hill_irwin-2010.pdf

Outcomes:

- The statement of educational aims and objectives has severalbenefits.
- To help teachers design the course - the content, the methods, and theassessment.
- To communicate the educational intent of the course to students and tocolleagues.
- To help identify the resources needed to undertake theteaching.
- To provide a basis for evaluating the course, and a basis for qualityassurance.

Course Number:MCA24205 **EC -II**

L-P:4-0 **Credits: 4**

MANAGEMENT INFORMATION SYSTEM (C)

Objectives:

To impart knowledge to make the students

- To understand Information Systems inBusiness
- To understand Enterprise Business system
- To get knowledge in e-Commercesystem

UNIT I:
Foundations of Information Systems in Business: Real World of Information Systems (IS) – Fundamental Roles of IS in Business – Role of e-Business in Business – Types of Information Systems – Managerial Challenges of Information Technology.
Components of Information Systems: Fundaments of system concepts – Components of Information Systems – Information System Resources – Information System Activities – Recognizing Information Systems

UNIT II:
Fundamentals of Strategic Advantage: Strategic Information Technology (IT) – Competitive Strategy Concepts – Strategic Uses of IT – Building a Customer-Focused Business – Value Chain and Strategic IS – Strategic uses of IT – Reengineering Business Processes – Becoming an Agile Company – Creating a Virtual Company – Building a Knowledge-Creating Company – Knowledge ManagementSystems

UNIT III:
Enterprise Business Systems: Customer Relationship Management (CRM) – CRM Goes Mobile – Three Phases of CRM – Benefits and Challenges of CRM – Trends in CRM – **Enterprise Resource Planning (ERP)**: Introduction – Benefits and Challenges of ERP – Trends in ERP – **Supply Chain Management (SCM)**: Introduction – Role of SCM – Benefits and Challenges of SCM – Trends inSCM

UNIT IV:
E-Commerce **Systems**: Introduction to e-Commerce – scope of e-Commerce – Essential E-Commerce Processes – Electronic Payment Processes - e-Commerce Trends – Business to Consumer e-Commerce – Web Store Requirements – Business-to-Business e-Commerce – **Decision Support in Business**: Introduction – Decision Support Trends – Decision Support Systems – Online Analytical Processing – Using Design Support Systems – Executive Information Systems – Knowledge ManagementSystems

UNIT V:

Worksheets for Decision Support – Basic Spreadsheet modeling – Range – Lookup – Index – Match – Text functions – IF Statement – Sensitivity Analysis – Goal Seek Command – Using Pivot table – Data Model – Power pivot – Power View and 3D maps - Summarizing – Filtering and Consolidating – CaseStudies

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1 James A. O"Brien, GeorgeM. Marakas, –Management Information Systems|,McGraw Hill, 10th Edition,2011.

Reference Books:

1. Kenneth C. Laudon, JaneP. Laudon, —Management Information Systems: Managing the Digital Firm", Pearson Education, 12th Edition,2012.
2. Steven Alter, —Information Systems – The Foundation of E-Business",Pearson Education, 4th Edition,2002.
3. Wayne Winston, Microsoft Excel Data Analysis and Business Modeling (5th Edition), Microsoft Press; 5 edition, 2016, ISBN-10: 1509304215, ISBN-13:978-1509304219

E-References:

1. https://www.sohailuniversity.edu.pk/wp-content/uploads/2018/12/Management-Information-Systems-OBrien.pdf

Outcomes:

- This course is designed to provide students with a basic understanding of how Information Systems are used in organizations for meeting strategic and operationalgoals.
- To that end, students will acquire skills using current end-user software for communication, data transformation, collaboration, and problemsolving.
- The course also covers software and hardware components, information structures, basic business organization and processes, information system security, andnetworks.
- Able to identify the information systemresources
- Can summarize the strategic uses ofIT

Course Number:MCA24304 **ECIII**

L-P:4-0 **Credits: 4**

BLOCK CHAIN TECHNOLOGIES (A)

Objectives:

- To Introduce the Concepts of BlockchainTechnologies.
- To be familiar with the types ofBlockchain.
- To understand the concept of Private and PublicBlockchain
- To understand the Security in BlockchainTechnology.
- To know the Applications of BlockchainTechnology.

UNIT I : FUNDAMENTALS OF BLOCK CHAIN : Introduction - Origin of Blockchain - Blockchain Solution - Components of Blockchain - Components of Blockchain - Block in Blockchain - The Technology and the Future

UNIT II : BLOCKCHAIN TYPES AND CONSENSUS MECHANISM : Introduction- Decentralization and Distribution - Types of Blockchain - Consensus Protocol - CRYPTOCURRENCY - BITCOIN, ALTCOIN and TOKEN : Introduction - Bitcoin and Cryptocurrency Basics - Types of Cryptocurrency - Cryptocurrency Usage

UNIT III : PUBLIC BLOCKCHAIN SYSTEM : Introduction - Public Blockchain - Popular Public Blockchains - The BitcoinClockchain - EtherumBlockchain

UNIT IV : PRIVATE BLOCKCHAIN SYSTEM : Introduction - Key Characteristics of Private Blockchain - Why We Need Private Blockchain - Private Blockchain Examples - Private Blockchain and Open Source - E-Commerce Site Examples - Varous Commands in E-Commerce Blockchain - Smart Contract in Private Environment - State Machine - Different Algorithms of Permissioned Blockchain - Byzantine Fault - Multichain

UNIT V : SECURITY IN BLOCKCHAIN : Introduction - Security Aspects in Bitcoin - Security and Privacy Challenges of Blockchain in General - Performance and Scalability - Identity Management and Authentication - Regularity Compliance and Assurance - Safeguarding Blockchain Smart Contract - Security Aspects in Hyperledger Fabric - APPLICATIONS OF BLOCKCHAIN : Blockchain in Banking and Finance - Blockchain in Healthcare.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

1.Blockchain Technology, ChandramouliSubramaniam, Asha A George, Abhilash K A, MeeraKarthikeyan, University Press, 2020

Reference Books:

1. Blockchain Basics: A Non-Technical Introduction, Daniel Drescher, Apress, 2017

2. BlockChain From Concept to Execution, DebajaniMohanty, BPB,2018

E-Resourses

1. https://www.pdfdrive.com/blockchain-

books.html2.https://www.blockchain.com/

Outcomes:

At the end of the course the student should be able to

- Understand the Basic Idea of Blockchain Technology.
- Identify the Differences Between Public and Private BlockchainTechnologies.
- Know about Cryptocurrency - Bitcoin, AltcoinandToken
- Understanding the SecurityChallenges
- Know about Applications in BlockchainTechnology.

Course Number:MCA24304 **EC-III**

L-P:4-0 **Credits:4**

DIGITAL FORENSICS (B)

Objectives:

- To Introduce the Concepts of Digital Forensics.
- To be familiar with the types of Forensics Technology and of Computer Forensics Systems.
- To understand the concept of Computer ForensicAnalysis
- To understand the InformationWarfare.
- To know the Processing Evidence and Report Preparation and FutureIssues.

UNIT I:

Introduction: Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Computer Forensics Systems – Vendor and Computer Forensics Services.

UNIT II:

Computer Forensics Evidence and Capture:Data Recovery – Evidence Collection and Data Seizure - Duplication and Preservation of Digital Evidence - Computer Image Verification and Authentication.

UNIT III:

Computer Forensic Analysis: Discover of Electronic Evidence - Identification of Data – Reconstructing Past Events – Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies

UNIT IV:

Information Warfare: Arsenal – Surveillance Tools – Hackers and Theft of Components – Contemporary Computer Crime - Identity Theft and Identity Fraud – Organized Crime &Terrorism – Avenues Prosecution and Government Efforts – Applying the First Amendment to Computer Related Crime-The Fourth Amendment and other Legal Issues.

UNIT V:

Computer Forensic Cases: Developing Forensic Capabilities – Searching and Seizing Computer Related Evidence –Processing Evidence and Report Preparation – Future Issues.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. John R. Vacca, –Computer Forensics: Computer Crime Scene Investigation‖,Laxmi Publications; First Edition, 2015. (CHAPTERS 1 – 18). (UNIT I –IV)

2. Marjie T Britz, –Computer Forensics and Cyber Crime: An Introduction‖, Pearson Education, 3rd Edition, 2013. (CHAPTERS 3 – 13). (UNIT IV –V)

Reference Books:

1. MariE-HelenMaras,–ComputerForensics:Cybercriminals,Laws,andEvidence‖,Jones& Bartlett Learning; 2nd Edition,2014.

2. MajidYar,–CybercrimeandSociety‖,SAGEPublicationsLtd,Hardcover,2ndEdition,2013.

E-Recourses:

1. http://index-of.es/Varios-2/Computer%20Forensics%20Computer%20Crime%20Scene%20Investigation.pdf

2. http://index-of.es/Varios-2/Computer%20Forensics%20and%20Cyber%20Crime%20An%20Introduction.pdf

Outcomes:

At the end of the course the student should be able to

- Understand the Basic Concept of ComputerForensics
- Know about Computer Forensics Evidence andCapture
- Know about Tactics of the Military and of Terrorist and Rogues and of the Tactics of PrivateCompanies
- Understanding the SurveillanceTools
- Know about Computer ForensicCases

Course Number:MCA24304 **EC-III**
L-P: 4-0 **Credits: 4**

SOFT COMPUTING (C)

Objectives:

- To expose the students to various types of soft computingtechniques
- To learn the various applications of softcomputing.
- To Understand the working principle of Artificial neuralnetwork
- To learn Unsupervised Learning Networks like counter propagation networks, Fixed Weight CompetitiveNets.
- To introduce knowledge on EvolutionaryComputing

Unit I:

Introduction : Neural Networks - Application Scope of Neural Networks - Fuzzy logic - Genetic Algorithm - Hybrid Systems - Soft Computing - Artificial neural network: Fundamental Concept - Evolution of Neural Networks - Basic models of Artificial Neural network - Important Terminologies of ANNs - McCulloch-pitts Neuron - Linear Separability–HebbNetwork.

Unit II:

Associative Memory Networks : Introduction - Training Algorithms for Pattern Association – Auto associative Memory Network – Hetero associative Memory Network - Bidirectional Associative Memory - Hopfield Networks - Iterative Auto associative Memory Networks - Temporal Associative Memory Network.

Unit III:

Unsupervised Learning Networks : Introduction - Fixed Weight Competitive Nets - Kohonen Self-Organizing Feature Maps -Learning Vector Quantization – Counter propagation Networks - Adaptive Resonance Theory Network.

Unit IV:

Classical Sets And Fuzzy Sets : Introduction - Classical Sets - Fuzzy Sets - Classical Relations and Fuzzy Relations: Introduction- Cartesian Product of Relation - Classical Relation - Fuzzy Relation - Tolerance and Equivalence Relation – Non interactive Fuzzy Sets.

Unit V:

Conventional Algorithm : Introduction - Basic Operators and Terminologies in Gas - Traditional Algorithm vs Genetic Algorithm - Simple GA - General Genetic Algorithm - The Schema Theorem - Classification of Genetic Algorithm - Holland Classifier System - Genetic Programming -Application of Genetic Algorithm.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text books:

1. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", 2008.

Reference books:

1. EvaVolna, –IntroductiontoSoft Computing, Book boon Publications, 2013
2. http://www.myreaders.info/html/soft_computing.html
3. https://epgp.inflibnet.ac.in/

Outcomes:

- Learn about soft computing techniques and theirapplications
- Analyze various neural networkarchitectures
- Able to model the fuzzysystems
- Analyze the genetic algorithms and theirapplications.
- Knowledge on unsupervised learningnetworks

Course Number:MCA24305 **EC-IV**
L-P:4-0 **Credits: 4**

INTERACTIVETECHNOLOGY (A)

Objectives

- To make students to become professional in the creation and development of web sites and webpages.
- To make students understand the web technologies such as Internet, JavaScript, XML, JSP, ASP.
- To develop professional software developmentskills.
- To familiarize the students with the backend concepts of SQL server, NoSQL and other databases.
- The course explains the concepts of developing advanced HTML pages with the help of frames, scripting languages, and evolving technologies like DHTML, andXML.

UNIT I:

Internet Basics: Basic Concepts – Internet Domains – IP Address – TCP/IP Protocol – The WWW – The Telnet – **Introduction to HTML:** Web server - Web client / browser - Tags – Text Formatting – Lists – Tables – Linking Documents - Frames.

UNIT II:

JavaScript: JavaScript in Web Pages – The Advantages of JavaScript – Writing JavaScript into HTML – Syntax – Operators and Expressions – Constructs and conditional checking – Functions – Placing text in a browser– Dialog Boxes – Form object's methods – Built in objects – user defined objects.

UNIT III:

XML: Comparison with HTML – DTD – XML elements – Content creation – Attributes – Entities – XSL – XLINK – XPATH – XPOINTER – Namespaces – Applications – integrating XML with other applications.

UNIT IV:

JSP Fundamentals: Basics – Directive basics – Page directive – The taglib directive – The include directive – JSP Standard Actions – Java Beans – Error Handling.

UNIT V:

ASP: Introduction to ASP – Objects – Components – Working with HTML forms – Connecting to Microsoft SQL Server & MS–Access Database – SQL statements with connection object – Working with record sets.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books

1. IvanBayross,–WebEnabledCommercialApplicationDevelopmentUsingHTML,DHTML, JavaScript, Perl CGI‖, BPB Publication, 3rd Ed. 2005. (Unit I &II)
2. ElliotteRustyHarold, –XMLBible|, 2nd Edition,WroxPublication.(UnitIII)
3. Vivek Chopra, Sing Li, Rupert Jones,JonEaves,John T. Bell, –Beginning Java Server Pages‖, Wrox Publications. (UnitIV)
4. Ivan Bayross,–PracticalASP|, BPBPublication.(Unit V)

Reference Books

1. A.A. Puntambekar,–Web Technologies|, Technical Publications, 2009
2. Deitel,Deitel,Goldberg,–Internet&WorldWideWeb:HowtoProgram‖,FifthEdition, Pearson Education,2012.

E-References:

1. www.w3schools.com
2. www.devguru.com

Outcomes

After the course, students can able to:

- Design Web page applying technologies of JavaScript, XML, JSP, ASP andSQL.
- Understand internet basics, HTML, Webserver and relatedtechnologies.
- Use JavaScript for the webdevelopment.
- Develop web pages usingXML.
- Understand JSPfundamentals.
- Use SQL for webpages.

Course Number:MCA24305 **EC -IV**

L-P:4-0 **Credits: 4**

COMPUTER VISION (B)

Objectives:

- To understand the fundamental concepts related to image processing and feature extractionetc.
- To study the concepts of edge detectiontechniques.
- To get familiar about image segmentationconcept.
- To understand motion analysis and objecttracking
- To apply the concepts to solve computer vision problems of differentfields.

UNIT I:

Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement-Histogram Processing.

UNIT II:

Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH

UNIT III:

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut,

Mean-Shift, Texture Segmentation; Object Detection

UNIT IV:

Motion analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio -Temporal Analysis, Dynamic Stereo; Motion parameter estimation

UNIT V:

Object tracking; Mean Shift tacking, Object Categorization, Content Based Image Retrieval, Action Recognition

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Textbooks:

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited2011.
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003.

References:

1. D.L.Baggioetal.,–MasteringOpenCVwithPracticalComputerVisionProjects‖,Packt Publishing,2012.
2. E. R. Davies, –Computer&MachineVision,Fourth Edition, AcademicPress,2012.

E-Resources:

1. http://szeliski.org/Book/drafts/SzeliskiBook_20100903_draft.pdf

Outcomes:

At the end of the course, students will be able to:

- Apply fundamental algorithms in ImageProcessing
- Implement edge tracking techniques
- Implement object motion and object tracking relatedtechniques
- Perform shapeanalysis
- Develop applications using computer visiontechniques

Course Number:MCA24305 **EC -IV**

L-P: 4-0 **Credits: 4**

INTERNET OF THINGS (C)

Objectives:

- Assess the genesis and impact of IoT applications, architectures in realworld.
- Illustrate diverse methods of deploying smart objects and connect them tonetwork.
- Compare different Application protocols forIoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoTin Various domains of Industry.

UNIT I:
IoT Definition , Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

UNIT II:
Smart Objects: The –Things‖ in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

UNIT III:
IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

UNIT: IV:
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an OperationalEnvironment

UNIT V:
IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-CaseExamples.

UNIT VI:
Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, JeromeHenry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internetof Things‖, 1stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978- 9386873743)

2. SrinivasaK G, –Internet of Things|,CENGAGELeaningIndia, 2017

Reference Books:

1. VijayMadisetti and ArshdeepBahga, –InternetofThings(AHands-on-Approach)‖, 1stEdition, VPT, 2014. (ISBN:978-8173719547)

2. Raj Kamal, –Internet of Things: Architecture and Design Principles|, 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Web Resources:

1. https://www.raspberrypi.org/
2. http://estimote.com
3. http://www.ti.com/tool/cc2541dk-sensor
4. https://developer.ibm.com/iot/
5. http://www.microsoft.com/en-in/server-cloud/internet-of-things.aspx

Outcomes:

After studying this course, students will be able to

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

VALUE ADDED COURSES

Course Number: 24VAC01 **VAC-I**

SOFT SKILLS: PROFESSIONAL ENGLISH

Objectives:

- Toimprovethecommunicationskillsofthestudents
- To understand anddemonstratewritingand speaking processes.
- Develop vocabulary and improve the accuracy in grammar
- To improvespeaking processes throughconducting meetings and report-writing.
- To understand anddemonstratewritingand speaking processes throughwritten communication, conducting meetings and report-writing.

UNITIINTRODUCTION

Meaning-Objectives-Importance-PrinciplesofCommunication-FormsofCommunication- Process of Communication- Communication barriers- techniques foreffectivecommunication

UNITIIBASICENGLISHCOMMUNICATION

Parts of Speech- Meaning and its usage- Noun- Pronoun-Verbs-Types of Verbs- Adverb-Adjectives-Conjunction- Interjections-Parts of Sentence- Subject and Predicate

UNITIIIWRITTENCOMMUNICATION

Paragraph writing - LetterWriting – Essay writing - Principles-Inquiries-Circulars-Acknowledgement - Complaints- Job ApplicationLetters-Bio-Data-CoveringLetters,Interviewletters,LetterofReference.E-Mail

UNITIVMEETINGS

ConductingMeetings:Procedure-preparingAgenda,minutes,andresolutions–Conducting Seminars and Conferences

UNITV REPORT WRITING

Types of Business Reports- Format- Structure- Components of Report - Analysis of Sample Reports from Industry

TEXTBOOKS:

1. Communication Skills, by N. Gupta, K. Jain, P. Mahajan, SahityaBhawan Publications, 2022, revised edition
2. Communication skills 2nd Edition, Oxford University Press, 2015
3. Business Communication, N. Gupta,K. Jain,P. Mahajan,SahityaBhawanPublications, 2021.
4. UrmilaRai and S. M Rai , Effective Communication (Himalaya Publishing House)
5. Shirley Taylor, Communication for Business, Pearson Education, New Delhi

6. Businesscommunication,principlesandmethodsandTechniques,NirmalSingh,Deep, and Deep publications PvtLtd., 2018.
7. Business communication, Sri Jin Kushal, SunitiAhuja, VK Global Publications Pvt Ltd,2020.
8. Businesscommunication,MeenakshiRaman,PrakashSingh,Oxforduniversitypress, 2016.
9. FoundationsofBusiness communication, IndiaEdition, Dona.J. Young,TataMcGrawHill,2018.

REFERENCES:

1. Professionalcommunication,ArunaKoneru,TatamcgrawHill,2016

E-Resources:

1. https://www.edx.org/learn/business-communications
2. https://learndigital.withgoogle.com/digitalunlocked/course/business-communication
3. https://www.eduonix.com/courses/Office-Productivity/a-complete-guide-for-effective-business-communication
4. https://www.futurelearn.com/courses/effective-communication

Outcomes:

- ToprovideanoverviewofPrerequisitestoEnglishCommunication.
- Develop vocabulary and improve the accuracy in grammar
- Displaycompetenceinoral,written,andvisualcommunication.
- Showanunderstandingofopportunitiesinthefieldofcommunication.
- Develop the confidence to speak in public
- Demonstrate positive group communication exchanges.

Course Number: 24VAC02 **VAC - II**

Web Site Development

Objectives:

- To make students understand about HTML and its Tags.
- To understand about Creating HTML Links.
- To familiarize the students with the Cascading Style Sheet.
- To expose the students to the concept ofDynamic HTML System.
- To expose the students with Programming skills with HTML5

Unit I

HTML Part I : Overview to HTML – Basic Tags – Elements – Attributes – Formatting – Phrase Tags – Meta Tags – Comments – Images – Tables – List.

Unit II

HTML Part II : Text Links – Image Links – E-Mail Links Frames – Iframes – Blocks – Backgrounds – Colors Fonts – Forms – Embedded Multimedia – Marquees – Header – Style Sheet.

Unit III

Dynamic HTML: Introduction to Style Sheet – Cascading Style Sheet – Cascading Style Sheet Properties – Using Styles in the < STYLE > Element.

Unit IV

HTML5 : Part I
Building the HTML5 Logo – Drawing Canvas – Manipulating Programmer – defined Objects.

Unit V

HTML5 Part II
Bouncing Video – Animating and Masking HTML5 Video – Map maker – Combining Google maps and the Canvas.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books

1. Thomas Powell, HTML & CSS : The Complete Reference , 5th Edition Paperback 2017

Reference Books:

1. DHTML and JavaScript by Gilorien.
2. HTML5 and JavaScript Projects by Jeanine Meyer
3. https://www.w3schools.com/html/
4. https://www.javatpoint.com/dhtml
5. https://www.tutorialspoint.com/html5/index.htm

Outcome

- Students can able to understand the importance of HTML and its Tags.
- Students can acquire in-depth knowledge on Creating HTML Links
- Students can be familiarizing with the Cascading Style Sheet.
- Students can understand the basic concept Dynamic HTML System.
- Students can able get interpretation about Programming skills with HTML5

BRIDGE COURSES

Course Number: 24BDC01 **Bridge Course: I**

Credits:2

PROGRAMMING LANGUAGES

Objectives:

- To make students understand the basic principal of Programming Languages.
- To understand about the Basic Terminology andNotation.
- To Train with simple C and C++ ProgrammingConcepts.
- To expose the Programming Language using Decision makingconcepts.
- To familiarize C and C++ Language with simple programming.

UNIT I:

Overview: Structure of C – Use of Comments- Compilation of a Program.**Data Concepts**: Variables, Constants, Data Types. Declaring Variables, Scope of the Variables according to Block.**Type of Operators**: Precedence and order of Evaluation, Statement and Expression.

UNIT II:

Type conversion: Automatic and Explicit type conversion – Data input and Output functions – Character I/O format.**Iterations:** Control statements for decision making: (i) Branching (ii) Looping (iii) Jumping.

UNIT III:

Overview: Introduction to C++ - Introducing Object oriented Approach **–** Variable Definition in C++ - Variable Declaration in C++ - Local Variables - Initializing Local and Global Variables– Applications of C++ Programming.

UNIT IV:

OOPs Concepts: Abstraction – Encapsulation – Inheritance – Polymorphism – Information hiding - Abstract data types

UNIT V:

Object & classes: C++ class declaration - Base and Derived Classes - Attributes - Methods - Constructors and destructors - Instantiation of objects - Default parameter value.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. E.Balagiuruswamy, –ProgramminginANSIC‖, 4th Edition, TMIPublication
2. McGrathMike ―C++Programming in Easy Steps ,BPB Publications.
3. https://www.tutorialspoint.com/cprogramming/index.htm

Reference Books:

1. YashwantKanetkar,–Let UsC‖, 13th Edition,PHP,2013
2. StroustrupBjarne,―C++Programming Language ,Pearson Education (US)

Outcomes:

- Able to understand the basic principal of Programming Languages.
- Able to understand about the Basic Terminology andNotation.
- Able to train with simple C and C++ ProgrammingConcepts.
- Able to expose the Programming Language using Decision makingconcepts.
- Able to familiarize C and C++ Language with simpleprogramming.

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Course Number: 24BDC02 **Bridge Course: II**

Credits:2

PRINCIPLE OF COMPUTING

Objectives:

- To Know the uses of ComputerNetworks
- To Understand the Basic Concepts of ComputerNetworks.
- To impart the basic database concepts, applications, data models, schemas and instances.
- To Demonstrate the use of SQL and relational algebra operations
- To Learn the Concepts related to Operating system and connectivityDevices.

UNIT I:

Basics of Computer Network : Introduction to Networks - Network Topology - Types of Network: LAN, MAN, WAN - Communications Types: Synchronous, Asynchronous - Modes of Communication: Simplex, Half Duplex, Full Duplex.

UNIT II:

Transmission Media: Transmission Media - Guided Media (Wired) : Coaxial Cable - Twisted - Fiber Optics Cable - Advantages & Disadvantages – Applications. Unguided Media(Wireless): Electromagnetic Spectrum for Wireless Communication, PropagationMethods.

UNIT III:

Introduction: Database-System Applications- Purpose of Database Systems – Viewof Data - Database Languages - Relational Databases - Database Design –DataStorage and Querying Transaction Management - History of DatabaseSystems**.**

UNIT IV:

SQL Overview of the SQL Query - Language - SQL Data Definition – BasicStructure of SQL Queries - Additional Basic Operations - Set Operations – NullValues Aggregate Functions - Nested Subqueries - Modification of the Database -SQL Data Typesand Schemas.

UNIT V:

Operating Systems: Basic Concepts- Operating System Structures, System Components – Operating System Services - System calls – System Programs – System Design and Implementation.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1.TanenbaumAndrewS., David J. Wetherall–Computer Networks‖, 2013, Fifth Edition, Prentice Hall of India Pvt. Ltd., New Delhi. (Unit 1 to2)

2. Database System Concepts, Sixth edition, Abraham Silberschatz, Henry F.Korth, S. Sudarshan, McGraw-Hill-2010 (Unit 3 to 4).

3. "Operating System Concepts", Silberschatz, Galvin, Gagne Sixth Edition, 2003.

Reference Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", McGraw-HillCompanies, New York, 5th Edition, 2017.

2.Blokdyk, Gerardus, and Blokdyk, Gerardus, "RDBMS Relational DatabaseManagement System a Complete Guide", 2020 Edition, Emereo PtyLimited, 2019.

3.Achut S. Godbole and KahateAtul , "Operating Systems & SystemsProgramming ", Tata Mcgraw Hill, 2003

Outcomes:

- Able to know the Uses of ComputerNetworks
- Able to understand the Basic Concepts of ComputerNetworks
- Able to know the basic concepts of Database Systems
- Able to get Understand the SQL queries to interact with Database
- Able to learn the Concepts related to operating system and connectivityDevices

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Course Number: 24BDC03 **Bridge Course: III**

Credits: 2

WEB PROGRAMMING

Objectives:

- To make students understand the basic concepts ofWWW.
- To understand about the Basic Terminology of WebDesign.
- To Train with simple Web Programs usingHTML
- To expose the knowledge of Style Sheets and itsApplications.
- To familiarize page Layout and Linking in websites.

UNIT I:

HTML : Concept of WWW ,Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features ofHTML5

UNIT II:

Dynamic HTML (DHTML): Introduction – Cascading Style Sheets (CSS) – DHTMLDocument Object Model and Collections – Event Handling. Java Script: Introduction – Language Elements – Objects of Java Script

UNIT –III

Extensible Mark-Up Language (XML): Introduction – HTML vs XML – Syntax ofthe XML Document – XML Attributes – XML Validation – XML DTD – The BuildingBlocks of XML .

UNIT - IV:

Essentials of PHP - Operators and Flow Control - Strings and Arrays.

UNIT - V:

Creating Functions - Reading Data in Web Pages - PHP Browser – Handling Power.

UNIT VI:

Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya,Wiley-India
2. C.Xavier, Web Technology and Design, NEW AGE; First edition, 2018
3. Steven M. Schafer, "HTML, XHTML, and CSS Bible", Wiley Publication, 2011

Outcomes:

- Able to make students understand the basic concepts ofWWW
- Able to understand about the Basic Terminology of WebDesign.
- Able to Train with simple Web Programs usingHTML
- Able to expose the knowledge of Style Sheets and itsApplications.
- Able to familiarize page Layout and Linking in websites.