KOLHAN UNIVERSITY, CHAIBASA

JHARKHAND

ORDINANCES
&
SYLLABUS

(As adopted from Jharkhand University of Technology, Ranchi)

FOR

TWO YEARS (FOUR SEMESTERS)

FULL TIME

POST GRADUATE PROGRAMME

IN

MASTER OF COMPUTER APPLICATION(MCA)

A SELF FINANCING COURSE

UNDER PG DEPARTMENT OF PHYSICS

KOLHAN UNIVERSITY,CHAIBASA

Jharkhand

-: Contents :-

Prin
08/09/2021.

1. Introduction

The Jharkhand University of Technology, Ranchi shall be conferred on candidates who are admitted to the program and fulfill all the requirements for the award of the degree.

2. Academic Calendar

2.1 That the term 'academic year' means the period extending from the first day of July in a year to the thirty of June in the next succeeding year. The word 'year' when used without limitation means a calendaryear.

2.2 That an academic year shall have ordinarily two semesters and each semester shall have at least 90 workingdays.

2.3 That the Master of Computer Applications (MCA) is a two-year programme spread over four semesters.

3. Eligibility for Admission

Passed BCA/Bachelor Degree in Computer Science Engineering or equivalent Degree OR Passed B.Sc./B.Com./B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University). Obtained at least 50% marks (45% marks in case of candidatesbelongingtoreserved category) in the qualifyingexamination.

4. Course Structure

There shall be 18 theory papers, 08 laboratory papers, one mini project, one project and a Research/Technical Paper. Out of the 18 theory papers, 12 shall be in information technology, 03 in electives, 02 in mathematics and 01 in business management. All 03 elective papers shall be in information technology.

5. Registration

5.1 Every studentof the MCA course is required to be present in person & Register for each semester on the date fixed and notified in the Academic Calendar.

a. Physical presence of the student on the campus on the first day of the semester.

b. Payment of semester fees including any unpaid dues of past semesters and

c. Selection of courses / subject papers to be studied during the semester.

5.2 Registration of students for each semester will be organized by the Examination section of the University. The subject details will be verified by the faculty members of respective faculty/college/ institute. Payment of due will verified by the Examination section of the University. An appropriate semester registration form will be used for this purpose.

5.3 A student who fails to register on the day announced for the purpose may be permitted by the Dean (Academic)/Principal/ Director, in the consideration of any urgent compelling reasons. Late registration within 05 working days on payment of additional fee as prescribed by the University/College/ Institute.

Normally no late registration shall be permitted after 5th working days from the scheduled date, except in special cases, a serious medical problem, a family calamity etc. to be approved by the Dean (Academic)/Principal/ Director. However, under no circumstance's late registration after 15 calendar days from the scheduled date of registration is allowed.

5.4 Only those students will be permitted who have

i. Cleared all University/College/Institute and hostel due of the previous semesters, Paid all required prescribed fees for the current semester.

ii. Not been debarred from registering for a specified period on disciplinary or any other ground

iii. Satisfied and academic requirements and not been struck off from the roll of the Institute.

6. Guidelines of Examinations

6.1 That to be admitted to MCA semester examinations, a candidate musthave:

I. completed a regular course of study in the university in the subject in which he/she wishes to beexamined,

II. attendedatleast70%ofthelecturesdeliveredandpracticalheld,and

III. registered in the University as astudent,

6.2 That of end of each semester, an examination shall be conducted by the University on the followingpattern:

Theory Papers: In each theory paper there shall be a University examination for 75 marks of three hours duration and 25 marks shall be assigned to sessional work as per thecoursecurriculum.

Practical Papers: In each theory paper there shall be a University examination for 50 marks of two hours duration and 25 marks shall be assigned to sessional work as perthe coursecurriculum.

Sessional Works: Sessional work of 25 marks shall be distributed as under:

Theory papers: There shall be best of two class test of 20 marks and assignment and viva shall carry 5 marks.

Practical Papers: The evaluation of sessional work of practical paper is based on the presentation of the laboratory records and innovative interaction with the teachers in the lab.

6.3 That of each semester term end examination the candidate has to submit an application in theprescribed format to the University through the HOD. The candidate has to fill in all the details of papers/subjects he/she wants to appear for. The date of issue of blank forms and last date for submission will be displayed on the notice board. The students shall have to get 'No Dues' certificate fromHOD.

6.4 That the marks of assignment/mini project/project/research or technical paper shall be awardedbyrespectiveteachersorboardaspertheguidelinesoftheMCAprogramme.

6.5 That in order to pass MCA semester examinations, a candidate must clear all papers in that semester with at least 40%marks in each theory, sessional work and practical.

6.6 That all such candidates who pass the MCA semester examination shall be admitted in the

08/09/2023

8/9

next semester of the course on payment of prescribed fees of that semester.

6.7 That the candidate who appeared in the MCA semester examination but failed to secure the requisite pass marks either in the theory papers or practical papers or in the sessional worksshall also be admitted in the succeeding semester of the MCA programme on payment of prescribed fees of thatsemester.

6.8 That the failed candidate shall be allowed to appear in those papers in succeeding semester examination on payment of requisite feerevised by University time to time.

6.9 That the mini project of the student in 3rdsemester shall be evaluated by two examiners (internal) and project of the student in 4thsemester shall be evaluated by two examiners (external &internal) to be appointed by the university. The marks on the mini project and project work shall be awarded on the basis of project report, project presentation, demonstration of skill and viva-voce in an open seminar, chaired by the HOD.

6.10 That a candidate shall be required to clear all the papers of all the semesters within two academic years from the date of entry in the 1stsemester of the MCA programme to be eligible for the award of degree. Thereafter the registration will stand cancelled.

7 Grading System

7.1 That after every semester examination, the candidates' score card will show the paper-wise marks, grade, grade-point and SGPA (semester grade point average) as per the following scheme.

Score of Paper (Univ.exam + Sessional work)	**Grade (G)**	**Grade Point (GP)**
85% to 100	Outstanding (O)	10
70% to 84.9%	Excellent (E)	8
55% to 69.9%	Very Good (V)	6
40% to 54.9%	Average (A)	4
Less than 40%	Fail (F)	Zero

Less than 40% will be considered as failure and letter grade 'F' will be assigned with zero points.

The Semester Grade Point Average (SGPA) for each semester and Cumulative Grade Point Average (CGPA) for all the semesters is calculated as follows:

For each subject (Paper) passed the grade point (GP) is multiplied by credit for that subject (paper). The total for all such earnings is calculated. This grand total is divided by the credits earned (passed). The result thus calculated is the semester grade point average (SGPA), i.e.

08/09/11

8/9

$$SGPA = \frac{\sum_i (Pi\ X\ GPi)}{\sum_i Pi}$$

Where *Pi* the credit of the subject (paper), *GPi* is the grade point for that subject (paper) and ΣiPi is the sum of all subject (paper) credits (semester credits).

The Cumulative Grade Point Average (CGPA) of the course is calculated as:

$$CGPA = \frac{\Sigma_i^3[(SGPA\ of\ semester)X(Semester\ credit\ of\ semester)]}{Sum\ of\ semester\ credits\ of\ semester\ 1\ to\ 3}$$

Thatthefinalresultsheetofthestudentsshalldisplaythefollowing:

(i) Semester wise grade and gradepoint;

(ii)SGPA of eachsemester;

(iii) CGPA ofcourse;

(iv) The grade score of the fullcourse.

(v) Percentage score of the fullcourse.

7.2 That if a candidate gets grade F in 4th semester, he/she shall be allowed to repeat the semester only once with a differentproject.

7.3 That for a successful completion the MCA programme, grade of 4th semester should not be F(Fail).

7.4 That the result of examination shall be notified by Controller of ExaminationsofJharkhand University of Technology, Ranchi in different newspapers and shall also be placed in department noticeboard.

7.5 That if a student is found to have indulged in any kind of malpractice or enough indulging in any malpractice, as per the regulations under Jharkhand University of Technology act.

08/09/14

8/9.

8. Distribution of Marks

FIRST YEAR OF STUDY

Semester – I

Course Code	Paper	Scheme of Instruction Periods/week	Scheme of Examination Maximum marks in		Paper Credit
			Univ. Exam.	Sessional Work	
IT-11	Programming and Data Structures	3	75	25	3
IT-12	Database Management Systems	3	75	25	3
IT-13	Python Programming	3	75	25	3
IT-14	Computer Organization and Architecture	3	75	25	3
SH-11	Mathematical Foundations	3	75	25	3
SH-12	Business Communication	3	75	25	3
	Laboratories				
IT-11P	Programming Lab	3	50	25	1.5
IT-12P	Database Lab	3	50	25	1.5
IT-13P	Python Programming Lab	3	50	25	1.5
				Semester Credit [SEM 1]:	**22.5**

Semester - II

Course Code	Paper	Scheme of Instruction Periods/week	Scheme of Examination Maximum marks in		Paper Credit
			Univ. Exam.	Sessional Work	
IT-21	Object Oriented Programming using JAVA	3	75	25	3
IT-22	Computer Communication Networks	3	75	25	3
IT-23	Operating Systems	3	75	25	3
IT-24	Theory of Computation	3	75	25	3
--	Elective – I	3	75	25	3
SH-21	Statistical and Numerical Computation	3	75	25	3
	Laboratories				
IT-21P	Java Lab	3	50	25	1.5
IT-22P	Network Lab	3	50	25	1.5
IT-23P	Operating Systems Lab	3	50	25	1.5
				Semester Credit [SEM 2]:	**22.5**

08/09/22

8/9.

SECOND YEAR OF STUDY

Semester - III

Course Code	Paper	Scheme of Instruction Periods/week	Scheme of Examination Maximum marks in		Paper Credit
			Univ. Exam.	Sessional Work	
IT-31	Internet and Web Technology	3	75	25	3
IT-32	Software Engineering	3	75	25	3
IT-33	WSN &Internet of Things	3	75	25	3
IT-34	Data Mining	3	75	25	3
--	Elective – II	3	75	25	3
--	Elective – III	3	75	25	3
	Laboratories				
IT-31P	Internet Lab	3	50	25	1.5
IT-32P	Software Engineering Lab	3	50	25	1.5
IT-33P	Mini Project	3	--	25	4
				Semester Credit [SEM 3]:	**25**

Semester - IV

Course Code	Paper	Scheme of Instruction Periods/week	Scheme of Examination Maximum marks in		Paper Credit
			Univ. Exam.	Sessional Work	
IT-41P	Project	-	-	100	20
IT-42R	Research/Technical Paper	-	Grade *	25	5

02/09/14

8/9.

9. Semester Course Structure

Semester	Category Of Course,	Course Code	Course	Mode of Delivery & Credits			Total Credits
				L (periods/ week)	T (periods/ week)	P (periods/ week)	
First Semester	Programme Core (PC)	IT-11	Programming and Data Structures	3	0	0	3
	Programme Core (PC)	IT-12	Database Management Systems	3	0	0	3
	Programme Core (PC)	IT-13	Python Programming	3	0	0	3
	Programme Core (PC)	IT-14	Computer organization and Architecture	3	0	0	3
	Science and Humanities	SH-11	Mathematical Foundations	3	0	0	3
	Science and Humanities	SH-12	Business Communication	3	0	0	3
	Laboratories						
	Programme Core (PC)	IT-11P	Programming Lab	0	0	3	1.5
	Programme Core (PC)	IT-12P	Database Lab	0	0	3	1.5
	Programme Core (PC)	IT-13P	Python Programming Lab	0	0	3	1.5
	Total						**22.5**

Semester	Category Of Course,	Course Code	Course	Mode of Delivery & Credits			Total Credits
				L (periods/ week)	T (periods/ week)	P (periods/ week)	
Second Semester	Programme Core (PC)	IT-21	Object Oriented Programming using JAVA	3	0	0	3
	Programme Core (PC)	IT-22	Computer Communication Networks	3	0	0	3
	Programme Core (PC)	IT-23	Operating Systems	3	0	0	3
	Programme Core (PC)	IT-24	Theory of Computation	3	0	0	3
	Programme Core (PC)	--	Elective – I	3	0	0	3
	Science and Humanities	SH-21	Statistical and Numerical Computation	3	0	0	3
	Laboratories						
	Programme Core (PC)	IT-21P	Java Lab	0	0	3	1.5
	Programme	IT-22P	Network Lab	0	0	3	1.5
	Core (PC)						
	Programme Core (PC)	IT-23P	Operating Systems Lab	0	0	3	1.5
	Total						**22.5**

08/03/22

Semester	Category Of Course,	Course Code	Course	Mode of Delivery & Credits			Total Credits
				L (periods/ week)	T (periods/ week)	P (periods/ week)	
Third Semester	Programme Core (PC)	IT-31	Internet and Web Technology	3	0	0	3
	Programme Core (PC)	IT-32	Software Engineering	3	0	0	3
	Programme Core (PC)	IT-33	WSN & Internet of Things	3	0	0	3
	Programme Core (PC)	IT-34	Data Mining	3	0	0	3
	Programme Core (PC)	--	Elective – II	3	0	0	3
	Programme Core (PC)	--	Elective – III	3	0	0	3
	Laboratories						
	Programme Core (PC)	IT-31P	Internet Lab	0	0	3	1.5
	Programme Core (PC)	IT-32P	Software Engineering Lab	0	0	3	1.5
	Programme Core (PC)	IT-33P	Mini Project	0	0	3	4
	Total						**25**

Fourth Semester	**Category Of Course,**	**Course Code**	**Course**	**Mode of Delivery & Credits**			Total Credits
				L (periods/ week)	**T (periods/ week)**	**P (periods/ week)**	
	Project and Research/Technical Paper						
	Project	IT-41P	Project				20
	Research/ Technical Paper	IT-42R	Research/Technical Paper				5
	Total						**25**

Total Credits: 95

08/09/17

8/9

List of Electives						
Elective	**Course Code**	**Name of Elective Courses**	**L**	**T**	**P**	**Credit**
Elective – 1	EC-11	Artificial Intelligence and its Applications	3	0	0	3
	EC-12	Network Security and Cryptography	3	0	0	3
	EC-13	Computer Graphics and Multimedia	3	0	0	3
	EC-14	Soft Computing	3	0	0	3
	EC-15	Block Chain Technology	3	0	0	3
Elective – 2	EC-21	Machine Learning	3	0	0	3
	EC-22	Digital Forensic	3	0	0	3
	EC-23	Image Processing	3	0	0	3
	EC-24	Optimization Techniques	3	0	0	3
	EC-25	Intrusion and Detection Systems	3	0	0	3
Elective – 3	EC-31	Cloud Computing	3	0	0	3
	EC-32	Computer Vision	3	0	0	3
	EC-33	Natural Language Processing and InformationRetrieval	3	0	0	3
	EC-34	Data Analytics	3	0	0	3
	EC-35	Cyber Security	3	0	0	3

08/09/21

8/9

10. SYLLABUS FOR M.C.A. 1ST SEMESTER

PAPER: IT 11 : PROGRAMMING AND DATA STRUCTURES

Fullmarks:75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives

This course enables the students:

1.	To provide knowledge of practical implementations and usage of Data Structures and Algorithms
2.	Employ knowledge of various data structures during construction of a program.
3.	To develop the logical ability to store and retrieve data efficiently.
4.	To develop an appreciation of graph theory-based solutions for real life problems.
5.	Design and construct object-oriented software with an appreciation for data abstraction.

Course Outcomes

After the completion of this course, students are expected to

A.	Identify various data structures and their usages.
B.	Apply data structures in the modelling of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design.
C.	Demonstrate the usage of optimal trees, heaps and priority queues.
D.	Implement sorting algorithms.
E.	Apply data structures in the modelling of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design.

Module 01(Lecture 06)

Introduction to C, Identifiers and keywords, Data types, Declarations, Expressions, Statements and symbolic constants. Pre-processor command, # include, define, if def, Preparing and running a complete C Program. Operators and expressions, Library functions. Control statements.

Module 02 (Lecture 06)

Functions: Defining and accessing, passing arguments, Function prototypes, Recursion. Use of library functions, Strong classes: automatic, external and static variables, Arrays: Defining and processing, Passing to a function, Multi-dimensional arrays. Strings operations on strings.

Module 03(Lecture 06)

Pointer's declarations. Passing to a function. Operators on pointers. Pointers and arrays. Arrays of pointers. Structures: Defining and processing. Passing to a function. Unions. Data files: Open, close, creates, process. Unformatted data files.

08/09/17

8/9

Module 04(Lecture 10)
Fundamental Data Structures: Using Arrays, Singly Linked Lists, Circularly Linked Lists, Doubly Linked Lists, Asymptotic Analysis.
Stacks, Queues, Dequeues: The Stack, Queue, Dequeue ADTs, Simple Array Based Stack, Queue, Dequeue Implementation, Implementing Stack, Queue with Singly Linked List, Reversing an Array using Stack, Matching Parenthesis and HTML tags, A Circular Queue.

Module 05(Lecture 06)
Sorting: Merge sort, Quick sort, studying sorting through algorithmic lens, Comparing Sorting Algorithms.
Heap: Priority Queues, Array Implementation of Heaps, Construction of Heaps, Heap Sort

Module 06(Lecture 08)
Trees: General Trees, Binary Trees, Implementing Trees, Tree Traversal Algorithms, Binary Search Trees, AVL Trees, B Trees.
Graphs: Data Structures for graphs, Graph Traversals, Transitive Closure, Directed Acyclic Graphs, Shortest Paths, Minimum Spanning Trees.

Text Books: -

1. E. Balaguruswamy, "Programming in ANSI C, 8th Edition, McGrow Hill,2019
2. Seymour Lipschuiz, "Data Structures with C", 3rd Edition, McGrow Hill, Schaum's Series2017

Reference Books:-

1. Reema Thareja, "Programming in C", latest Edition, Oxford,2018
2. Ashok N. Kamthane, "Introduction to Data Structures in C", 1st Edition, Pearson,2009

PAPER : IT 12 : DATABASE MANAGEMENT SYSTEMS
Fullmarks:75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	An ability to apply knowledge of mathematics, science and engineering to develop and analyze computing systems.
2.	An ability to perform experiments to analyze and interpret data for different applications.
3.	An ability to design, implement and evaluate computer-based systems, processes, components or programs to meet desired needs within realistic constraints of time and space.
4.	An ability to analyze the local and global impact of systems /processes /applications /technologies on individuals, organizations, society and environment.
5.	An ability to function in multidisciplinary teams.

08/09/21 8/9.

Course Outcomes
After the completion of this course, students are expected to

A.	Explain the basic concepts and the applications of database systems.
B.	Utilize the knowledge of basics of SQL and construct queries using SQL.
C.	Explain&usedesignprinciplesforlogicaldesignofdatabases,includingtheE-Rmethodand normalization approach.
D.	Demonstrate the basics of query evaluation and apply query optimization techniques.
E.	Explain the basic concepts and the applications of database systems.

Module 01(Lecture 06)
Introduction: An example, Characteristics of Database approach, Advantages of using DBMS approach, A brief history of database applications, Data models, schemas and instances, Three-schema architecture and data independence, Database languages and interfaces, The database system environment, Centralized and client-server architectures, Classification of Database Management systems.

Module 02(Lecture 06)
Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship types of degree higher than two.

Module 03(Lecture 08)
Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and dealing with constraint violation, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra, Relational Database Design Using ER- to-Relational Mapping.

Module 04(Lecture 08)
SQL, Data Definition and Data Types, Specifying basic constraints in SQL, Schema change statements in SQL, Basic queries in SQL, More complex SQL Queries. Insert, Delete and Update statements in SQL, Specifying constraints as Assertion and Trigger, Views (Virtual Tables) in SQL, Additional features of SQL, Database programming issues and techniques, Embedded SQL, Dynamic SQL, Database stored procedures and SQL /PSM.

Module 05(Lecture 08)
Database Design, Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. Multivalued and join dependencies, DKNF, Atomic values, Data-base Design Process. Modelling Temporal Data, Alternative approaches to database design.

Module 06(Lecture 06)
Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions; Lock- Based Concurrency Control, Performance of locking; Transaction support in SQL,Introduction to crash recovery, Transaction State, Characterizing Schedules based on Recoverability and Serializability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity, Deadlock Handling, Recovery and Atomicity, Log-Based Recovery, Distributed

08/05/24

8/9

Databases and Client-Server Architectures: Concepts and Types of Distributed databases, data fragmentation, Replication and Allocation Techniques for Distributed Database Design, Query Processing in DistributedDatabases.

Text Book:

1. ElmasriRamez, &Navathe S.B., "Fundamentals of Database Systems", 7th Edition, Pearson Education,2016.
2. Peter Rob, Steven Morris & Carlos Coronel , "Data base Systems design, Implementation, and Management", 8th Edition, Cengage Learning2007.

Reference Book:

1. Silberschatz A., &Korth H., "Database Systems Concepts", 6th Edition, McGraw Hill Higher Education,2019.
2. C.J.Date , "Introduction to Database Systems", 8th Edition , Addison-Wesley,2003

PAPER : IT 13 : PYTHON PROGRAMMING
Full marks: 75, Pass Marks: 30, Time: 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To introduce Python programming language through its core language basics and program design techniques suitable for modern applications.
2.	To understand the wide range of programming facilities available in Python covering graphics, GUI, data visualization and Databases.
3.	To utilize high-performance programming constructs available in Python to develop solutions in real life scenarios.

After the completion of this course, students are expected to

A.	Design real life situational problems and think creatively about solutions of them.
B.	Apply a solution clearly and accurately in a program using Python.
C.	Apply the best features of Python to program real life problems

Module 01(Lecture 05)
Introduction to Python, history of python. Two modes of using Python Interpreter, Variables and Data Types, Operators and their Precedence, Strings & Slicing, Python Lists, tuples and set, Input from the Keyboard.

Module 02(Lecture 05)
Conditional statements in python if, elif, Loops and Iterations: while and for loops, Python Syntax, Colon & Indentation, Syntax of for loops, Jump statements: break and continue.

Module 03(Lecture 06)
Functions, passing arguments and return values. Optional and Named Arguments, Storing functions in modules. Modules and Packages in Python, Different ways to import Packages.

Module 04(Lecture 09)
Object Oriented Programming in Python, classes, creating and using a class. Working with classes and instances. Inheritance, importing classes, python standard library.

Module 05(Lecture 07)
File Input/output the pickle module, working with a file, File related modules in Python, File modes and permissions, Reading & Writing data from a file, redirecting output streams to files, working with directories, CSV files and Data Files, Exception Handling, Divide a zero error. Use of try except block, working with multiple files. Graphics, GUI, Writing GUI Programs.

Module 06(Lecture 10)
Arrays and Matrices, The NumPy Module, Creating Arrays and Matrices, Copying, Arithmetic Operations, Cross product & Dot product, Saving and Restoring, Matrix inversion & 3D Data Visualization, The Matplotlib Module, Multiple plots, Polar plots, Pie Charts, Plotting mathematical functions.

Text Books:

1. David Beazley & Brain K. Jones, Python Cookbook, 3rd edition, O' Reilly,2013.
2. 2. Yashavant Kanetkar & Aditya Kanetkar, Let Us Python, 2nd edition, BPB,2020.

Reference Books:

1. Mark Summerfield, Programming in Python 3, 2nd edition, Pearson Education, 2010
2. Martin C. Brown, Python the Complete Reference, 1st edition ,Mc Graw Hill,2018.

PAPER : IT 14 : COMPUTER ORGANISATION AND ARCHITECTURE
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To provide knowledge of Computer Architecture
2.	Employ knowledge of various Digital Logic Circuits, Data Representation, Registerand Processor level Design and Instruction Set architecture
3.	To develop the logical ability to Determine which hardware blocks and control lines are used for specific instructions
4.	Understand memory organization, I/O organization and its impact on computer cost/performance.
5.	Know merits and pitfalls in computer performance measurements.

Course Outcomes
After the completion of this course, students are expected to

08/05/24

8/9

A.	Describe the merits and pitfalls in computer performance measurements and analyze the impact of instruction set architecture on cost-performance of computer design
B.	Explain Digital Logic Circuits, Data Representation, Register and Processor level Design and Instruction Set architecture
C.	Solve problems related to computer arithmetic and determine which hardware blocks and control lines are used for specific instructions
D.	Design a pipeline for consistent execution of instructions with minimum hazards
E.	Explain memory organization, I/O organization and its impact on computer cost/performance.

Module 01(Lecture 06)
Number system, Binary Arithmetic, Complements, Alphanumeric and EBCDIC Codes, Logic Gates, Boolean algebra, Canonical and Standard Forms, Karnaugh map, IEEE Standard Floating-Point Representation.

Module 02(Lecture 06)
Basic processing unit: Some Fundamental Concepts, Basic architecture of computer, Functional units, Operational concepts, Bus structures, Instruction code, Instruction set, Instruction Cycle & Execution Cycle, Instruction formats,

Module 03(Lecture 06)
General Register and Stack Organization, Addressing Modes, Data Transfer & Manipulation Programs, Program Control, Control unit: Micro programmed vs. Hardwired controlled unit, RISC vs CISC.

Module 04(Lecture 08)
Memory organization: Memory Hierarchy, RAM, ROM, Auxiliary Memory, Associative Memory, Cache memory organization, Mapping techniques, Virtual memory, Page Replacement. Inclusion, Coherence, and Locality.

Module 05(Lecture 06)
Input-output organization: Input-Output Interface, Interrupt, Modes of transfer: Programmed I/O, Interrupt Initiate I/O, Direct Memory Access (Initialization, Transfer and Controller), Input-Output Processor.

Module 06(Lecture 08)
Pipelining: Basic Concept of Pipeline Organization, Different types of Pipelining, Pipeline Performance Evaluation, Data Dependencies, Hazard and Techniques for overcoming or reducing the effects of various hazards, Superscalar and Superpipeline Design, Flynn's Classification, Parallel Architecture.

Text Books:

1. Mano.M., Computer System and Architecture, Revised 3rd Edition, PearsonEducation.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 6thEdition, McGraw-Hill Education, New Delhi,2011.

Reference Books:

1. William Stalling, Computer Organization and Architecture- Designing for Performance, 10th Edition, Pearson Education, 2016.
2. A.S. Tananbaum, Structured Computer Organization, 6th Edition, Pearson Education,2013

08/09/19

8/9/19

PAPER : SH 11 : MATHEMATICAL FOUNDATIONS
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	Attain problem solving attitude in systematic and timely manner.
2.	Apply knowledge of mathematics, algorithm and computing principles appropriately to solve real-world problems.
3.	Identify modern tools and techniques through critical thinking for solving complex problems.

Course Outcomes
After the completion of this course, students are expected to

A.	Gain intense foundational introduction to fundamental concepts in discrete mathematics.
B.	Interpret, identify, and apply the language associated with logical structure, sets, relations and functions.
C.	Applying mathematical approach in real life problem through combinatorics.
D.	Understand Graph Terminologies and their representation, Connected & Disconnected graphs.
E.	Special cases of graph theory like, trees to search the minimal spanning trees.

Module 01(Lecture 08)
Mathematical logic: Propositions, Connectives, Conditional, Tautologies, Normal form, Mathematical Induction (M.I.), Predicate Calculus.

Module 02(Lecture 04)
Sets Concepts: Definition and notations of sets, Types of sets, Set operations & properties, Venn diagram, De-Morgan's laws

Module 03(Lecture 08)
Relation & Function: product sets, partition, binary relation in a set, domain & range, Boolean matrices, Adjacency matrix of a relation, Properties of relation, Equivalence relation, Sum & product of function, types of functions, Compositions of function, Inverse of functions.

Module 04(Lecture 08)
Combinatorics: Basic counting Principles, Factorial notation, Permutation & combination, Pigeonhole principle, Binomial theorem.

Module 05(Lecture 10)
Graph Theory: Introduction, Graph basics, Digraph, Sub graph, Circuit & cycle, Multiple path, Connected Graph, Eulerian graph, Hamiltonian graph, Biconnected graph, Konigsberg Bridge problem, Four colour problem.

Module 06(Lecture 06)
Trees: Definitions, Forest, Rooted Graph, Properties of tree, Binary tree, spanning tree Minimal spanning trees- Kruskal's Algorithm, Prim's Algorithm, Directed tree.

08/09/14

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics & Its Applications: With Combinatorics and Graph Theory, Tata McGraw Hill Education Private Limited,2010
2. Bernard Kolman Robert Busby Sharon C. Ross, Discrete Mathematical Structures, Pearson Education,2018.

Reference Books:

1. S. K. Yadav, Discrete Mathematics with Graph theory, Ane Books Pvt. Ltd,2016.
2. Swapan Kumar Chakraborty; Bikash Kanti Sarkar, Discrete Mathematics, Oxford University Press, 2011.

PAPER : SH 12 : BUSINESS COMMUNICATION

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives

This course enables the students:

1.	Make business communication strategies effectively
2.	Utilize problem solving skills
3.	Develop collaborative work skills with regard to team work
4.	Be in tune with organizational formats and channels
5.	Communicate through mail, internet and other technological medium.

Course Outcomes

After the completion of this course, students are expected to

A.	Analyse the matter and demonstrate it at required platform.
B.	Comprehend the issue and select appropriate medium of presentation
C.	Become able to appropriately apply the mode of expression.
D.	Make effective participation in professional affairs
E.	Develop the ability to give written or oral presentation

Module 01(Lecture 10)

Communication: Verbal Communication, Its Importance and Objectives, Process of Communication, Barriers of Communications, Flow of Communication; Non-verbal Communication: Body language, Gestures, Facial expression,

Module 02(Lecture 04)

Essay writing: Essays on general, social, political, sports, entertainment and other topics

Module 03(Lecture 04)

Précis writing: Precis writing of given extract from newspapers, stories, essays and other kind of writings.

Module 04(Lecture 08)

Slide preparation, presentation principles, written presentation of technical material

08/09/17

09

Module 05(Lecture 08)
Preparation of bio-data, Covering letter, preparation of bibliography, official correspondence.

Module 06(Lecture 08)
Writing Skills in Business and Public Administration: Business letter, report, Memo, Circulars. Inquiries, Order, Draft and other such writings

Text Books:

1. Raman, M., Sharma, S. "Technical Communication", Oxford University Press (India),2011.
2. Prasad, P., "Universal English", S. K. Kataria& Sons (New Delhi),2019.

Reference Books:

1. Ludlow, R., and Panton, F. "The Essence of Effective Communication", Prentice Hall of India Pvt. Ltd.1992.
2. Munter, M. " Business Communication: Strategy and Skill " Prentice Hall of India Pvt. Ltd.1987.

08/09/21

8/9

LABORATORY SYLLABUS FOR M.C.A. 1ST SEMESTER

PAPER: IT-11P: PROGRAMMING LAB

Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

Sl. No.	Name of Experiment
01.	WAP for factorial of a given number.
02.	WAP to check a number is palindrome or not using function
03.	WAP in C for Factorial of given number using recursion method.
04.	WAP to select an option for addition, subtraction, multiplication and division to call by function for each.
05.	WAP for Divide and Conquer search.
06.	WAP for Selection sort, Quick sort, and Merge sort.
07.	WAP for stack and perform operation like. a. Push Operationand b. PopOperation
08.	WAP for insertion of Nodes at beginning, middle and end in Linked list.
09.	WAP for deletion of Nodes at beginning, middle and end in Linked list.
10.	WAP for Circular and doubly linked lists.
11.	WAP for Depth first Search.
12.	WAP for Breadth First Search.

Tools Required: Compiler Turbo C++/GCC

IDE : Turbo C++ IDE, DEV C++ IDE

Operating System Required: Windows 7/10

08/05/19 8/9.

PAPER: IT-12P:DATABASE LAB

Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

Sl. No.	Name of Experiment
01.	SQL query using DML and DDL commands
02.	SQL query using DCL and TCL commands
03.	Use of Character Functions and Number Functions
04.	Use of Date Function and General Function
05.	Use of group function
06.	Creation of primary key & all constraints in new table
07.	Addition of primary key & all constraints in existing table
08.	Creation of Sequences.
09.	Creation of Views.
10.	Creation of Indexes.
11.	Writing Function in PL/SQL.
12.	Writing Procedure in PL/SQL.
13.	Creation of triggers in PL/SQL.
14.	Creation of Cursor in PL/SQL.
15.	Creation of Packages in PL/SQL.

Tools Required: Oraclce10g

Operating System Required: Windows 7/10

08/09/14 8/9.

PAPER: IT-13P: PYTHON PROGRAMMING LAB

Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

Sl. No.	Name of Experiment
01.	Write a program to demonstrate basic data type in python.
02.	Write a Program for checking whether the given number is an even number or not.
03.	Write a Program to demonstrate list and tuple in python. Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
04.	Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
05.	Write a program to count the numbers of characters in the string and store them in a dictionary data structure Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure.
06.	Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure.
07.	To finding mean, median, mode for the given set of numbers in a list.
08.	Write a Python script for multiplication of two matrices.
09.	Create a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle.
10.	Write Python program to implement constructors
11.	Write Python program to implement inheritance
12.	Write Python program to implement Polymorphism.
13.	Write Python program to create a simple calculator, where the user will enter a number in a text field, and either add it to or subtract it from a running total, which we will display. We will also allow the user to reset the total.

Tools Required: Python 3.9, Anaconda,

IDE: Jupyter Note Book/Spider IDE/PyCharm

Operating System Required: Windows 7/10

07/09/22

89.

SYLLABUS FOR M.C.A. 2nd SEMESTER

PAPER : IT 21 : Object Oriented Programming using JAVA.
Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2.	Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3.	Understand the principles of inheritance, packages and interfaces.

Course Outcomes
After the completion of this course, students are expected to

A.	The Students will learn to create Classes and their Objects
B.	Learn and implement principles and concepts of Object Orientation such as Abstraction, Data Hiding, and polymorphism.
C.	Develop programs by using inbuilt libraries and importing Packages.
D.	The student will learn to create and handle threads, interfaces and applets

Module 01 (Lecture 08)
Basics of Java: Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements If, else, nested if, if-else ladders, Switch, while, do-while, for, break, continue. Single and Multidimensional Array, String class, String Buffer class, Operations on string, Command line argument, Use of Wrapper Class.

Module 02 (Lecture 06)
Classes, Objects and Methods: Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize () method, Access control, modifiers, Nested class, Inner class, Abstract class.

Module 03 (Lecture 06)
Inheritance: Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords.

Module 04 (Lecture 04)
Interfaces: Creation and Implementation of an interface, Interface reference, instance of operator, Interface inheritance, Dynamic method dispatch, Understanding of Java Object Class, Comparison between Abstract Class andinterface.

Module 05 (Lecture 06)
Multithreaded Programming: Use of Multithread programming, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock. Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File Input Stream, File Output Stream, Input Stream Reader, Output Stream Writer, File Reader, File Writer, BufferedReader.

Module 06 (Lecture 10)
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, dialogs, menu bar, graphics, layout manager – layout manager types – boarder, grid, flow. Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Text books: -

1. Herbert Schildt, Java the Complete Reference, 11th,McGraw-Hill/Osborne.
2. E. Balaguruswamy Programming with Java A Primer, 3rd ,McGrawhill.

Reference books: -

1. Horstmann&Cornell,CoreJava Volume-I Fundamentals, 8th, PearsonEducation.
2. Herbert Schildt, Java: A Beginner's Guide, 8th, McGraw-HillEducation

PAPER : IT 22 : Computer CommunicationNetworks
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	Build an understanding of the fundamental concepts of computer networking.
2.	Familiarize the student with the basic taxonomy and terminology of the computernetworking area.
3.	Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4.	Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
5.	Build an understanding of the fundamental concepts of computer networking.

08/09/21

8/9.

Course Outcomes

After the completion of this course, students are expected to

A.	Build an understanding of the fundamental concepts of computer networking.
B.	Familiarize the student with the basic taxonomy and terminology of the computer networking area.
C.	Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
D.	Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
E.	Build an understanding of the fundamental concepts of computer networking.

Module 01 (Lecture 06)

Introduction to Computer Networks and Physical Layer: Personal Area Network, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks, Network software, protocol hierarchies. Reference Models, Open System Interconnection (OSI), TCP/IP Reference models, Architecture of Internet. Networking Devices, Network Standardization and Examples of Networks.

Module 02(Lecture 06)

Data Transmission Concepts: Guided Transmission Media, Magnetic Media, Twisted Pairs, Coaxial Cable, Fiber Optics, Wireless Transmission, Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Public Switched Telephone Networks. Modulation techniques (FDMA, TDMA, CDMA).

Module 03(Lecture 08)

Data Link layer: Data link layer design issues, Error Detection and Correction Codes, Data Link Protocols (Simplex Stop-and-wait protocol for Error free and noisy channel) and Sliding window protocols. The Channel Allocation Problem, Multiple access protocols and Examples, Wireless LAN, Bluetooth.

Module 04(Lecture 08)

Network layer : Network Layer Design issues, Routing algorithms, Congestion Control Algorithms, Quality of Service, Internetworking and The Network Layer in the Internet.

Module 05(Lecture 08)

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The Internet Transport Protocol: UDP, The Internet Transport Protocols – TCP.

Module 06(Lecture 06)

The application Layer : Domain name system, Electronic Mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks. the World Wide Web, HTTP

Text books:

1. Forouzen, "Data Communication and Networking", TMH, 5thEdition.
2. A.S. Tanenbaum, Computer Networks, Pearson Education, 5thEdition.

Reference books:

1. W. Stallings, Data and Computer Communication, Pearson Education, 8thEdition.
2. Computer Networking by James F. Kurose and Keith W. Ross, Pearson Education, 3rdEdition.

08/09/21

9/9

PAPER : IT 23 : OPERATING SYSTEMS
Full marks: 75, Pass Marks: 30, Time: 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	To understand the main components of an OS & their functions
2.	To study the process management and scheduling.
3.	To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4.	To understand the concepts and implementation Memory management policies and virtual Memory
5.	To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the differentparts of OS

After the completion of this course, students are expected to

A.	Describe the important computer system resources and the role of operating system in their management policies and algorithms.
B.	Understand the process management policies and scheduling of processes by CPU
C.	Evaluate the requirement for process synchronization and coordination handled by operating System
D.	Describe and analyze the memory management and its allocation policies.
E.	Identify use and evaluate the storage management policies with respect to different storage management technologies. 6. Identify the need to create the special purpose operating system.

Module 01 (Lecture 06)
Operating system concepts: OS definition and services; Types and features: batch systems, multiprogramming, multitasking, parallel systems, distributed systems, real-time systems, time-sharing systems, PC systems; System Calls types, System Programs.

Module 02 (Lecture 08)
Process vs. Thread: process states, process control block; Inter-process communication; Process Synchronization, Critical section problems and their solutions, Semaphores, Classical problems of synchronization;

Module 03 (Lecture 06)
CPU Scheduling: Criteria; Algorithms: FCFS, SJF, Priority, Round-Robin, Multilevel Queue Scheduling. Deadlocks: necessary conditions, prevention, avoidance and recovery, banker's algorithm.

Module 04 (Lecture 10)
Memory Management: Logical, Physical Addressing, Memory management techniques, Paging and Segmentation approaches, virtual memory, Demand Paging and Page Replacement algorithms

Module 05 (Lecture 07)
File management: File system Structure, allocation methods free space management: Bit vector, linked list, grouping, counting: Directory implementation: Linear List, Hash table. Device Management: Disk structure, Disk scheduling: Selecting Disk Scheduling algorithm.

Module 06 (Lecture 07)
Networks, Security and Design Principles: Network operating system, distributed operating system, external security, operational security, password protection, access control, security kernels, hardware security, layered approach, design principle.

Text books:

1. Silberschatz and Galvin, Operating System Concepts, 9th Edition, Wiley,2015
2. Andrew S. Tannenbaum, Distributed Operating Systems, 2nd Edition, Pearson

Education Reference books:

1. J. Archer Harris, Operating Systems, Publisher, 4th Edition, McGraw HillProfessional
2. Williams Stallings, Operating systems internal and design principals, 9thedition, Pearson,2018.

PAPER : IT 24 : THEORY OF COMPUTATION
Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	The objective of this course is to explore the theoretical foundations of computer sciencefrom the perspective of formal languages
2.	classify machines by their power to recognize languages.

Course Outcomes
After the completion of this course, students are expected to

A.	Classify machines by their power to recognize languages.
B.	Understand differentiate regular, context-free and recursively enumerable languages
C.	Demonstrate the usage of grammars to produce strings from a specific language.
D.	Apply acquire concepts relating to the theory of computation and computationalmodels including decidability and intractability.

Module 01 (Lecture 04)
Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non-deterministic finite automaton, transition diagrams and Language recognizers.

Module 02 (Lecture 08)
Finite Automata: NFA with Î transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Î transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

08/05/24

8/9

Module 03 (Lecture 06)
Regular Languages: Regular sets, regular expressions, identity rules, constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs notrequired).

Module 04 (Lecture 04)
Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings.

Module 05 (Lecture 10)
Context Free Grammars: Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).
Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL andDPDA.

Module 06 (Lecture 10)
Turing Machine: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required).
Computability Theory: Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence
problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

Text books:

1. Hopcroft H.E. and Ullman J. D ,"Introduction to Automata Theory Languages and Computation. July 2006, 3rd Edition, PearsonEducation
2. Michael Sipser," Introduction to Theory of Computation", – January 2012 2ndedition Thomson

Reference books:

1. Daniel I.A. Cohen , Introduction to Computer Theory, 1996 2nd edition , JohnWiley.
2. Theory of Computer Science – Automata languages and computation -Mishraand Chandrashekaran, Jan 2006, 2nd edition,PHI

PAPER : SH 21 : STATISTICAL & NUMERICALCOMPUTATION
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	Distinguish types of studies and their limitations and strengths,
2.	Describe a data set including both categorical and quantitative variables to support or refute a statement,

08/09/17 8/9.

3.	Apply laws of probability to concrete problems,
4.	Perform statistical inference in several circumstances and interpret the results in an applied context,
5.	Use a computer for the purpose of simulation in probability and statistical inference

Course Outcomes

After the completion of this course, students are expected to

A.	Mathematical statistics open doors in engineering, business, finance, computing, data sciences, health sciences, environmental sciences and public policy
B.	Recent discoveries in the statistical methods have played an essential role in internet search algorithms, disease control, communications technology, climate modelling and much more.
C.	These methods are among the most important disciplines in today's complex world, in part because they serve as the common language of science.
D.	Derivenumerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
E.	It Analyse and evaluate the accuracy of common numerical methods.

Module 01 (Lecture 06)

Concept of Probability: Experiment and Sample Space, Events and Operations with Events, Probability of an Event, Basic probability Rules, Application of Probability Rules, ConditionalProbability.
Random Variables: How Random Variable Arise, Probability Distribution of a Random Variable, Mean or Expected Value of a Random Variable, Probability Histogram value of a Random Variable, Variance and Standard Deviation of a random Variable.

Module 02 (Lecture 06)

Binomial Experiments: Structure of a Binomial Experiment, Binomial Probability Distribution, Use of Binomial Probability Table.
Normal Curve and Normal Distribution: Motivation behind a Normal Curve, properties of a Normal curve, Normal probability Distribution, Areas under a Normal Curve.

Module 03 (Lecture 06)

Errors in Numerical calculations: Errors & their computation-absolute, relative &percentage.
Solution of algebraic & transcendental equations: Introduction, Bisection method, Iterative method, False position method, Newton's Raphson method, Lin Bairstows method. Error analysis & convergence study

Module 04 (Lecture 08)

Interpolation with equal & unequal intervals: Introduction, finite differences-forward, backward & central, difference tables, differences of polynomials, Newton's formula for interpolation, Gauss's central difference interpolation formula, divided difference & their properties-Newton's divided differences formula, Lagrange's interpolation formula, Inverse interpolation.

Module 05 (Lecture 06)

Numerical differential & integration: Introduction, derivatives using forward &backward difference formula, Numerical Integration-Trapezoidal rule, Simpson's 1/3 & 3/8 rules Weddle'srule.

Module 06 (Lecture 10)
Numerical solution of linear system of equations: Direct Method-Gauss elimination, Guass-Jordan, LU decomposition methods. Iterative methods-Gauss-Jacobi & Gauss Seidel methods.

Numerical solution ordinary differential equations: Taylor series method, Euler's method, Modified Euler's method, Runga-Kutta methods of 2^{nd}& 4^{th} order.

Text books:

1. Nabendu Pal &Sahadeb Sarkar, Statistics : Concepts and Applications, PHI , New Delhi-2013..
2. B.S. Grewal Numerical Methods in Engineering & Science (Programs in C, C++ and Introduction to MATLAB) Khanna Publishers,2014.

Reference books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics Sultan Chand and Sons, 2002.
2. S.S Sastry, Introductory methods of numerical analysis, PHI Learning Private Limited, New Delhi2012

LABORATORY SYLLABUS FOR M.C.A. 2ND SEMESTER

PAPER: IT-21P: JAVA LAB
Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

Sl. No.	Name of Experiments
01.	Introduction, Compiling & Executing a Java Program.
02.	Data types & Variables, Decision Control Structures: if, nested if etc.
03.	Program on Decision Control Structures: if, nested if etc.
04.	Loop Control Structures: do while, for etc.
05.	Classes and Objects.
06.	Data Abstraction & Data Biding, Inheritance, Polymorphism.
07.	Using Concept of Package.
08.	Programs on Threads.
09.	Programs on Exception Handlings
10.	Programs on Applet Programs.
11.	Interfaces and Inner classes, Wrapper Classes, Generics.
12.	Programs on JDBC.
13.	Creating GUI.

Tools Required: JDK 1.5

IDE : NetBeans, BlueJ, Eclipse

Operating System Required: Windows 7/10

08/09/22

09.

PAPER: IT-22P: NETWORK LAB

Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

SL. No	Name of Experiment
01.	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
02.	Study of Network Devices in Detail.
03.	Study of network IP.
04.	Connect the computers in Local Area Network.
05.	Study of basic network command.
06.	Study of Network configuration commands.
07.	Configure a Network topology using packet tracer software.
08.	Configure a Network topology using packet tracer software.
09.	Configure a Network using Distance Vector Routing protocol.
10.	Configure Network using Link State Vector Routing protocol.

Tools Required: Compiler Turbo C++/GCC

IDE : Turbo C++ IDE, DEV C++ IDE

Operating System Required: Windows 7/10

PAPER: IT-23P: OPERATING SYSTEM LAB
Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

SL.No.	Name of Experiment
01.	Study of hardware and software requirements of different operating systems (UNIX, LINUX, WINDOWS XP, WINDOWS 7/8
02.	Execute various UNIX system calls for i. Process management ii. File management iii. Input/output Systems calls
03.	Implement CPU Scheduling Policies: i. SJF ii. Priority iii. FCFS iv. Multi-level Queue
04.	Implement file storage allocation technique: i. Contiguous (using array) ii. Linked –list (using linked-list) iii. Indirect allocation (indexing)
05.	Implementation of contiguous allocation techniques: i. Worst-Fit ii. Best- Fit iii. First- Fit
06.	Calculation of external and internal fragmentation i. Free space list of blocks from system ii. List process file from the system
07.	Implementation of compaction for the continually changing memory layout and calculate total movement of data
08.	Implementation of resource allocation graph RAG
09.	Implementation of Banker's algorithm
10.	Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used for storing graph.
11.	Implement the solution for Bounded Buffer (producer-consumer) problem using inter process communication techniques-Semaphores
12.	Implement the solutions for Readers-Writers problem using inter process communication technique – Semaphore

Tools Required: Compiler Turbo C++/GCC

IDE : Turbo C++ IDE, DEV C++ IDE

Operating System Required: Windows 7/10

08/09/13

8/9.

SYLLABUS FOR M.C.A. 3rd SEMESTER

PAPER : IT 31 : INTERNET AND WEB TECHNOLOGY.
Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	This Subject is useful for Making own Web page and how to host own web site on internet.
2.	Along with that Students will also learn about the protocols involved in internet technology.

Course Outcomes
After the completion of this course, students are expected to

A.	Identify about the technologies used in internet.
B.	students would have capability to make own web site and host their own web site on internet

Module 01 (Lecture 03)
Introduction to WWW: History, Protocols and programs, secure connections, application and development tools, the web browser, what is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP

Module 02(Lecture 08)
Introduction to HTML: The development process, Html tags and simple HTML forms, web site structure Introduction to XHTML: XML, Move to XHTML, Meta tags, Character entities, frames and frame sets, inside browser. Style sheets: Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, border sand boxes, margins, padding lists, positioning using CSS

Module 03 (Lectures 06)
Javascript: Client-side scripting, what is Javascript, how to develop Javascript, simple Javascript, variables, functions, conditions, loops and repetition

Module 04 (Lecture 07)
Advance script, Javascript and objects, Javascript own objects, the DOM and web browser environments, forms and validations
DHTML: Combining HTML, CSS and Javascript, events and buttons, controlling your browser

Module 05 (Lecture 07)
XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application.XML, XSL and XSLT.
Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT

08/09/12 8/9

Module 06 (Lecture 07)
PHP : Starting to script on server side, Arrays, function and forms, advance PHP
Databases : Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

Text books:

2. Steven HolznerTitle : "Web Technologies, black book".Jan,2009, 5th edition, DreamtechPress
3. P.J. Deitel& H.M. DeitelPearson. "Web Applications : Concepts and Real World Design", 2006Wiley-India

Reference books:

1. Lynn Beighley& Michael Morrison , "Head First PHP & MySQL"- 2009 5th edition Pearson Education
2. Laura Lemay, "Mastering HTML, CSS &Javascript Web Publishing " -2016 Firstedition BPB Publications

PAPER : IT 32 : SOFTWARE ENGINEERING
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To understand principles, concepts, methods, and techniques of the software engineering approach to producing quality software (particularly for large, complex systems).
2.	To organize and manage a medium-sized software development project, including project plans and documentation, schedule and cost estimates, and quality assurance activities.
3.	To make effective technical oral and written presentations.
4.	To function effectively as a member of a team engaged in technical work.
5.	To think critically about ethical and social issues in software engineering.

Course Outcomes
After the completion of this course, students are expected to

A.	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
B.	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
C.	An ability to communicate effectively with a range of audiences
D.	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
E.	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks,and meet objectives

08/09/17 BHG.

Module 01(Lecture 06)
Introduction: Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary, Spiral, V- shaped, Agile

Module 02(Lecture 06)
Software Requirement Analysis and Specifications: Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.

Module 03(Lecture08)
Software Design: Project Scheduling, Staffing, Software Configuration Management, Cohesion& Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design,UML.

Module 04(Lecture08)
Software Testing: Validation &Verification, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Module 05(Lecture 08)
Software Project Planning: Software Project Metrics: Size Metrics like LOC, Token Count, Function Count, Cost estimation, static, Single and multivariate models, COCOMOModel, Risk management.

Module 06(Lecture 06)
Software Reliability: Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation. Overview of Quality Standards like ISO 9001
CASE Tools: Concepts, use and application.

Text books: -

3. Roger S. Pressman, "Software Engineering: A practitioner's Approach", 7th Edition, TMH,2017.
4. Rajib Mall, Fundamentals of Software Engineering", 5th Edition, PHI,2018.

Reference books: -

3. Ian Sommerville , "Software Engineering", 9th Edition, Pearson,2010
4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "Fundamental of Software Engineering "2nd Edition, Pearson,2015.

PAPER : IT 33 : WSN& INTERNET OF THINGS
Fullmarks: 75, Pass Marks: 30, Time: 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives

This course enables the students:

1.	Understand various sources of IoT &M2M communication protocols.
2.	Describe Cloud computing and design principles of IoT.
3.	Become aware of MQTT clients, MQTT server and its programming.
4.	Understand the architecture and design principles of WSNs.
5.	Enrich the knowledge about MAC and routing protocols in WSNs.

After the completion of this course, students are expected to

A.	Describe the OSI Model for the IoT/M2M Systems.
B.	Understand the architecture and design principles for IoT.
C.	Learn the programming for IoT Applications.
D.	Identify the communication protocols which best suits the WSNs

Module 01(Lecture 07)
IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT,M2M communication, Examples of IoT. Modified OSI Model for the IoT/M2M Systems, data enrichment, data consolidation and device management at IoT/M2M Gateway, web communication protocols used by connected IoT/M2M devices, Message communication protocols (CoAP-SMS, CoAP-MQ, MQTT, XMPP) for IoT/M2M devices.

Module 02(Lecture 06)
Internet connectivity, Internet-based communication, IPv4, IPv6,6LoWPAN protocol, IP Addressing in the IoT, Application layer protocols: HTTP, HTTPS, FTP, TELNET and ports.

Module 03(Lecture 08)
Introduction, Cloud computing paradigm for data collection, storage and computing, Cloud service models, IoT Cloud- based data collection, storage and computing services using Nimbits.

Module 04(Lecture 07)
Introduction, Prototyping Embedded device software, Programming Embedded Device Arduino Platform using IDE, Reading data from sensors and devices, Devices, Gateways, Internet and Web/Cloud services software development.

Module 05(Lecture 08)
Programming MQTT clients and MQTT server. Introduction to IoT privacy and security. Vulnerabilities, security requirements and threat analysis, IoT Security Tomography and layered attacker model.

Module 06 (Lecture 06)
Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks.
Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs Gateway Concepts.

08/09/17

Text books:

1. RajKamal,‖InternetofThings-Architectureanddesignprinciples‖,McGrawHillEducation.
2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks" , JohnWiley,2005.

Reference books:

1.KazemSohraby, Daniel Minoli, &TaiebZnati, —Wireless SensorNetworksTechnology, Protocols, And Applications‖, John Wiley,2007.

2. Anna Hac, —Wireless Sensor Network Designs‖, John Wiley,2003.

PAPER : IT 34 : DATA MINING

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives

This course enables the students:

1.	To learn the overview of data mining principles and approaches.
2.	This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles.
3.	To describe the strengths and limitations of various clustering algorithms and to choose the appropriate algorithm.
4.	Student will be able to understand architectures, applications, design and implementation of data mining and data ware housing concepts.
5.	To learn the concepts of data mining, with illustrations of current state of the art research and applications.

Course Outcomes

After the completion of this course, students are expected to

A.	Understand the functionality of the various data mining and data warehousing component.
B.	Learn the strengths and limitations of various data mining and data warehousing Models.
C.	Explain the analyzing techniques of various data.
D.	Describe different methodologies used in data mining and data ware housing.
E.	Compare different approaches of data ware housing and data mining with various Technologies.

Module 01 (Lecture 08)

Data Mining- Introduction, Data, Types of Data, Data Mining Functionalities, Interestingness of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Data Warehouse, Issues, Data Preprocessing.

Module 02 (Lecture 06)

Data Warehousing- Data warehousing Components, building a Data warehouse, Mapping the Data Warehouse to a Multiprocessor Architecture, DBMS Schemas for Decision Support, Data Extraction, Cleanup and Transformation Tools, Metadata.

08/09/17

8/9.

Module 03 (Lecture 06)
Business Analysis- Reporting and Query tools and Applications, Tool Categories, The Need for Applications, Online Analytical Processing (OLAP), Multidimensional Data Model, OLAP Guidelines, Multidimensional versus Metarelational OLAP, Categories of Tools, OLAP Tools and the Internet.

Module 04 (Lecture 06)
Association Rule Mining - Mining Frequent Patterns, Associations and Correlations, Mining Methods, Mining various Kinds of Association Rules, Correlation Analysis, Constraint Based Association Mining

Module 05 (Lecture 06)
Classification - Classification and Prediction, Basic Concepts, Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines Associative Classification, Lazy Learners, Other Classification Methods, Prediction.

Module 06 (Lecture 08)
Clustering and Trends in Data Mining- Cluster Analysis, Types of Data, Categorization of Major Clustering Methods, K-means, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model-Based Clustering Methods, Clustering High Dimensional Data Constraint-Based Cluster Analysis, Outlier Analysis, Data Mining Applications.

Text book:

1.Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.

2.Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier,2012.

Reference books:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education2007.

2. K. P. Soman, Shyam Diwakar and V. Aja, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India,2006.

08/09/14

8/9.

LABORATORY SYLLABUS FOR M.C.A. 3RD SEMESTER

PAPER: IT-31P: INTERNET LAB

Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

Sl. No.	List of Experiments
01.	CreateHTMLdocumentcodetodevelopaWebpagehavingthebackgroundinred andtitle"MyFirstPage"inanyothercolourandgivingdetailsofyourname,age, telephonenumber,address,enrolmentnumberalignedinproperorder.
02.	Create HTML code to design a page containing paragraphs giving suitable heading style.
03.	CreateawebpagetoshowdifferentattributesofFonttagsuchascolour,sizefaceandanother showdifferentattributes:italics,bold,underlineandalsothispagehavingbackground colour green, giving text colour blue.
04.	CreateaWebpageofredcolouranddisplaylinksinbluecolourwriteappropriatecontentand insertanimagetowardstheleft-handsideofthepage.Whenuserclicksonthe image, it should open another web page.
05.	CreateaWebpageusing*href*attributeofanchortag&theattribute:*alink, vlink*etc and display a moving message in redcolour.
06.	Create an HTML document containing an ordered nested list and unordered nested list showing the content page of engineering college, medical college and general college.
07.	Create a web page containing a table having name of five countries and their capitals.
08.	Create HTML page to show the logical style tags and physical style tags.
09.	Design a form in web page using level, all input types such text as well clickable option.
10.	CreateanHTMLformthatinputsemployeedetailsanddisplaythesameonthe HTMLpage.
11.	To find the addition of two numbers in web page.
12.	To displays the multiplication table.
13.	Create a web page in dynamic form.
14.	Write a program of XML using key attributes.

Tools Required: IDE, Atom, Visual Studio Code
Server: Wamp Server/XAMPP Server/Tomcat Server

Operating System Required: Windows 7/10

PAPER: IT-33P: SOFTWARE ENGINEERING LAB
Full marks: 75(25(INTERNAL)+50(EXTERNAL)), Pass Marks: 30, Time: 3 Hrs. Credits: 3

SI.	Name of Experiment
01.	Study of SRS (Software Requirement Specification) for one the following problems: Library Management System/ATM System/Hospital Management System/Online Marketing System.

02.	Study of Software development Life Cycle Model with an example:
	• WaterfallModel
	  ○ Classical WaterfallModel
	  ○ Iterative WaterfallModel
	• SpiralModel
	• Prototype Model

03.	Software design Principal: Draw the data flow diagram & structure chart for Library Management System/ATM System/Hospital Management System/ Online Marketing System.
04.	Introduction to UML. Design the Use case Model & Class diagram for Library Management System/ATM System/Hospital Management System/Online Marketing System.
05.	Design the Sequence diagram & Collaboration diagram for Library Management System/ATM System/Hospital Management System/Online Marketing System.
06.	Design the Activity diagram & State Chart diagram for Library Management System/ATM System/Hospital Management System/Online Marketing System.
07.	Design the Component diagram for Library Management System/ATM System/Hospital Management System/Online Marketing System.
08.	Design the Deployment diagram for Library Management System/ATM System/Hospital Management System/Online Marketing System.
09.	To Study various Software Metrics.
10.	To study about Integration Testing Identify the uses of Stubs or drivers in the context of an Integration Testing.

Tools Required: STAR UML/Microsoft Visio/Rational Rose

Operating System Required: Windows 7/10

SYLLABUS FOR M.C.A. ELECTIVE - 1

PAPER :EC-11 : ARTIFICIAL INTELLIGENCE AND ITS APPLICATIONS

Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives

This course enables the students:

1.	To learn the overview of artificial intelligence principles and approaches.
2.	To understand the basic areas of artificial intelligence including problem solving, knowledge representation, reasoning, decision making, planning, perception and action.
3.	To describe the strengths and limitations of various search algorithms and to choose the appropriate algorithm.
4.	To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
5.	To learn the concepts of Artificial Intelligence, with illustrations of current state of the art research and applications.

Course Outcomes

After the completion of this course, students are expected to

A.	Understand the concepts of Artificial intelligence.
B.	Interpret the modern view of Artificial intelligence as the study of agents that receive precepts from the environment and perform actions.
C.	Represent knowledge of the world using logic and infer new facts from that Knowledge
D.	Build awareness of AI facing major challenges and the complexity of typical problems within the field.
E.	Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team.

Module 01(Lecture 06)

Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem, Agents & environment, nature of environment, structure of agents, goal-based agents, utility-based agents, learning agents, Forms of learning, inductive learning, learning decision trees, explanation-based learning, learning using relevance information, neural net learning & genetic learning.

Module 02 (Lecture 08)

Problems, Problem Space & search: Defining the problem as state space search, production system, constraint satisfaction problems, issues in the design of search programs. Search techniques, solving problems by searching: Problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.

Module 03 (Lecture 08)
Heuristic search strategies, Greedy best-first search, A* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems. Adversarial search, Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterativedeepening.

Module 04 (Lecture 07)
Knowledge & Reasoning, Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation, using predicate logic, representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

Module 05 (Lecture 07)
Representing knowledge using rules, Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge. Probabilistic reasoning, Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster Shafer theory, Fuzzy sets, and fuzzy logics.

Module 06 (Lecture 06)
Natural Language Processing, Introduction, Syntactic processing, semantic analysis, discourse, and pragmatic processing. Expert Systems, Representing and using domain knowledge, expert system shells, and knowledge acquisition. Basic knowledge of programming language likeProlog

Text book:

1. Artificial Intelligence, Ritch & Knight,TMH
2. Artificial Intelligence, A Modern Approach, Stuart Russel, Peter Norvig,Pearson

Reference books:

1. Introduction to Artificial Intelligence & Expert Systems, Patterson,PHI.
2. Prolog Programming for A.I. by Bratko,TMH

PAPER :EC-12 : NETWORK SECURITY AND CRYPTOGRAPHY.
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

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

Course Outcomes
After the completion of this course, students are expected to

A.	Provide security of the data over the network.
B.	Do research in the emerging areas of cryptography and network security.
C.	Implement various networking protocols.
D.	Protect any network from the threats in the world.

Module 01(Lecture 06)
Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linear crypt analysis of DES - block cipher modes of operations - triple DES – AES.

Module 02(Lecture 06)
Confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.

Module 03(Lecture 06)
Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS..

Module 04(Lecture 08)
MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME.

Module 05(Lecture 06)
IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management.

Module 06(Lecture 08)
Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trustedsystems.

Text Books: -

1. William Stallings, "Crpyptography and Network security Principles and Practices",Pearson/PHI.
2. Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with codingtheory",Pearson.

08/09/19

Reference Books: -

1. W. Mao, "Modern Cryptography – Theory and Practice",PearsonEducation.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice HallofIndia.

PAPER : EC-13 : COMPUTER GRAPHICS AND MULTIMEDIA

Fullmarks: 75, Pass Marks: 30, Time: 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives

This course enables the students:

1.	This course covers basics of computer graphics & Multimedia.
2.	Computer graphics are pictures and films created using computers. Usually, the term refers to computer-generated image data created with the help of specialized graphical hardware and software.
3.	Computer graphics is responsible for displaying art and image data effectively and meaningfully to the consumer.
4.	Computer graphics is used for processing image data received from the physical world.
5.	Computer graphics development has had a significant impact on many types of media and has revolutionized animation, movies, advertising, video games, and graphic design in general

After the completion of this course, students are expected to

A.	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
B.	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
C.	Use of geometric transformations on graphics objects and their application in composite form.
D.	Extract scene with different clipping methods and its transformation to graphics display device.
E.	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

Module 01(Lecture 04)

Introduction to computer graphics and graphics systems. Raster and vector graphics systems, video display devices, physical and logical input devices, simple color models.

Module 02(Lecture 08)

Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Module 03(Lecture 08)

2D Transformation: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines.

08/09/21 8/9.

Module 04(Lecture 06)
Viewing pipeline, Window to Viewport co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

Module 05(Lecture 10)
Hidden Surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry. Rendering of a polygonal surface; Flat, Gouraud, and Phong shading; Texture mapping, bump texture, environment map; Introduction to ray tracing; Image synthesis, sampling techniques, andanti-aliasing.

Module 06(Lecture 04)
Multimedia, concepts, design, hardware, standards – MPEG, JPEG, MIDI, multimedia design methodology, development and testing.

Text Books:

1. Donald Hearn and Pauline Baker Computer Graphics, Prentice Hall, New Delhi,2012
2. Fundamentals of Computer Graphics &Multimedia,Mukherjee,PHI

Reference Books:

1. Foley J.D.,VanDamA, "Fundamentals of Interactive Computer Graphics",AddisonWesley,19932.Krishnamurthy N., Introduction to Computer Graphics,1st Edition,TMH,2002

PAPER :EC-14 : SOFT COMPUTING
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To understand the knowledge about Artificial Intelligent and its parts.
2.	To understand the functions of Neural Network.
3.	To know the applications of Fuzzy Logic.
4.	To know the basic functionalities of optimizations through soft computing
5.	To understand the basic functions of soft computing.

Course Outcomes
After the completion of this course, students are expected to

A.	To learn the fundamentals of non-traditional technologies and approaches to solving hardreal-world problems.
B.	Develop Fuzzy Inference System.
C.	Explain concepts of neural networks.
D.	Solve problems on Genetic Algorithms.
E.	Develop knowledge of soft computing theories fundamentals and so they will be able to design program systems using approaches of these theories for solving various real-world problems.

08/09/17

Module 01(Lecture 06)
Introduction to Artificial Intelligence, Neural Network, Fuzzy Logic & Genetic Algorithm. Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Set, Fuzzy Set, Crip Relation, Fuzzy Relations.

Module 02(Lecture 06)
Fuzzy Logic: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, and Applications.

Module 03(Lecture 08)
Genetic Algorithms, Basic Concepts, Creation of Offspring, Working Principle, Encoding, Fitness Function, Reproduction. Genetic Modelling, Inheritance Operations, Cross Over, Inversion and Deletion, Mutation Operator, Bit Wise Operators, Generation Cycle, Convergence of Genetic Algorithm, Application, Multi-Level Optimization, Real Life Problems, Difference and Similarities Between GA and Other Traditional Methods, Advanced in GA.

Module 04(Lecture 07)
Fundamentals of Neural Networks, Basic Concepts of Neural Network, Human Brain, Model of An Artificial Neuron, Neural Network Architectures, Characteristic of Neural Networks, Learning Method, Taxonomy Of Neural Network Architectures, History Of Neural Network Research, Early Neural Network Architectures, Some Application Domains.

Module 05(Lecture 06)
Back Propagation Network Architecture of Back Propagation Network, Back Propagation Learning, Illustration, Applications, Effect of Tuning Parameters of The Back Propagation Neural Network, Selection Of Various Parameters In BPN, Variations Of Standard Back Propagation Algorithm.

Module 06 (Lecture 08)
Associative Memory and Adaptive Resonance Theory, Autocorrelations, Hetrocorrelators, Multiple Training Encoding Strategy, Exponential BAM, Associative Memory for Real Coded Pattern Pairs, Applications, Introduction to Adaptive Resonance Theory, ARTI, Character Recognition UsingARI1

Text Books:

1. S. Rajasekaran and G.A. Vijayalakshmi Pai, —Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications‖, Prentice Hall of India,2003.
2.J.S.R. Jang, C.T. Sun and E. Mizutani, —Neuro-Fuzzy and Soft Computing‖, Pearson Education, 2004.

Reference Books:

1.Bart Kosko, —Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence‖, Prentice Hall,1992.
2.Jang JyhShing R, Sun C. T., Mizutani E. "Neuro Fuzzy and Soft Computing –AComputational Approach to Learning and Machine Intelligence", Prentice Hall of India, 1997.

08/09/17

PAPER : EC- 15 : BLOCK CHAIN TECHNOLOGY.
Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	Understand how blockchain systems (mainly Bitcoin and Ethereum) work.
2.	To securely interact with them.
3.	Design, build, and deploy smart contracts and distributed applications.
4.	Integrate ideas from blockchain technology into their own projects.

Course Outcomes
After the completion of this course, students are expected to

A.	Explain design principles of Bitcoin and Ethereum.
B.	Explain Nakamoto consensus.
C.	Explain the Simplified Payment Verification protocol.
D.	List and describe differences between proof-of-work and proof-of-stake consensus.
E.	Interact with a blockchain system by sending and reading transactions.

Module 01 (Lecture 10)
Introduction: Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

Module 02 (Lecture 10)
Block Chain: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain

Module 03 (Lecture 06)
Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

Module 04 (Lecture 06)
Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Name coin.

Module 05 (Lecture 06)
Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects – Crypto-currency Exchange, Black Market and Global Economy.

Module 06 (Lecture 04)
Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Text books:

1. S. Desikan, G. Ramesh, Software Testing: Principles and Practices, (2e) Pearson Education,2007.
2. A. P. Mathur, Fundamentals of Software Testing, (2e) Pearson Education, 2008.

Reference books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016). Reference Books
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic CashSystem

SYLLABUS FOR M.C.A. ELECTIVE - 2

PAPER :EC-21 : MACHINE LEARNING
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To introduce students to the basic concepts and techniques of Machine Learning.
2.	To have a thorough understanding of the Supervised and Unsupervised learning techniques.
3.	To study the various probabilities-based learning techniques.
4.	To understand graphical models of machine learning algorithms.

Course Outcomes
After the completion of this course, students are expected to:

A.	Distinguish between, supervised, unsupervised and semi-supervised learning.
B.	Apply the apt machine learning strategy for any given problem.
C.	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem.
D.	Design systems that use the appropriate graph models of machine learning
E.	Modify existing machine learning algorithms to improve classification efficiency.

Module 01(Lectures 10)
Introduction: Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

Module 02(Lectures 10)
Linear Models: Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support VectorMachines.

Module 03 (Lectures 10)
Tree and Probabilistic Models: Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbour Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map.

Module 04 (Lectures 03)
Dimensionality Reduction: Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization.

Module 05 (Lectures 03)
Evolutionary Models: Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

Module 06 (Lectures 06)
Graphical Models: Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – TrackingMethods.

Text Books: -

1. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2015.
2. Tom M Mitchell, "Machine Learning", First Edition, McGraw Hill Education,2017.

Reference Books:-

1. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", First Edition, Cambridge University Press, 2012.
2. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", First Edition, Wiley,2014.

PAPER :EC-22 : DIGITAL FORENSIC.
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	Understand the fundamental of forensics
2.	Have in depth knowledge of relationship between IT and Forensics
3.	Study different aspects of digital evidences

Course Outcomes
After the completion of this course, students are expected to

A.	Develop computer forensic awareness
B.	Utilizing the knowledge for investigations in order to solve computer crime
C.	Perform best practices for incidence response
D.	Apply computer forensic tools for investigation

08/05/17

8/9

Module 01(Lectures 04)
Introduction: Introduction of Cyber Crime, Computer roles in Crime, Introduction to Digital Forensics and its uses. Forensics Evidence, Collection, Processing and the phases of forensics investigation, Types of Computer Forensics

Module 02(Lectures 06)
Data Recovery: Encryption and Decryption, Recovery deleted files, identifying false images and Steganography methods for media data including text, image and audio data

Module 03(Lecture 07)
Digital Evidence Controls: Uncovering attacks that evade detection by event viewer and task manager. Memory image acquisition techniques and their limitations

Module 04(Lectures 07)
Network Forensics: Different attacks in network, collecting and analyzing network-based evidence in windows and Unix environment, Email forensics for standard protocols

Module 05(Lectures 08)
Crime and mobile phones, evidences, forensic procedures, files present in SIM Card, Device data, External memory dump and evidences in memory card, Android forensic fundamental, Data extraction techniques, screen lock bypassing techniques

Module 06(Lectures 10)
Cloud Forensics: Fundamentals of cloud forensics, Cloud crimes, Uses of cloud forensics and its challenges, Interaction of Email system with local and cloud storage
Real forensic Case and Its Tools: Processing a complete forensic case and preparing a forensic report and Introduction of some forensic tools- Helix, FTK, Autopsy and FIRE

Text books:

1. Digital Evidence and Computer crime 3rd Edition: Forensics Science, Computers and the Internet by Eoghan Casey,2011
2. Computer Forensic and Cyber Crime: An Introduction 3rd Edition by Marjie T. Britz,2013

Reference books:

1. Digital Forensics with open source tools. Cory Altheide and Harlan Carvey, ISBN: 978- 1-59749-586-8, Elsevier Publications, April2011
2. Network Forensics: Tracking Hackers through Cyber Space, Sherri Davidoff, Jonathan Ham Prentice Hall2012

PAPER :EC-23 : IMAGE PROCESSING.
Fullmarks: 75, Pass Marks: 30, Time: 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To study the image fundamentals and mathematical transforms necessary for image processing.
2.	To study the image enhancement techniques
3.	To study image restoration procedures.
4.	To study the image compression procedures.

After the completion of this course, students are expected to

A.	Review the fundamental concepts of a digital image processing system
B.	Analyse images in the frequency domain using various transforms.
C.	Evaluate the techniques for image enhancement and image restoration.
D.	Categorize various compression techniques
E.	Interpret Image compression standards and interpret image segmentation and representation techniques.

Module 01(Lectures 06)
Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.
Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels

Module 02(Lectures 06)
Image enhancement in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods

Module 03(Lectures 08)
Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

Module 04(Lectures 08)
Color Image Processing: Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation
Image Compression: Fundamentals, image compression models, error-free compression, lossypredictive coding, image compression standards

Module 05(Lectures 09)
Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hitor miss transformation, basic morphologic algorithms
Image Segmentation: Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation

Module 06(Lecture 05)
Object Recognition: Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching

Text Books:

5. RafealC.Gonzalez, Richard E.Woods "Digital Image Processing,", 4th Edition, Pearson ,2018
6. Anil k Jain, "Fundamentals of Digital Images Processing" 1stEdition Pearson2015

Reference Books:

5. S Jayaraman "Digital Image Processing" 2ndEdition, MC GRAW HILL,2020
6. Munesh Chandra Trivedi , "Digital Image Processing" 1st Edition , Khanna PublishingHouse,2014

PAPER :EC-24 : OPTIMIZATION TECHNIQUES.
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives
This course enables the students:

1.	To appropriately formulate Linear Programming (LP) models for service and manufacturing systems, and apply optimization techniques (OTs) to solve these LP problems.
2.	Identify a Linear Programming Problems i.e., Use graphical method to solve simple LP Method problems, Use Simplex Method to solve general LP problems, Use Revised Simplex on LP problems and Solve Transportation Problem.
3.	To appropriately formulate Integer Programming (IP) models for service and manufacturing systems, and apply OTs to solve these IP problems.
4.	Game Theory is a mathematical framework which makes possible the analysis of the decision-making process of interdependent subjects. It is aimed at explaining and predicting how individuals behave in a specific strategic situation, and therefore helping to improve decision making.
5.	After going through this course, the student gets knowledge on Real World Optimization Problems through optimization techniques.

Course Outcomes
After the completion of this course, students are expected to

08/09/17

8/9

A.	Attain problem solving attitude in systematic and timely manner.
B.	Apply knowledge of mathematics, algorithm and computing principles to solve real world problems and understand importance of optimization of industrial process management.
C.	Identify modern tools and techniques through critical thinking for solving complex problems.
D.	Able to use optimization techniques for simple structures.

Module 01(Lectures 12)
Linear Programming Problem: Introduction, Mathematical Formulation of the problem, Graphical Solution Method, some Exceptional Cases, General LPP, Canonical and Standard forms of LPP, Simplex Method, Introduction, Fundamental properties of solutions, the Computational Procedure, Use of Artificial variables, Solution to simulation Linear Equations.

Module 02(Lectures 06)
Duality in LPP: Introduction, General Primal-Dual Pair, Formulating a Dual Problem, Primal Dual pair in Matrix form, Duality theorems, Dual Simplex method.

Module 03(Lectures 08)
Transportation Problem: Concept, Formulation of Transportation Problem, Balanced and Unbalanced Problems, North West Corner Rule, Least Cost Method, Vogel's Approximation Method, Modi Method, Degeneracy in Transportation Problem.

Module 04(Lectures 06)
Integer Programming Problems: Introduction, Importance of Integer Programming Problems, Construction of Gomory's constraints, Gomory's cutting Plane Method and Branch and Bound method.

Module 05(Lectures 04)
Revised Simplex Method: Introduction and Computational Procedure

Module 06 (Lectures 08)
Game Theory: Introduction, Two-person zero sum game, Maximin and Minimax principles, Game without saddle points, Graphical Method for 2 × n and m× 2 Games.

Text Book:

1. KantiSwarup, P. K. Gupta, ManMohan, OpeationsReasearch", SultanChand&Sons, New Delhi-2001.
2. S. Kalavathy OPERATIONS RESEARCH - 4THEDN, 2013

Reference Books:

1. Ronald L. Rardin "Optimization in operations Research", Pearson Education,NewDelhi-2003
2. S.S. Rao, "Optimization Theory & Application", Wiley Eastern Ltd,1979.

PAPER :EC-25 : INTRUSION AND DETECTION SYSTEMS.
Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	Understand when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise.
2.	Apply knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems.
3.	Analyze intrusion detection alerts and logs to distinguish attack types from false alarms.

Course Outcomes
After the completion of this course, students are expected to

A.	Explain the fundamental concepts of Network Protocol Analysis and demonstrate the skill to capture and analyze network packets.
B.	Use various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks and troubleshoot network problems.

Module 01 (Lecture 08)
History of Intrusion detection, Audit, Concept and definition, Internal and external threats to data, attacks, Need and types of IDS, Information sources Host based information sources.

Module 02 (Lecture 08)
Intrusion Prevention Systems, Network IDs protocol-based IDs, Hybrid IDs, Network based information sources. Analysis schemes, thinking about intrusion. A model for intrusion analysis, techniques Responses requirement of responses, types of responses mapping responses to policy Vulnerability analysis, credential analysis non credential analysis

Module 03 (Lecture 08)
Introduction to Snort, Snort Installation Scenarios, Installing Snort, Running Snort on Multiple Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes.

Module 04 (Lecture 08)
Working with Snort Rules, Rule Headers, Rule Options, The Snort Configuration File etc. Plugins, Pre-processors and Output Modules,

Module 05(Lecture 08)
Using ACID and Snort Snarf with Snort, Using Snort with MySQL.

Module 06(Lecture 08)
Agent development for intrusion detection, Architecture models of IDs and IPs.

Text Books:

1. RafeeqRehman : " Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall ,2003.
2. Christopher Kruegel,FredrikValeur, Giovanni Vigna: "Intrusion Detection and Correlation Challenges and Solutions", 1st Edition, Springer,2005.

Reference Books:

1. Carl Endorf, Eugene Schultz and Jim Mellander" Intrusion Detection & Prevention", 1st Edition, Tata McGraw-Hill,2004.
2. T. Fahringer, R. Prodan, "A Text book on Grid Application Development and Computing Environment". 6th Edition.

08/09/14

8/9.

SYLLABUS FOR M.C.A. ELECTIVE - 3

PAPER :EC-31 : CLOUD COMPUTING
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To understand the concept of cloud computing.
2.	To appreciate the evolution of cloud from the existing technologies.
3.	To have knowledge on the various issues in cloud computing.
4.	To be familiar with the lead players in cloud.
5.	To appreciate the emergence of cloud as the next generation computing paradigm.

Course Outcomes
After the completion of this course, students are expected to:

A.	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
B.	Learn the key and enabling technologies that help in the development of cloud.
C.	Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
D.	Explain the core issues of cloud computing such as resource management and security
E.	Be able to install and use current cloud technologies.
F.	Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

Module 01 (Lectures – 07)
Introduction: Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

Module 02(Lectures 10)
Cloud Enabling Technologies: Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

Module 03(Lectures 08)
Cloud Architecture, Services and Storage: Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

08/09/21

Module 04 (Lectures 05)
Resource Management In Cloud: Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources.

Module 05 (Lectures 05)
Security in Cloud: Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

Module 06 (Lectures 07)
Cloud Technologies and Advancements: Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack – Case studies from the leading distributed computing vendors such as Amazon, Microsoft, and Google– Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Text Books: -

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers,2017.
2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Securityl, CRC Press,2017.

Reference Books: -

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering Cloud Computing", Tata Mcgraw Hill,2017.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach", Tata Mcgraw Hill,2017.

PAPER :EC-32 : COMPUTER VISION
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To learn fundamental knowledge about Computer Vision.
2.	To understand the foundation of image formation, measurement, and analysis.
3.	To understand of image process formation.
4.	To provide the exaction of features from images and do analysis of images
5.	To develop applications using computer vision techniques

Course Outcomes
After the completion of this course, students are expected to

A.	Develop the practical skills necessary to build computer vision applications.
B.	Describe the object and scene recognition and categorization from images
C.	Generate 3D model from images
D.	To develop applications using computer vision techniques
E.	Understand video processing, motion computation and 3D vision and geometry applications.

08/09/23

Module 01(Lecture 08)
Introduction: Image Processing, Computer Vision and Computer Graphics, What is Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and AugmentedReality.

Module 02(Lecture 06)
Image Formation Models: Monocular imaging system, Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, color etc, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading, Photometric Stereo, Depth from Defocus, Construction of 3D model from images

Module 03(Lecture 06)
Image Processing with Feature Extraction and Motion Estimation: Image preprocessing, Image representations (continuous and discrete), Edge detection, Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.

Module 04(Lecture 06)
Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multiresolution analysis

Module 05(Lecture06)
Object recognition and Image Understanding: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis,
Shape priors for recognition, Pattern recognition methods, HMM, GMM and EM

Module 06(Lecture08)
Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Text Books: -

1. D.ForsythandJ.Ponce,"ComputerVision-Amodernapproach",PrenticeHallRobotVision,byB. K. P.
Horn, McGraw-Hill, 2E, 2011
2. E. R. Davies, Computer & Machine Vision, 4E, Academic Press,2012

Reference Books: -

7. E. Trucco and A. Verri, "Introductory Techniques for 3D Computer Vision", Prentice Hall,2002
8. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press,2012

PAPER :EC-33 : NATURAL LANGUAGE PROCESSING AND INFORMATION RETRIEVAL
Full marks: 75, Pass Marks: 30, Time: 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To understand the fundamental knowledge about natural language processing.
2.	To understand the language modeling.
3.	To provide the knowledge of Part-of-speech tagging.
4.	To provide the concepts parsing and semantics.
5.	To provide the different approaches of NLP applications.

Course Outcomes
After the completion of this course, students are expected to

A.	Define NLP problems and their importance.
B.	Understanding the relationship between NLP and statistics & machine learning
C.	Improve the innovation or creativity skills in NLP system.
D.	Analyse NLP problems to decompose them into appropriate components.
E.	To compare and contrast use of different statistical approaches for different types of NLP applications.

Module 01(Lecture 06)
Introduction to NLP: Introduction and applications, NLP phases, Difficulty of NLP including ambiguity; Spelling error and Noisy Channel Model; Concepts of Parts-of-speech and Formal Grammar of English.

Module 02(Lecture 08)
Language Modeling: N-gram and Neural Language Models Language Modeling with N-gram, Simple N-gram models, smoothing (basic techniques), Evaluating language models; Neural Network basics, Training; Neural Language Model, Case study: application of neural language model in NLP system development.

Module 03(Lecture 07)
Parts-of-speech Tagging: basic concepts; Tagset; Early approaches: Rule based and TBL; POS tagging using HMM, POS Tagging using Maximum EntropyModel.

Module 04(Lecture 08)
Parsing Basic concepts: Top down and bottom-up parsing, Treebank; Syntactic parsing: CKY parsing; Statistical parsing basics: Probabilistic Context Free Grammar (PCFG); Probabilistic CKY Parsing of PCFGs.

Module 05(Lecture 07)
Semantics: Vector Semantics; Words and Vector; Measuring Similarity; Semantics with dense vectors; SVD and Latent Semantic Analysis; Embeddings from prediction: Skip-gram and CBOW; Concept of Word Sense; Introduction to WorldNet

08/05/23

Module 06(Lecture 07)
Applications of NLP- Spell-checking, Summarization, Information Retrieval- Vector space model, term weighting, homonymy, polysemy, synonymy, improving user queries. Machine Translation– Overview.

Text Books: -

1. Jurafsky Dan and Martin James H., "Speech and Language Processing", 3E, Pearson Education2018
2. Akshar Bharati, Vineet Chaitanya and Rajeev Sangal, "Natural Language Processing: A Paninian Perspective" PHI New Delhi,2013.

Reference Books: -

1.Siddiqui T., Tiwary U. S., "Natural language processing and Information retrieval", OUP, 2008.
2.Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", 1E Edition, O'Reilly Media, 2009.

PAPER : EC-34 : BIG DATA ANALYTICS

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To understand the computational approaches to Modelling, Feature Extraction
2.	To understand the need and application of Map Reduce
3.	To understand the various search algorithms applicable to Big Data
4.	To analyse and interpret streaming data
5.	To learn how to handle large data sets in main memory

Course Outcomes
After the completion of this course, students are expected to

A.	Design algorithms by employing Map Reduce technique for solving Big Data problems
B.	Design algorithms for Big Data by deciding on the apt Features set
C.	Design algorithms for handling petabytes of datasets
D.	Design algorithms and propose solutions for Big Data by optimizing main memory consumption
E.	Design solutions for problems in Big Data by suggesting appropriate clustering techniques.

Module 01(Lecture10)
Data Mining and Large-Scale Files: Introduction to Statistical modeling – Machine Learning – Computational approaches to modeling – Summarization – Feature Extraction – Statistical Limits on Data Mining - Distributed File Systems – Map-reduce – Algorithms using Map Reduce – Efficiency of Cluster ComputingTechniques.

Module 02(Lecture06)
Similar Items: Nearest Neighbour Search – Shingling of Documents – Similarity preserving summaries – Locality sensitive hashing for documents – Distance Measures – Theory of Locality Sensitive Functions – LSH Families – Methods for High Degree of Similarities.

08/09/23

8/9

Module 03(Lecture 06)
Mining Data Streams: Stream Data Model – Sampling Data in the Stream – Filtering Streams – Counting Distance Elements in a Stream – Estimating Moments – Counting Ones in Window – Decaying Windows

Module 04(Lecture 06)
Link Analysis and Frequent Item sets: Page Rank –Efficient Computation - Topic Sensitive Page Rank – Link Spam – Market Basket Model – A-priori algorithm – Handling Larger Datasets in Main Memory – Limited Pass Algorithm – Counting Frequent Item sets.

Module 05(Lecture 08)
Clustering: Introduction to Clustering Techniques – Hierarchical Clustering –Algorithms – K-Means – Cure – Clustering in Non – Euclidean Spaces – Streams and Parallelism.

Module 06 (Lecture 04)
Case Study: Advertising on the Web – Recommendation Systems.

Text Books:

1. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 3rd Edition,2020.
2. Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining Concepts and Techniques", Morgan Kaufman Publications, Third Edition,2011.

Reference Books:

1. Ian H.Witten, Eibe Frank "Data Mining – Practical Machine Learning Tools and Techniques", Morgan Kaufman Publications, 4thEdition,
2. David Hand, HeikkiMannila and Padhraic Smyth, "Principles of Data Mining", MIT PRESS,2001

PAPER : EC- 35 : CYBER SECURITY.
Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives
This course enables the students:

1.	To understand the knowledge about cyber security.
2.	To define difference between threat, risk, attack and vulnerability.
3.	To provide the concepts of how threats materialize into attacks.
4.	To provide the information that where to find information about threats, vulnerabilities and attacks.
5.	To provide the brief concepts of typical threats, attacks and exploits and the motivations behind them.

Course Outcomes
After the completion of this course, students are expected to

A.	Develop and improve the analytical skills.
B.	Establish the security in computer, network and applications.
C.	Improve the innovation or creativity skills.

D.	Develop problem solving techniques.
E.	Help to protect from cyber-Crime.

Module 01 (Lecture 07)
Introduction to Cyber Security: Introduction -Computer Security - Threats –Harm-Vulnerabilities - Controls - Authentication -Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

Module 02 (Lecture 07)
Security In Operating System & Networks: Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

Module 03 (Lecture 06)
Defenses - Security Countermeasures: Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

Module 04 (Lecture 08)
Privacy in Cyberspace: Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field IsHeaded.

Module 05 (Lecture 06)
Management and Incidents: Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cybercrime - Cyber Warfare and Home LandSecurity.

Module 06 (Lecture 08)
Cybercrime and Forensics: Introduction to Cybercrime, Classifications of Cyber Crimes, Local and Global perspectives on Cybercrime, Cyber offences, Cyberstalking, Cybercrime and cloud computing, cybercrimes through hand held devices., Tools and Methods used in Cybercrime, phishing, steganography,
attacks on wireless network. Understanding Digital forensic, Forensics science, computer forensics, and digital forensics.

Text Books: -

1. Godbole Nina, BelapureSunit, "Cyber Security", Wiley Indian Print,2014.
2.Michael E Whitman and Herbert J Mattord, Principles of Information Security, Vikas Publishing House, New Delhi,2003

Reference Books: -

1.Deva Vasu, "Cyber Crimes and Law Enforcement", Commonwealth Publishers, New Delhi, 2003.
2.Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, "Security in Computing", 5th Edition , Pearson Education ,2015