# MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12

## PG COURSES – AFFILIATED COLLEGES

## MASTER OF SCIENCE in INFORMATION TECHNOLOGY

## REGULATIONS – 2021

**(Choice Based Credit System)**
**(with effect from the academic year 2021-2022)**

### Vision of the University

To provide quality education to reach the un-reached

### Mission of the University

- To conduct research, teaching and outreach programmes to improve conditions of human living
- To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity.
- To offer a wide variety of off-campus educational and training programs, including the use of Information Technology to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development
- To provide quality/ inclusive education, especially for the rural and un-reached segments of economically downtrodden students including socially oppressed and differently abled

### PREAMBLE

The Learning Outcome-based Curriculum Framework (LOCF) approach which is student-centric, interactive and outcome oriented with well-defined aims, objectives and goals to achieve has been adopted in M.Sc Information Technology Programme to create and disseminate knowledge to the students on the latest technologies by imparting the technical skills to meet industrial needs and inculcate the skills for employability.

### Vision

Empowering students with knowledge and technical skill set in the domain of Information Technology

**Mission**

To enable the students excel in the field of Information Technology

**PROGRAM EDUCATIONAL OBJECTIVES**

1. To understand the core concepts in Information Technology and acquire expertise
2. To facilitate students to develop problem solving and programming skills in the field of Information Technology
3. To empower students to involve in active research
4. To contribute to the developmental needs of India and the world.
5. To make the students employable by imparting knowledge in the Information Technology domain

**PROGRAM OUTCOME:**

**PO 1** Evaluate the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems

**PO 2** Analyze, synthesize, model and integrate technologies to develop Information Technology systems

**PO 3** Communicate effectively, as a member or team leader, in IT related projects involving multidisciplinary environments.

**PO 4** Adapt to new developments and foster technological growth.

**PO 5** Develop strong moral and ethical values to contribute as a responsible member of the society

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

**PSO 1** Understand and analyze the fundamental knowledge in the Information Technology domain.

**PSO 2** Enhance the logical and analytical thinking to understand the computational systems.

**PSO 3** Ability to comprehend the development methodologies of software systems and to design the software solutions.

**PSO 4** Explore the developing areas in the Information Technology sector and to enrich themselves to be skillful to meet the diverse expectations of the industry.

**PSO 5** Equipped to be competent in providing optimal and ethical solutions to the technological challenges laid by the professional societies.

## REGULATIONS/ PROGRAMME SPECIFIC REQUIREMENTS

**Duration of the Course**:

M.Sc. Information Technology is a 2 years full time programme spread over four semesters.

**Eligibility for Admission to the Programme**

Candidates for admission to the first year of two year M.Sc. Information Technology shall be required to have passed any degree from a recognized University accepted by the Syndicate of this University.

**Credit Requirement**:

The general Regulations of the Choice Based Credit System programme of Manonmaniam Sundaranar University are applicable to this programme. The University requirement for the M.Sc. programme is completion of 90 credits of course work, out of which 6 credits should be through the mini project, 16 credits should be through the 4th semester main project work, remaining 64 credits should be through Core, and Elective papers. A Core course has 4 credits elective has 3 credits and Practical subjects weigh 2 credits. No candidate will be eligible for the Degree of M.Sc. (Master of Science) in Information Technology unless the candidate has undergone the prescribed courses of study for a period not less than 4 semesters and has acquired 90 credits.

A candidate will be permitted to appear for the semester examination only if the candidate keeps not less than 75 percent attendance. The University condonation rules are applicable for those who lack minimum of 75% attendance. The candidates with less than 60% attendance will have to repeat the concerned entire semester. The Assessment will comprise Continuous Internal Assessment (CIA) carrying a maximum of 25% marks and end-semester Examination carrying a maximum of 75% marks in each theory subject (Core/Elective). For practical subjects, Mini Project and Major Project, the CIA is carried out for 50% marks and the External Assessment (Final Lab Exam, Record, Viva-Voce for Practical Subjects and Project Presentation, Project Report, Viva-Voce for Mini Project and Major Project) is for 50% marks. Semester examination will be conducted for all subjects of study, at the end of each Semester. If a Student wants to carry out the final Major project work in 4th semester in an IT company, the student can get permission from the concerned Project Supervisor and Head of the Department after submitting the Acceptance Letter from the IT Company.

# MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

PG COURSES – AFFILIATED COLLEGES

## M.Sc INFORMATION TECHNOLOGY

(Choice Based Credit System)

(with effect from the academic year 2021-2022 onwards)

SEMESTER WISE COURSE LIST

| Sem | Sub No | Subject status | Subject Title | Contact Hrs | Credits |
|---|---|---|---|---|---|
| I | 1 | Core 1 | Mathematical Foundation of Information Technology | 5 | 4 |
| | 2 | Core 2 | Distributed Operating System | 5 | 4 |
| | 3 | Core 3 | Advanced Database Management Systems | 4 | 4 |
| | 4 | Core 4 | Python Programming | 4 | 4 |
| | 5 | Core 5 | Computer Networks | 4 | 4 |
| | 6 | Core 6 Practical 1 | Python programming- lab | 4 | 2 |
| | 7 | Core 7 Practical 2 | Advanced Database Management System- Lab | 4 | 2 |
| | | | Sub Total | 30 | 24 |
| II | 8 | Core 8 | Advanced Web Technology | 5 | 4 |
| | 9 | Core 9 | Design and Analysis of Algorithms | 5 | 4 |
| | 10 | Core 10 | Compiler Design | 4 | 4 |
| | 11 | Core 11 | Mobile Computing | 4 | 4 |
| | 12 | Elective 1 | Elective -1 | 4 | 3 |
| | 13 | Core 12 Practical 3 | Design and Analysis of Algorithms- lab | 4 | 2 |
| | 14 | Core 13 Practical 4 | Advanced Web Technology- Lab | 4 | 2 |
| | | | Sub Total | 30 | 23 |
| III | 15 | Core 14 | Internet of Things | 4 | 4 |
| | 16 | Core 15 | Data Science and Big Data Analytics | 4 | 4 |
| | 17 | Core 16 | Software Project Management | 4 | 4 |
| | 18 | Core 17 | Research Methodology | 4 | 4 |
| | 19 | Elective 2 | Elective- 2 | 4 | 3 |
| | 20 | Core 18 Practical 5 | Data Science and Big Data Analytics using R-Lab | 4 | 2 |
| | 21 | Core 19 | Mini Project | 6 | 6 |
| | | | Sub Total | 30 | 27 |
| IV | 22 | Core 20 | Major Project | 30 | 16 |
| | | | Sub Total | 30 | 16 |
| | | | Total | 120 | 90 |

# List of Electives Offered

| | | |
|---|---|---|
| 1.1 | Digital Image Processing | Elective 1 |
| 1.2 | Soft Computing | |
| 1.3 | Cryptography and Network Security | |
| 1.4 | Embedded System | |
| 2.1 | Web Services | Elective 2 |
| 2.2 | Cloud Computing | |
| 2.3 | Application Development using Android | |
| 2.4 | Machine Learning | |

## Scheme of Examination / Question Paper Pattern - Theory Subjects:

(Total Marks: 100 (Internal: 25 Marks, External: 75 Marks)

| There is no Passing Minimum for the CIA component. But overall (CIA+ External), the student should get 50% or more to get a pass | |
|---|---|
| **CIA- Internal Marks** | **End semester Examination - External Marks** |
| i. Average of best two tests from three: 15 Marks<br>ii. Assignment: 05 Marks<br>iii. Seminar: 05 Marks<br>---<br>Total : 25 Marks | Total : 75 Marks |
| | Passing minimum 50% i.e. 38 marks |

## External (End Semester) Examination Question pattern:

Time: 3 hours Max. Marks: 75

**Part – A**

(10 x 1 = 10)

*Answer all the questions*

Ten Questions, two objective type questions from each unit.

**Part – B**

(5 x 5 = 25)

*Answer all the questions*

Five Questions, two questions from each unit with internal choice

( Either ...Or... type)

**Part – C**

(5 x 8 = 40)

Answer all the questions

Five Questions, two questions from each unit with internal choice

( Either .. Or type)

## PRACTICAL

Practical examinations will be conducted at the end of each semester. The scheme of valuation is to be decided by the respective board of Question setters.

**Passing Minimum for Practical Exam:**

There is no Passing Minimum for the CIA component. But overall (CIA+ External), the student should get 50% or more to get a pass.

**Assessment Components (External : Internal – 50 : 50)**

## PROJECT AND VIVA-VOCE

Project report evaluation and Viva-Voce will be conducted by the external examiner and the project Supervisor. The break-up for the project work is as follows:

| Components | Marks |
|---|---|
| Project Report | 20 |
| Project Presentation & Viva-Voce | 30 |
| Total | 50 |

**Passing Minimum for Mini/Major Project:**

There is no Passing Minimum for the CIA component. But overall (CIA+ External), the student should score 50% or more to get a pass.

**Model Question Paper** Sub. Code : ZITM 11

M.Sc. (CBCS) DEGREE EXAMINATION,

NOVEMBER 2021

First Semester

Information Technology – Core

MATHEMATICAL FOUNDATIONS OF INFORMATION TECHNOLOGY
(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)
Answer ALL questions.

Choose the correct answer:

1. Find the value of p for which, the rank of the given matrix is 1.

(a) 4 (b) 2 (c) 3 (d) 1

2. The matrix which do have an inverse by solving it, is classified as

(a) non-singular matrix (b) singular matrix

(c) unidentified matrix (d) linear matrix

3. The members of the set S = {x|x is the square of an integer and x < 100} is _____

(a) {0, 2, 4, 5, 9, 55, 46, 49, 99, 81} (b) {1, 4, 9, 16}

(c) {0, 1, 4, 9, 16, 25, 36, 49, 64, 81} (d) {0, 1, 4, 9, 25, 36, 49, 123}

4. If x is a set and the set contains an integer which is neither positive nor negative then the set x is _____

(a) Set is Empty (b) Set is Non-empty

(c) Set is Finite (d) Set is both Non-empty and Finite.

5. The least number of computers required to connect 10 computers to 5 routers to guarantee 5 computers can directly access 5 routers is _____

(a) 74 (b) 104 (c) 30 (d) 67

6. When four coins are tossed simultaneously, in _____ number of the outcomes at most two of the coins will turn up as heads.

(a) 17 (b) 28 (c) 11 (d) 43

7. ٦(p ↔ q) is logically equivalent to _____

(a) q ↔ p (b) p ↔٦q (c) ٦p ↔ ٦q (d) ٦q ↔٦p

8. $p \wedge q$ is logically equivalent to _____

(a) $\neg(p \rightarrow \neg q)$ (b) $(p \rightarrow \neg q)$ (c) $(\neg p \rightarrow \neg q)$ (d) $(\neg p \rightarrow q)$

9. In a 7-node directed cyclic graph, the number of Hamiltonian cycle is to be _____

(a) 728 (b) 450 (c) 360 (d) 260

10. If each and every vertex in G has degree at most 23 then G can have a vertex colouring of _____

(a) 24 (b) 23 (c) 176 (d) 54

PART B — (5 x 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find the rank of the matrix $\begin{pmatrix} 1 & 5 \\ 3 & 9 \end{pmatrix}$

Or

(b) Explain the inverse of matrix.

12. (a) Let the universal set be the set U = {a, b, c, d, e, f, g} and let A = {a, c, e, g} and let B = {d, e, f, g). Find A ∪ B, A ∩ B , B - A and $A^c$ .

Or

(b) Let a relation R be defined on the set Z by "aRb if a, b ϵ Z and a – b is divisible by 5". Is R an equivalence relation? Justify your answer.

13. (a) If (Kn + 1) pigeons are kept in n pigeon holes where K is a positive integer, what is the average number of pigeons per pigeon hole?

Or

(b) In a certain country, the car number plate is formed by 4 digits from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 followed by 3 letters from the alphabet. How many number plates can be formed if neither the digits nor the letters are repeated?

14. (a) Which of these are propositions? If the statement is a proposition, determine whether it is true or false.

(i) Delhi is the capital of India.

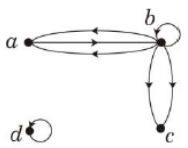
(ii) Can Sanya come to you?

(iii) 1 + 2 = 3 or 2 + 3 = 5

Or

(b) Write a note on propositional calculus.

15. (a) In the following graph drawn below, determine the number of vertices and edges and find the in-degree and out-degree of each vertex.




Or

(b) Write a note on subgraph.

PART C — (5 x 8 = 40 marks)

Answer ALL questions by choosing either (a) or (b).

16. (a) Find the inverse of $\begin{bmatrix} 5 & 6 \\ -1 & 2 \end{bmatrix}$.

Or

(b) Discuss the Cayley Hamilton Theorem with example.

17. (a) If n(A) =12, n(B) =17 and n(AUB) = 21, find n(A∩B).

Or

(b) Compare the injective, subjective and objective functions.

18. (a) Suppose a survey of 100 people asks if they have a cat or dog as a pet. The results are as follows: 55 answered yes for cat, 58 answered yes for dog and 20 people checked yes for both cat and dog. How many people have a cat or a dog?

Or

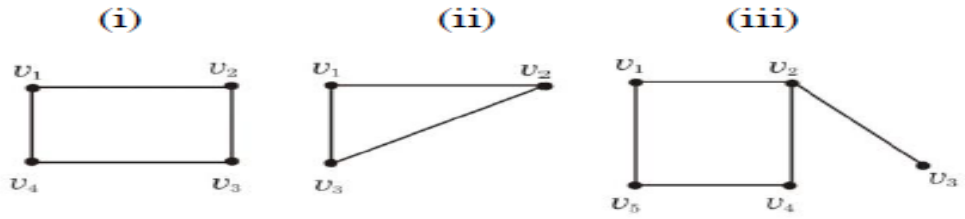
(b) By using mathematical induction prove that the given equation is true for all positive integers. $2+6+10+.....+(4n-2)=2n^2$.

19. (a) Prove ⅂(A∨B) and (⅂A ∧⅂B) are equivalent.

Or

(b) Analyze the statement, “if you get more doubles than any other player you will lose, or that if you lose you must have bought the most properties”, using truth tables.

20. (a) Find which of the following graphs are bipartite.




Or

(b) Illustrate the concept of Euler paths with simple example.

## MATHEMATICAL FOUNDATION OF INFORMATION TECHNOLOGY

L T P C
4 1 0 4

**COURSE OBJECTIVES:**

To expose the students to the following:

1. Propositional function, quantifiers, rules of inference.
2. Binary relations, posets, Hasse diagram, lattice, Functions, and pigeonhole principle.
3. Algebraic structures like groups and elementary combinatorics.
4. Generate various types of functions recursively and solve them.
5. Concepts in graphs like its representation, planar graphs, graph coloring andtrees

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Apply mathematical concept for Information Technology problem solving.

CO2. Design mathematical models for real time projects and applications.

CO3. Analyze each learning model from a different algorithmic approach

CO4. Acquire knowledge of relations, functions and mathematical logic

CO5. Understand the basic concepts of Graph Theory

**UNIT I : MATRIX ALGEBRA . - 14 hours**

Matrices - Rank of a matrix - Solving system of equations Eigenvalues and Eigenvectors - Cayley - Hamilton theorem - Inverse of a matrix

**UNIT II : BASIC SET THEORY - 16 hours**

Basic definitions - Venn diagrams and set operations - Laws of set theory -. Relations - Properties of relations - Matrices of relations - Closure operations on relations - Functions - Injective, subjective and objective functions

**UNIT – III : COMBINATORICS - 14 hours**

Review of Permutation and Combination - MathematicalInduction - Pigeon hole principle - Principle of Inclusion and Exclusion

**UNIT IV : MATHEMATICAL LOGIC - 15 hours**

Propositions and logical operators -Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives - Normal forms - Proofs in propositional calculus - Predicate calculus.

**UNIT V : GRAPH THEORY - 16 hours**

Graphs: An Introduction, Special Graphs, Subgraph, Degree of a Vertex – The Concept, Given a Degree Sequence – How to Draw the Graph? Adjacency Matrices, Incidence Matrices, Isomorphism of Graphs, Paths and Circuits, Euler Paths, Hamiltonian Circuit, the Travelling Salesman Problem, Shortest Path Problem

**CO - PO - PSO Mapping**

| MATHEMATICAL FOUNDATION OF INFORMATION TECHNOLOGY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 1 |
| CO 5 | S | S | M | S | M | S | S | S | S | S | K – 2 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

## TEXT BOOKS :

1. John Vince, “Foundation Mathematics for Computer Science, A Visual Approach”, Springer, 2015. 2. Jayant Ganguly, “Mathematical Foundations for Computer Science Engineers”, PHI, 2011.

## REFERENCES :

1. K. Trivedi, “Probability and Statistics with Reliability, Queuing, and Computer Science Applications”, Wiley, 2016.
2. M. Mitzenmacher and E. Upfal, “Probability and Computing: Randomized Algorithms and Probabilistic Analysis”, Cambridge University Press, 2005.
3. Alan Tucker, “Applied Combinatorics”, 6th Edition, Wiley 2012.

## DISTRIBUTED OPERATING SYSTEM

L T P C
4 1 0 4

**COURSE OBJECTIVES**:

1. To study Distributed operating system concepts
2. To understand hardware, software and communication in distributed OS
3. To learn the distributed resource management components.
4. Practices to learn concepts of OS and Program the principles of Operating Systems

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Analyze resource management techniques.

CO2. Understand mutual exclusion and Deadlock detection in Distributed operating system.

CO3. Design algorithms of distributed shared memory and commit protocols

CO4. Implement fault tolerant distributed systems.

CO5. Appreciate the features of different operating systems

**UNIT I - 15 hours**

Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock Conditions for Deadlock – System with single-unit requests, Consumable Resources, Reusable Resources.

**UNIT II - 15 hours**

Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport's Logical Clock, Vector Clock, Global State, Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport's Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

**UNIT III - 15 hours**

Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

**UNIT IV - 15 hours**

Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

**UNIT V** **- 15 hours**

Multiprocessor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

**CO - PO - PSO Mapping**

| DISTRIBUTED OPERATING SYSTEM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | M | S | S | M | S | S | K - 4 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 2 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 3 |
| CO 5 | S | S | M | S | S | S | S | M | S | M | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. Mukesh Singhal N.G.Shivaratri, “Advanced Concepts in Operating Systems”, Mc Graw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

**REFERENCES:**

1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, “Operating Concepts”, 6th EditionAddison Wesley publications 2003.
2. Andrew S.Tanenbaum “Modern Operating Systems”, 2nd Edition Addison Wesley 2001

## ADVANCED DATABASE MANAGEMENT SYSTEMS

L T P C

COURSE OBJECTIVES: 4 0 0 4

Acquire Knowledge of Database Models, Applications of Database Models and EmergingTrends

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand the various Data models and databases
CO2. Analyse Database Architecture
CO3. Appreciate normalization concept in a database
CO4. Design and use database efficiently
CO5. Become a good database administrator

**UNIT-I : - 12 hours**

Relational and parallel Database Design: Basics, Entity Types, Relationship Types, ER Model, ER-to-Relational Mapping algorithm. Normalization: Functional Dependency, 1NF, 2NF, 3NF, BCNF,4NF and 5NF. Architecture, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism.

**UNIT-II : - 12 hours**

Distributed and Object based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.

**UNIT-III: - 12 hours**

Spatial Database: Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive Database Systems, Recursive Query Processing. -10 hours

**UNIT-IV: - 12 hours**

XML Databases: XML Hierarchical data model, XML Documents, DTD, XML Schema, XML Querying, XHTML, Illustrative Experiments.

**UNIT-V : : - 12 hours**

Temporal Databases: Introduction, Intervals, Packing and Unpacking Relations, Generalizing the relational Operators, Database Design, Integrity Constraints, Multimedia Databases: Multimedia Sources, Multimedia Database Queries, Multimedia Database Applications.

## CO - PO - PSO Mapping

| ADVANCED DATABASE MANAGEMENT SYSTEMS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 5 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

### TEXT BOOKS:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, “Database System Comcepts”, 6th edition, McGraw-Hill International Edition, 2011
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education Reprint 2016.

### REFERENCES:

1. Ramez Elmasri, Shamkant B Navathe, “Fundamental of Database Systems”, Pearson, 7th edition 2016.
2. Thomas Connolly, Carolyn Begg., “Database Systems a practical approach to Design, Inmplementation and Management “, Pearson Education, 2014.

## PYTHON PROGRAMMING

L T P C
4 0 0 4

**Course Objectives**

- To understand why **Python** is a useful scripting language for developers.
- To learn how to design and program **Python** applications.
- To learn how to use lists, tuples, and dictionaries in **Python** programs.
- To learn how to identify **Python** object types.

***Course Outcome:***

CO1. Develop algorithmic solutions to simple computational problems

CO2. Read, write, execute by hand simple Python programs.

CO3. Structure simple Python programs for solving problems.

CO4. Decompose a Python program into functions.

CO5. Represent compound data using Python lists, tuples, dictionaries.

**UNIT I : ALGORITHMIC PROBLEM SOLVING : - 12 hours**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

**UNIT II : DATA, EXPRESSIONS, STATEMENTS : - 12 hours**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

**UNIT III :CONTROL FLOW, FUNCTIONS : - 12 hours**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

**UNIT IV: LISTS, TUPLES, DICTIONARIES: - 12 hours**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

**UNIT V: - 12 hours**

**FILES, MODULES, PACKAGES** Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

## CO - PO - PSO Mapping

| PYTHON PROGRAMMING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 2 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016 (http://greenteapress.com/ wp/think python/)

2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

**REFERENCES:**

1. John V Guttag, —"Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.
4. Kenneth A. Lambert, Fundamentals of Python: First Programs, CENGAGE Learning, 2012.
5. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo , Practical Programming: An Introduction to Computer Science using Python 3, Second edition, Pragmatic Programmers, LLC, 2013.

For audio explanation and easy learning visit www.padeepz.com

COMPUTER NETWORKS

L T P C
4 0 0 4

**COURSE OBJECTIVES:**

1. To study communication network protocols, different communication layer structure
2. To learn security mechanism for data communication

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Master the terminology and concepts of the OSI reference model

CO2. Understand TCP/IP reference model.

CO3. Analyze the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.

CO4. Familiar with wireless networking concepts, and be familiar with contemporary issues in networking technologies.

CO5. Work with network tools and network programming

**UNIT 1: - 12 hours**

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs – RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

**UNIT-2: - 12 hours**

Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

**UNIT 3: - 12 hours**

Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

**UNIT 4: - 12 hours**

Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

**UNIT 5: - 12 hours**

Transport layer – transport service- Elements of transport protocol - Addressing, Establishing

& Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

**CO - PO - PSO Mapping**

| COMPUTER NETWORKS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 2 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS :**

1. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

**REFERENCES :**

1) B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
2) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.
3) D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.
4) Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.
5) Teresa C.Piliouras, "Network Design Management and Technical Perspectives, Second Edition", Auerbach Publishers, 2015.

## PYTHON PROGRAMMING – LAB

L T P C
0 0 4 2

### COURSE OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

### *Course Outcome:*

On successful completion of the course, the learners will be able to

CO1. Develop algorithmic solutions to simple computational problems
CO2. Read, write, execute by hand simple Python programs.
CO3. Structure simple Python programs for solving problems.
CO4. Decompose a Python program into functions.
CO5. Represent compound data using Python lists, tuples, dictionaries.

### LIST OF PROGRAMS:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

**CO - PO - PSO Mapping**

| PYTHON PROGRAMMING – LAB | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 5 |

Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L

## ADVANCED DATABASE MANAGEMENT SYSTEM LAB

L T P C

0 0 4 2

**COURSE OBJECTIVES**:

- To understand the concepts of Open Source DBMS.
- To understand the process of distributing tables across multiple systems
- To understand the process of storing, retrieving spatial and temporal data
- To understand the process of storing, retrieving objects in a database
- To understand the process of storing and retrieving data from a XML Database

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand Various Data models
CO2. Work on Database Architecture
CO3. Relate Knowledge patterns
CO4. Construct Object Oriented Databases
CO5. Build Queries

**EXPERIMENTS IN THE FOLLOWING TOPICS:**

1. Simple exercises on Create, Retrieve, update, delete commands in any one of the free open source NOSQL DBMS.
2. MySQL Database Creation, Table Creation, Query
3. MySQL Replication – Distributed Databases
4. Spatial data storage and retrieval in MySQL
5. Temporal data storage and retrieval in MySQL
6. Object storage and retrieval in MySQL
7. XML Databases, XML table creation, XQuery For, Let, Where, Order by, Return expression

**CO - PO - PSO Mapping**

| ADVANCED DATABASE MANAGEMENT SYSTEM LAB | | | | | | | | | | | |
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| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 1 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 3 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 3 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

## ADVANCED WEB TECHNOLOGY

L T P C
4 1 0 4

**COURSE OBJECTIVES**:

The main **objective** of the course is to present the advanced **web technology** concepts that are required for developing **web** applications. The key **technology** components are descriptive languages, server side program elements and client side program elements.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1.Understand Web Technology concepts

CO2. Develop web applications

CO3. Handle cookies in Laravel

CO4. Appreciate Exception handling feature in Laravel

CO5. Work with Databases

**UNIT I :** **15 hours**

**HTML AND CSS** Basic – Formatting tags – Links – Images – Frames – Lists – Tables – Forms – Entities– Cascading Stylesheets- Types- Properties: Background -Text– Border– Table – List.

**UNIT II :** **15 hours**

**XML** Basic – Elements – Attributes – XML Namespace – Cascading Stylesheets – XSLT elements – Xpath, XSL Formatting Objects – Xlinks. Document type Definitions – Internal and External DTD declaration – DTD Elements declaration – DTD Attributes: Types and declaration – PCDATA – CDATA – Entities.

**UNIT III:** **15 hours**

**BASICS OF LARAVEL** Introduction – Usage of Framework – Special about Laravel – How it works – Why Laravel – Setting up Laravel Development Environment – System requirements – composer – Local development environments – Creating a new Laravel project – Laravel's directory structure – Configuration – Up and running – Routing and Controllers – MVC – HTTP verbs – REST – Route definitions – Route groups – Views Controllers.

**UNIT IV:** **15 hours**

**BASICS IN PHP** Echoing data – PHP Syntax and Variables – Control Structures – Conditionals – Loops – Functions – PHP String Handling functions – PHP Number Handling functions – PHP Arrays – Cookies – Cookies in Laravel – Accessing the Cookie tool – Sessions – Accessing the session – Methods available on session instances – Flash session storage.

**UNIT V:** **15 hours**

**DATABASE** Database Connections – Configuration – Query builder – Select – Insert – Update – Delete – Validation – Validation on the request object – Manual validation – Display Validation Error Messages – Handling Exceptions.

### CO - PO - PSO Mapping

| ADVANCED WEB TECHNOLOGY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 3 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

## TEXT BOOKS:


1. Thomas Powell, “The Complete Reference: HTML AND XHTML”, Fifth Edition, Tata McGraw Hill Publication, 2010. **(Unit: I)**
2. Heather Williamson, “The Complete Reference -XML”, First Edition, Tata McGraw Hill Publication. **(Unit: II)**
3. Matt Stauffer, “Laravel: Up & Running: A Framework for Building Modern PHP Apps”, O′Reilly Publishing, Second Edition, 2019. **(Unit: III - V)**


## REFERENCES:


1. Michael K. Glass, Yann Le Sconarnce, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, “Beginning PHP, Apache, MySQL Web Development”, Wiley Publishing Inc.
2. Steven Holzner, “The Complete Reference: PHP”, First Edition, Tata McGraw Hill Publication.

## DESIGN AND ANALYSIS OF ALGORITHMS

L T P C
4 1 0 4

**COURSE OBJECTIVES:**

To learn effective problem solving in Computing applications and analyze the algorithmic procedure to determine the computational complexity of algorithms.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1.Understand and solve complex problems

CO2. Select an appropriate algorithm for the problem

CO3. Evolve as a competent programmer

CO4. Classify problems into complexity classes like P and NP.

CO5. Analyze graphs and determine shortest path

**UNIT I :INTRODUCTION**: **15 hours**

Algorithm Definition – Algorithm Specification – PerformanceAnalysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

**UNIT II :DIVIDE AND CONQUER**: **15 hours**

The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication. -12 hours

**UNIT III :THE GREEDY METHOD**: **15 hours**

General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost SpanningTrees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

**UNIT IV :DYNAMIC PROGRAMMING**: **15 hours**

The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees
– Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

**UNIT V :BACKTRACKING:** **15 hours**

The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem.

## CO - PO - PSO Mapping

| DESIGN AND ANALYSIS OF ALGORITHMS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 1 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 4 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

### TEXT BOOKS:

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

### REFERENCES :

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman, LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.
4. Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen, “Evolutionary Algorithms for Solving Multi-Objective Problems”, Springer 2nd Edition, 2007.

COMPILER DESIGN

L T P C
4 0 0 4

**COURSE OBJECTIVES**:

- Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
- Acquire knowledge about finite automata and regular expressions
- Learn context free grammars, compiler parsing techniques.
- Explore knowledge about Syntax Directed definitions and translation scheme
- Understand intermediate machine representations and actual code generation

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand the basics of a compiler

CO2. Apply the knowledge of patterns, tokens & regular expressions

CO3. Appreciate the working of a parser

CO4. Analyze code generation and optimization

CO5. Design a compiler

**UNIT – I : LEXICAL ANALYSIS** **12 hours**

Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

**UNIT – II : SYNTAX ANALYSIS** **12 hours**

The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

**UNIT – III :SEMANTIC ANALYSIS** **12 hours**

Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

**UNIT – IV :INTERMEDIATE CODE GENERATION** **12 hours**

Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

**UNIT – V:CODE GENERATION AND CODE OPTIMIZATION** **12 hours**

Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.

**CO - PO - PSO Mapping**

| COMPILER DESIGN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

## TEXT BOOKS:

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Second Edition, Pearson Education Asia, 2009.

## REFERENCES:

**1.** A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison- Wesley, 2003.
**2.** Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
**3.** Kennath C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
**4.** Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
**5.** S.Godfrey Winster, S.Aruna Devi, R.Sujatha, “Compiler Design”, yesdee Publishers, Third Reprint 2019.

## MOBILE COMPUTING

**COURSE OBJECTIVES**:

- Understand the basic concepts of mobile
- Be familiar with GPRS Technology
- system Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Explain the basics of mobile system

CO2. Develop mobile application

CO3. Understand the Mobile Ad hoc networks and its routing

CO4. Analyze the different types of security features

CO5. Appreciate the features of Mobile computing

**UNIT 1:** **12 hours**

**BASICS OF MOBILE** - Mobile device profiles - Middleware and gateways - Wireless Internet - Smart clients - Three-tier Architecture- Design considerations for mobilecomputing-– Mobility and Location based services. -

**UNIT 2:** **12 hours**

**MOBILE COMPUTING THROUGH INTERNET**- Mobile-enabled Applications - Developing Mobile GUIs – VUIs and Mobile Applications – Characteristics and benefits -Multichannel and Multi modal user interfaces – Synchronization and replication of Mobile Data - SMS architecture – GPRS – Mobile Computing through Telephony. -

**UNIT 3:** **12 hours**

**MOBILE APPLICATION DEVELOPMENT** - Android- wi-fi –GPS – Camera Movement – orientation - event based programming – iOS/ windows CE - Blackberry – windows phone – M-Commerce- structure – pros & cons – Mobile payment system - J2ME.

**UNIT -4:** **12 hours**

**ADHOC WIRELESS NETWORK** - Ad Hoc Wireless Network –MAC protocol Routing protocols - Transport Layer Protocol - QoS – Energy Management – application design – work flow – composing applications – Dynamic linking – Intents and Services – Communication via the web.

**UNIT -5:** **12 hours**

**SECURITY AND HACKING** - Password security – Network security – web security – Database security - Wireless Sensor Network - Architecture and Design – Medium Access Control – Routing – Transport Layer – Energy model.

## CO - PO - PSO Mapping

| MOBILE COMPUTING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 5 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

### TEXT BOOKS :

1. Jochen Schiller, Mobile Communications, Second Edition,2012.
2. William Stallings,"Wireless Communications & Networks", Pearson Education, 2009.

### REFERENCES:

1. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004
2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.
3. Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff,Thomas Schack, "Pervasive Computing", Pearson, 2009.
4. Fei Hu, Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

## DESIGN AND ANALYSIS OF ALGORITHMS- LAB

L T P C
0 0 4 2

COURSE OBJECTIVES:

- Design the algorithm for any given problem
- Implement the algorithm successfully

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand and solve complex problems

CO2. Select an appropriate algorithm for the problem

CO3. Evolve as a competent programmer capable of designing and analyzing algorithms and data structures for different kinds of problems

CO4. Classify problems into complexity classes like P and NP.

CO5. Analyze graphs and determine shortest path

LIST OF EXPERIMENTS:

1. Quick Sort Algorithm
2. Merge Sort Algorithm
3. Knapsack Problem
4. Dijkstra's Algoirhm
5. Kruskal's Algorithm
6. Depth First Search Algorithm
7. Traveling Sales Man Problem
8. Prim's Algorithm
9. Floyd's Algorithm
10. N Queen's Problem

### CO - PO - PSO Mapping

| DESIGN AND ANALYSIS OF ALGORITHMS LAB | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 4 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

## ADVANCED WEB TECHNOLOGY- LAB

**L T P C**
**0 0 4 2**

COURSE OBJECTIVES:

- Design the algorithm for any given problem
- Implement the algorithm successfully

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Recognize the importance of validation control

CO2. Analyze cookies and session

CO3. Apply the knowledge of Java Script object, data access and SQL to develop a client servermodel.

CO4. Design Web applications using various technologies such as Java, XML, AJAX, Servlets,PHP, JSP and MySQL

CO5. Implement Database connectivity

**LIST OF EXPERIMENTS:**

1. Design a web page in HTML using frames.
2. Design a web page in HTML using list.
3. Design a web page in HTML using tables.
4. Design a web page in HTML using forms.
5. Design a web site using INLINE CSS.
6. Design a web site using INTERNAL CSS.
7. Design a web site with navigation menus with EXTERNAL CSS
8. Design a simple XML document.
9. Design a web page in XML using CSS.
10. Design a web page in XML using XSLT.
11. Design a web page in XML using INTERNAL DTD.
12. Design a web page in XML using EXTERNAL DTD.
13. Designing a XML page using Entities
14. Design a web site in PHP using string functions.
15. Design a web site in PHP using Numeric functions.
16. Design a web site in PHP using Array.
17. Design a web site in PHP using forms.
18. Design a web site in PHP using cookies.
19. Design a web site in PHP using session.Design a web site in PHP using data

## CO - PO - PSO Mapping

| ADVANCED WEB TECHNOLOGY LAB | | | | | | | | | | | |
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| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 1 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 3 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 5 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L

## INTERNET OF THINGS

L T P C
4 0 0 4

COURSE OBJECTIVES

1. Describe what IoT is and how it works today
2. Recognise the factors that contributed to the emergence of IoT
3. Design and program IoT devices
4. Use real IoT protocols for communication
5. Secure the elements of an IoT device

***Course Outcome***:

On successful completion of the course, the learners will be able to

CO1. Gain the basic knowledge about IoT
CO2. Use IoT related products inreal life.
CO3. Rely less on physical resources and start to do work smarter.
CO4. Analyze opportunities and challenges in IoT
CO5. Understand the need of Sensors and actuators

**UNIT I: - 12 hours**

**INTRODUCTION AND DOMAIN SPECIFIC IOTS** Introduction – Definition and Characteristics of IoT – Physical design of IoT – Logical Design of IoT – IoT enabling technologies – Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health and Lifestyle.

**UNIT II: - 12 hours**

**IOT SYSTEM MANAGEMENT AND DESIGN METHODOLOGY** IoT and M2M: Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – Software Defined Networking – Need for IoT System Management SNMP – Network operator requirements – NETCONF – YANG – IoT System Management with NETCONF-YANG – IoT Design methodology.

**UNIT III: - 12 hours**

**IoT SYSTEMS LOGICAL DESIGN AND PHYSICAL DEVICES** IoT Systems – Logical Design using Python – Python data types and data structures – Control flow – Functions – Modules – Packages – File Handling – Date/Time operations – Classes Python packages for IoT – IoT Physical devices and endpoints: Basic building blocks of IoT devices – Exemplary device: Raspberry Pi – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python.

**UNIT IV: - 12 hours**

**IOT PHYSICAL SERVERS, WEB SERVICES AND CASE STUDIES**
Introduction to Cloud storage models and Communication APIs – WAMP – Python Web Application Framework - DJANGO – Amazon Web Services for IoT – Amazon EC2 –

Amazon Autoscaling – Amazon S3 – AmazonRDS – Case studies illustrating IoT – Smart Lighting – Home Intrusion System – Forest Fire Detection – Smart Irrigation – IoT printer.

**UNIT V:** **- 12 hours**

**DATA ANALYTICS AND TOOLS FOR IOT** Introduction – Apache Hadoop Mapreduce Programming Model – Hadoop Mapreduce Job Execution – Mapreduce Job Execution Workflow – Hadoop Cluster Setup – Tools for IoT – Chef – Setting up Chef – Chef Case studies – Puppet – Puppet case study.

**CO - PO - PSO Mapping**

| INTERNET OF THINGS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 1 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 2 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS :**

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things: A Hands-on Approach”, First Edition, Universities Press, 2016.

**REFERENCES :**

1. Anand Tamboli, “Build your own IoT Platform”, First Edition, APress, 2019.
2. Yashavant Kanetkar, Shrirang Korde, “21 IOT Experiments”, BPB Publications, 2018.
3. Raj Kamal, “Internet of Things Architecture and Design Principles”, First Edition, Mc Graw Hill Education, 2017.

## DATA SCIENCE AND BIG DATA ANALYTICS

L T P C
4 0 0 4

**COURSE OBJECTIVES**:

The course provides grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Acquire the knowledge on the basics of Big Data
CO2. Work with big data tools
CO3. Design efficient algorithms for mining the data from large volumes
CO4. Explore the cutting-edge tools and technologies to analyze Big Data
CO5. Appreciate Big Data Processing concepts and Data visualization techniques

**UNIT I:** **12 hours**

**INTRODUCTION TO BIG DATA ANALYTICS :** Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Analytics Life cycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize

**UNIT II:** **12 hours**

**BASIC DATA ANALYTIC METHODS USING R:** Introduction to R programming – R Graphical User Interfaces – Data Import and Export – Attribute and Data Types – Descriptive Statistics Exploratory Data Analysis: Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation -– Statistical Methods of Evaluation : Hypothesis Testing – Difference ofMeans – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA.

**UNIT III:** **12 hours**

**ADVANCED ANALYTICAL THEORY AND METHODS:** Clustering – K Means – Use Cases – Overview – Determining number of clusters – Diagnostics – Reasons to choose and cautions – Additional Algorithms - Association Rules : A Priori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Validation and Testing

– Diagnostics. Regression: Linear Regression and Logistic Regression – Use cases – Model Description – Diagnostics - Additional Regression Models. -

**UNIT IV:** **12 hours**

**CLASSIFICATION:** Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Naive Bayes – Bayes Theorem – Naïve Bayes Classifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods - Time Series Analysis : : Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model -

Text Analysis : Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments –Gaining Insights.

**UNIT V:** **12 hours**

**ADVANCED ANALYTICS-TECHNOLOGY AND TOOLS:** MapReduce and Hadoop : Analytics for Unstructured Data .- *UseCase* - *MapReduce* - Apache Hadoop – The Hadoop Ecosystem – pig – Hive – Hbase – Mahout – NoSQL - Tools in Database Analytics : SQL Essentials – Joins – Set operations – Grouping Extensions – In Database Text Analysis -Advanced SQL – Windows Functions – User Defined Functions and Aggregates – ordered aggregates- MADiib - Analytics Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables : Developing Core Material for Multiple Audiences – Project Goals – Main Findings – Approach Model Description – Key points support with Data - Model details – Recommendations – DataVisualization.

**CO - PO - PSO Mapping**

| DATA SCIENCE AND BIG DATA ANALYTICS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | M | S | S | M | S | S | S | M | S | S | K - 3 |
| CO 2 | S | S | S | S | S | S | S | S | S | S | K - 3 |
| CO 3 | S | S | M | S | M | S | S | S | S | S | K - 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 5 | M | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS :**

1. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", EMC Education Services Published by John Wiley & Sons, Inc. 2015

**REFERENCES:**

1. Noreen Burlingame, "The little book on Big Data", New Street publishers, 2012.
2. Anil Maheshwari, " Data Analytics", McGraw Hill Education, 2017.
3. Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", Starch Press; 1 edition, 2011.
4. Sandip Rakshit, "R for Beginners", McGraw Hill Education, 2017
5. http://www.johndcook.com/R_language_for_programmers.html.
6. http://bigdatauniversity.com/.
7. http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction.

## SOFTWARE PROJECT MANAGEMENT

L T P C
4 0 0 4

**COURSE OBJECTIVES :**

This course will enable students to:

- Understand the framework of project management
- Learn to monitor and control the project
- Gain sound knowledge in Agile method
- Know the team, cost, quality and resource management
- Identify and control the risk in the projects

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Analyze the scope, cost, timing, and quality of the project

CO2. Align the project to the organization's strategic plans

CO3. Gain sound knowledge in Agile method

CO4. Estimate the cost, quality and resource management

CO5. Identify and control the risk in the projects

**UNIT I : 12 hours**

**PROJECT MANAGEMENT FRAMEWORK:** Introduction: Project - Project management - Relationship among Project, Program and Portfolio management - Project and operations management- Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. **The Standard for Project Management of a Project**: Project management processes for a project: Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.

**UNIT II : 12 hours**

Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype - **Agile Methods** – Extreme Programming Selecting the Most Appropriate Process Model- Need of Agile - Iterative vs Incremental-Agile Manifesto and Mindset – Lean, Scrum and Kanban methods-uncertainty, Risk, and lifecycle selection-Scrum Elements overview-5 levels of planning-Scrum Process overview-Agile Team-roles and responsibilities- Epic-feature-User Stories-PBI-The Sprint.

**UNIT III : 12 hours**

**THE PROJECT MANAGEMENT KNOWLEDGE AREAS:** Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management: Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project team management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

**UNIT IV :** **12 hours**

Project cost management: Estimate costs - Determine budget - Control costs. Project Quality Management: Plan quality - perform quality assurance - Perform quality control. Project Human Resource Management: Develop human resource plan - Acquire project team - Develop project team - Manage project team. Project Communications Management: Identify stakeholders - Plan communications - Distribute information - Manage stakeholder expectations - report performance.

**UNIT V :** **12 hours**

Project Risk Management: Plan risk management - Identify risks - Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses - Monitor and control risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.

-10 hours

**CO - PO - PSO Mapping**

| SOFTWARE PROJECT MANAGEMENT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 4 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 1 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 2 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. "A guide to the Project management Body of Knowledge (PMBOK Guide)" Fouth Edition, Project Management Institute, Pennsylvania, 2008
2. BOB Huges, Mike Cotterell, Rajib Mall “Software Project Management”, McGraw Hill, Fifth Edition,2011.
3. Emerson, "Agile Handbook," Philosophie

**REFERENCES :**

1. Futrell, “Quality Software Project Management”, Pearson Education India.
2. Royce, “Software Project Management”, Pearson Education India.
3. C.Ravindranath Pandian, “Applied Software Risk Management-A Guide for Software Project Managers”, Auerbach Publications, 2015.
4. Benjamin A. Lieberman, “The Art of Software Modeling”, Auerbach Publications, 2010.

## RESEARCH METHODOLOGY

L T P C
4 0 0 4

### COURSE OBJECTIVES

- To impart knowledge and skills required for research and IPR:
- Problem formulation, analysis and solutions.
- Technical paper writing / presentation without violating professional ethics
- Patent drafting and filing patents.

***Course Outcome:***

On successful completion of the course, the learners will be able to
CO1. Develop data collection according to the underlying theoretical ramework.
CO2. Analyze quantitative data and qualitative data using software packages
CO3. Construct and document an appropriate research design
CO4. Understand the ill-effects of Plagiarism
CO5. Become a good teacher using ICT based Teaching Methods

**UNIT I** **12 hours**

**RESEARCH PROBLEM FORMULATION** Meaning of research problem- Sources of research problem, criteria characteristics of a good research problem, errors in selecting a research problem, scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations

**UNIT II** **12 hours**

**LITERATURE REVIEW** Effective literature studies approaches, analysis, plagiarism, and research ethics

**UNIT III** **12 hours**

**TECHNICAL WRITING /PRESENTATION** Effective technical writing, how to write report, paper, developing a research proposal, format of research proposal, a presentation and assessment by a review committee.

**UNIT IV** **12 hours**

**INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (IPR)**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**UNIT V** **12 hours**

**INTELLECTUAL PROPERTY RIGHTS (IPR)** Patent Rights: Scope of Patent Rights. Licensing

and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs

**CO - PO - PSO Mapping**

| RESEARCH METHODOLOGY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K -4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 3 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. Research Methodology Methods and Techniques, Kothari, C. R., Wiley Eastern Ltd.
2. Research methodology: an introduction for science & engineering students', by Stuart Melville and Wayne Goddard.

3. Practical Research Methods, Dawson, C., UBSPD Pvt. Ltd.

**REFERENCES:**

1. Asimov, “Introduction to Design”, Prentice Hall, 1962.
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners” 2010

## DATA SCIENCE AND BIG DATA ANALYTICS USING R-LAB

L T P C
0 0 4 2

### COURSE OBJECTIVES

- To impart knowledge and skills required for data analysis.
- Problem formulation, analysis and solutions.

***Course Outcome:***

On successful completion of the course, the learners will be able to
CO1. Acquire the knowledge on the basics of Big Data
CO2. Work with big data tools
CO3. Design efficient algorithms for mining the data from large volumes
CO4. Explore the cutting-edge tools and technologies to analyze Big Data
CO5. Appreciate Big Data Processing concepts and Data visualization techniques

### LIST OF EXERCISES:

1. Creating and displaying Data.
2. Matrix manipulations
3. Creating and manipulating a List and an Array
4. Creating a Data Frame and Matrix-like Operations on a Data Frame
5. Merging two Data Frames
6. Applying functions to Data Frames
7. Using Functions with Factors
8. Accessing the Internet
9. String Manipulations
10. Visualization Effects
11. Plotting with Layers
12. Overriding Aesthetics
13. Histograms and Density Charts
14. Simple Linear Regression – Fitting, Evaluation and Visualization
15. Multiple Linear Regression, Lasso and Ridge Regression

**CO - PO - PSO Mapping**

| DATA SCIENCE AND BIG DATA ANALYTICS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | M | S | S | M | S | S | S | M | S | S | K - 3 |
| CO 2 | S | S | S | S | S | S | S | S | S | S | K - 3 |
| CO 3 | S | S | M | S | M | S | S | S | S | S | K - 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 5 | M | S | M | S | S | S | S | S | S | S | K – 6 |

Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L

## MINI PROJECT

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1. Each student has to undergo an individual project in the Institution
2. Internal Project Supervisor shall be allocated for each student.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Develop a model to achieve the project's goal

CO2. Demonstrate sound technical knowledge of the selected project topic.

CO3. Undertake problem identification, formulation and solution.

CO4. Design solutions to complex problems utilising a systematic approach

CO5. Appreciate the steps involved in Software development process

**CO - PO - PSO Mapping**

| MINI PROJECT | | | | | | | | | | | |
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| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 1 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L

**Elective – 1-1**

## DIGITAL IMAGE PROCESSING

L T P C
4 0 0 3

**COURSE OBJECTIVES:**

To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Review the fundamental concepts of a digital image processing system
CO2. Analyze imagesin the frequency domain using various transforms.
CO3. Evaluate the techniques for image enhancement and image restoration.
CO4. Interpret Image compression standards
CO5. Gain knowledge to process images used in various fields

**UNIT–I: 12 hours**

Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.

Color Models: Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.

**UNIT–II: 12 hours**

Spatial Domain: Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.

Frequency Domain: Image transforms: FFT, DCT, Karhunen-Loeve transform, Hotlling's T2 transform, Wavelet transforms and their properties. Image filtering in frequency domain.

**UNIT–III: 12 hours**

Edge Detection: Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

**UNIT–IV: 12 hours**

Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform based coding;

Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards. -

**UNIT–V:** **12 hours**

Image Segmentation: Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological watersheds- The use of motion in segmentation, Image Segmentation based on Color. Morphological Image Processing: Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.

**CO - PO - PSO Mapping**

| DIGITAL IMAGE PROCESSING | | | | | | | | | | | |
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| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 1 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 1 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1.Rafael Gonzalez, Richard E. Woods, “Digital Image Processing”, Fourth Edition, PHI/Pearson Education, 2013.
2.A. K. Jain, Fundamentals of Image Processing, Second Ed., PHI, New Delhi, 2015.

**REFERENCES:**

1.B. Chan la, D. Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.
2.Nick Elford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.
3.Todd R.Reed, “Digital Image Sequence Processing, Compression, and Analysis”, CRC Press, 2015.
4.L.Prasad, S.S.Iyengar, “Wavelet Analysis with Applications to Image Processing”, CRC Press, 2015.

Elective – 1 -2 **SOFT COMPUTING** L T P C 4 0 0 3

**COURSE OBJECTIVES:**

•Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.

•Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Comprehend the fuzzy logic and the concept of fuzziness

CO2. Identify neural network architectures, applications and limitations.

CO3. Select an appropriate algorithm for real life problems

CO4. Evolve as a competent programmer designing and analyzing algorithms

CO5. Appreciate Genetic Algorithms

**UNIT I: 12 hours**

**Introduction:** Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – LinearSeparability.

**UNIT II: 12 hours**

**Supervised Learning Networks:** Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

**UNIT III : 12 hours**

**Fuzzy Sets:** Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods. -

**UNIT IV: 12 hours**

**Fuzzy Arithmetic** – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems. -

**UNIT V: 12 hours**

**Genetic Algorithm:** Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

**CO - PO - PSO Mapping**

| SOFT COMPUTING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. S.N. Sivanandam, S.N. Deepa, “Principles of Soft Computing”, Wiley India, 2007.
Reference Book
2. S. Rajasekaran, G.A.V. Pai, “Neural Networks, Fuzzy Logic, Genetic Algorithms”, Prentice Hall India, 2004.

**REFERENCES:**

1. Fuzzy Logic: A Pratical approach, F. Martin, Mc neill, and Ellen Thro, AP Professional, 2000.
2. Fuzzy Logic with Engineering Applications (3rd Edn.), Timothy J. Ross, Willey, 2010.
3. Foundations of Neural Networks, Fuzzy Systems, and Knowldge Engineering, Nikola K. Kasabov, MIT Press, 1998.
4. Fuzzy Logic for Embedded Systems Applications, Ahmed M. Ibrahim, Elesvier Press, 2004.
5. An Introduction to Genetic Algorithms, Melanie Mitchell, MIT Press, 2000.
6. Genetic Algorithms In Search, Optimization And Machine Learning, David E. Goldberg, Pearson Education, 2002.

**Elective – 1 -3**

## CRYPTOGRAPHY AND NETWORK SECURITY

L T P C

4 0 0 3

**COURSE OBJECTIVES**:

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.
- To know about the malicious software & firewalls.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Gain knowledge about the fundamentals of networks security, threats and vulnerabilities

CO2. Analyze cryptographic algorithms

CO3. Understand the various Authentication schemes to simulate different applications.

CO4. Examine Security practices and System security standards

CO5. Comprehend Intrusion Detection

**UNIT I : 12 hours**

**INTRODUCTION -** Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography-Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

**UNIT II : 12 hours**

**SYMMETRIC ENCRYPTION AND MESSAGE CONFIDENTIALITY -** Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4, Chipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. Public-key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.

**UNIT III : 12 hours**

**AUTHENTICATION APPLICATIONS -** Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.

**UNIT IV: 12 hours**

**IP SECURITY -** IP Security Over view, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. Web Security: Web Security Considerations, Secure Socket Layer(SSL) and Transport Layer Security(TLS),

Secure Electronic Transaction(SET).Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.

**UNIT V :** **12 hours**

**INTRUDERS** - Intruders, Intrusion Detection, Password Management. **Malicious Software:** Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls:** Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

**CO - PO - PSO Mapping**

| CRYPTOGRAPHY AND NETWORK SECURITY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 1 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 5 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS :**

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata Mc Graw Hill, 2007, Reprint 2015.
2. Stallings William, “Cryptography and Network Security - Principles and Practice 2017.
**3.** William Stallings, “Network Security Essentials Applications and Standards ”Third Edition, Pearson Education, 2008**.**

**REFERENCES :**

1. Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms And Protocols”, Wiley Publications, 2003.
2. Charles Pfleeger, “Security In Computing”, 4th Edition, Prentice Hall Of India, 2006.
3. Ulysess Black, “Internet Security Protocols”, Pearson Education Asia, 2000.
4. Charlie Kaufman And Radia Perlman, Mike Speciner, “Network Security, Second Edition, Private Communication In Public World”, PHI 2002.
5. Bruce Schneier And Neils Ferguson, “Practical Cryptography”, First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
6. Douglas R Simson “Cryptography – Theory And Practice”, First Edition, CRC Press, 1995.

**Elective – 1 -4** **EMBEDDED SYSTEMS**

L T P C
4 0 0 3

**COURSE OBJECTIVES:**

This course will enable students to:

•Understand the basic hardware components and their selection method based on thecharacteristics and attributes of an embedded system.

•Describe the hardware software co-design and firmware design approaches

•Know the RTOS internals, multitasking, task scheduling, task communication and synchronisation

•Learn the development life cycle of embedded system

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand the basic hardware components of an embedded system.
CO2. Describe the hardware software co-design and firmware design approaches
CO3. Know the RTOS internals
CO4. Analyze interrupts, hyper threading and software optimization
CO5. Learn the development life cycle of embedded system

**UNIT I:** **12 hours**

Introduction to Embedded system - Embedded system vs General computing systems - History - Classification - Major Application Areas- Purpose of Embedded systems - Smart running shoes: The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems. -

**UNIT II:** **12 hours**

Elements of an Embedded system - core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS- Memory - Sensors and Actuators Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit, Brown-out protection circuit, Oscillator unit, Real-time clock, and Watchdog timer - PCB and Passive Components. -

**UNIT III:** **12 hours**

Embedded Systems - Washing machine: Application-specific - Automotive: Domain specific. Hardware Software Co-Design - Computational Models - Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and testing of Embedded Hardware and firmware.

**UNIT IV:** **12 hours**

RTOS based Embedded System Design: Operating System Basics - Types of operating Systems - Tasks, process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronisation - Device Drivers - choosing an RTOS.

**UNIT V:** **12 hours**

Components in embedded system development environment, Files generated during compilation,

simulators, emulators and debugging - Objectives of Embedded product Development Life Cycle – Different Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study: Digital Clock.

## CO - PO - PSO Mapping

| EMBEDDED SYSTEMS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. K. V. Shibu, "Introduction to embedded systems", TMH education Pvt. Ltd. 2009.

**REFERENCE BOOKS :**

1.Raj Kamal, “Embedded Systems: Architecture, Programming and Design”, TMH. Second Edition 2009
2.Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley. Third Edition 2006
3.Cliff Young, Faraboschi Paolo, and Joseph A. Fisher, "Embedded Computing: A VLIW Approach to Architecture, Compilers and Tools", Morgan Kaufmann Publishers, An imprintof Elsevier, 2005.
4.David E. Simon, “An Embedded Software Primer” Pearson Education, 1999

**Elective –2-1**

## WEB SERVICES

L T P C
4 0 0 3

**COURSE OBJECTIVES:**

- To enable the student to be familiar with distributed services, XML and web services
- To study the use of web services in B2C and B2B applications

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand the design principles and application of SOAP and REST based web services.

CO2. Design collaborating web services according to a specification.

CO3. Implement an application that uses multiple web services in a realistic business scenario.

CO4. Use industry standard open source tools

CO5. Build, test, deploy and execute web services and web applications that consume them.

**UNIT – I:** **12 hours**

**Overview** of Distributed Computing. Introduction to web services – Industry standards, Technologies and concepts underlying web services – their support to web services. Applications that consume web services.

**UNIT – II:** **12 hours**

XML – its choice for web services – network protocols to back end databases- technologies – SOAP, WSDL – exchange of information between applications in distributed environment – locating remote web services – its access and usage. UDDI specification – an introduction.

**UNIT – III :** **12 hours**

A brief outline of web services – conversation – static and interactive aspects of system interface and its implementation, work flow – orchestration and refinement, transactions, security issues – the common attacks – security attacks facilitated within web services quality of services – Architecting of systems to meet users requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services – energy consumption, network bandwidth utilization, portals and services management.

**UNIT – IV:** **12 hours**

Building real world enterprise applications using web services – sample source codes to develop web services – steps necessary to build and deploy web services and client applications to meet customers requirement – Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

**UNIT – V:** **12 hours**

Deployment of Web services and applications onto Tomcat application server andaxis SOAP server (both are free wares) – Web services platform as a set of enabling technologies for XML based distributed computing.

**CO - PO - PSO Mapping**

| WEB SERVICES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 3 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXTBOOKS:**

1. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services : An Architects Guide, Prentice Hall, Nov 2003.
2. Heather Williamson, “XML: The Complete Reference “,Tata McGraw-Hill Education India.

**REFERENCES:**

1. Martin Kalin, “Java Web Services: Up and Running”, O’Reilly Publishers.

**Elective –2-2**

## CLOUD COMPUTING

L T P C
4 0 0 3

**COURSE OBJECTIVES:**

The objective of this course is to provide students with the comprehensive and in- depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations. Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Gain good understanding of cloud computing
CO2. Analyze cloud architecture
CO3. Understand the issues and challenges in Cloud Computing
CO4. Appreciate Social media analytics
CO5. Design Web API

**UNIT – I:** **12 hours**

**COMPUTING BASICS:** Cloud computing definition- Characteristics- Benefit- Challenges- Distributed Systems- Virtualization-Service-oriented computing- Utility-oriented computing- Building Cloud Computing environments- computing platforms & technologies - Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.

**UNIT - II:** **12 hours**

**VIRTUALIZATION, CLOUD SERVICES AND PLATFORMS:** Virtualization - Characteristics- taxonomy-types- Pros and Cons- Examples Architecture: Reference model- types of clouds- Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment and Management Service - Identity And Access Management Services - Open Source Private Cloud Software.

**UNIT – III:** **12 hours**

**CLOUD APPLICATION DESIGN AND DEVELOPMENT:** Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics

**UNIT – IV:** **12 hours**

**PYTHON FOR CLOUD** Introduction- Installing Python- Data types & Data Structures- Control Flow- Functions- Modules- Packages- File Handling- Date/Time Operations – Classes- Python for Cloud: Amazon Web Services –Google Cloud Platform - Windows Azure –Map Reduced – Packages of Interest – Designing a RESTful Web API. -

**UNIT – V:** **12 hours**

BIG DATA ANALYTICS, MULTIMEDIA CLOUD & CLOUD SECURITY -Big Data Analytics: Clustering Big data – Classification – Recommendation systems. Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Transcoding App-Cloud Security: CSA Cloud Security Architecture - Authentication- Authorization - Identity & Access management - Data Security - Key Management- Auditing- Cloud for Industry, Healthcare & Education.

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## CO - PO - PSO Mapping

| CLOUD COMPUTING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 1 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 6 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 5 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.
2. ArshdeepBahga, Vijay Madisetti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016.

**REFERENCES:**

1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
2. Michael Miller “Cloud Computing Web based application that change the way you work and collaborate online”. Pearson edition, 2008.
3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and More, Jones & Bartlett Learning, 2012.

**Elective – 2-3**

## APPLICATION DEVELOPMENT USING ANDROID

L T P C
4 0 0 3

**COURSE OBJECTIVES**:

1. To facilitate students to understand android SDK
2. To help students to gain a basic understanding of Android application development
3. To inculcate working knowledge of Android Studio development tool

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Install and configure Android application development tools.

CO2. Design and develop user Interfaces for the Android platform.

CO3. Save state information across important operating system events.

CO4. Apply Java programming concepts to Android application development.

CO5. Deploy Android Application

**UNIT - I** **12 hours**

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

**UNIT - II** **12 hours**

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter,Permissions.

**UNIT - III** **12 hours**

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

**UNIT - IV** **12 hours**

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

**UNIT – V** **12 hours**

Using Common Android APIs: Using Android Data and Storage APIs, Managingdata using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

## CO - PO - PSO Mapping

| APPLICATION DEVELOPMENT USING ANDROID | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 3 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

### TEXT BOOKS:

1. T. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

### REFERENCES:

1. Reto Meier, “Professional Android Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition:

**Elective –2-4**

## MACHINE LEARNING

L T P C
4 0 0 3

**COURSE OBJECTIVES :**

•To Learn about Machine Intelligence and Machine Learning applications
•To implement and apply machine learning algorithms to real- world applications.
•To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
•To understand how to perform evaluation of learning algorithms and model selection.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Understand the fundamental issues and challenges of machine learning: data, model selection and model complexity
CO2. Analyze the strengths and weaknesses of popular machine learningapproaches.
CO3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
CO4. Design and implement various machine learning algorithms in a range of real-world applications.
CO5. Identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.

**UNIT I:** **12 hours**

**INTRODUCTION** Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

**UNIT II:** **12 hours**

**NEURAL NETWORKS AND GENETIC ALGORITHMS :**Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back PropagationAlgorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

**UNIT III:** **12 hours**

**BAYESIAN AND COMPUTATIONAL LEARNING:** Bayes Theorem –Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model. -

**UNIT IV:** **12 hours**

**INSTANT BASED LEARNING :** K- Nearest Neighbour Learning – Locallyweighted Regression – Radial Basis Functions – Case Based Learning.

**UNIT V:** **12 hours**

**ADVANCED LEARNING :**Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted

Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning -14 hours

**CO - PO - PSO Mapping**

| MACHINE LEARNING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K - 2 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K - 4 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K - 4 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K - 5 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 3 |

**Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L**

**TEXT BOOKS:**

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited,2013.

**REFERENCES:**

1. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, "Genetic Algorithms and Genetic Programming", CRC Press Taylor and Francis Group.

## SEMESTER VI

## MAJOR PROJECT

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 30 | 16 |

**COURSE OBJECTIVES :**

1. Each student has to undergo an individual project either in the Institution or in a reputed industry
2. Internal Project Supervisor shall be allocated for each student.

***Course Outcome:***

On successful completion of the course, the learners will be able to

CO1. Develop a model to achieve the project's goal

CO2. Demonstrate sound technical knowledge of the selected project topic.

CO3. Undertake problem identification, formulation and solution.

CO4. Design solutions to complex problems utilising a systematic approach

CO5. Appreciate the steps involved in Software development process

**CO - PO - PSO Mapping**

| MAJOR PROJECT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO | | | | | PSO | | | | | COGNITIVE LEVEL |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| CO 1 | S | S | S | M | S | S | S | M | S | S | K – 3 |
| CO 2 | S | S | M | S | S | S | S | S | S | S | K – 3 |
| CO 3 | S | S | M | S | S | S | S | S | S | S | K – 2 |
| CO 4 | S | S | M | S | S | S | S | S | S | S | K – 5 |
| CO 5 | S | S | M | S | S | S | S | S | S | S | K – 6 |

Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L

Code No. : 6543 Sub. Code : ZITM 11/ ZNTM 11

M.Sc. (CBCS) DEGREE EXAMINATION,

NOVEMBER 2021

First Semester

Information Technology/Networking and Information Technology — Core

MATHEMATICAL FOUNDATIONS OF INFORMATION TECHNOLOGY

(For those who joined in July 2021 onwards)

Time : Three hours
Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. Find the value of p for which, the rank of the given matrix is 1.

(a) 4 (b) 2 (c) 3 (d) 1

2. The matrix which do have an inverse by solving it, is classified as

(a) non-singular matrix (b) singular matrix

(c) unidentified matrix (d) linear matrix

3. The members of the set S = {x|x is the square of an integer and x < 100} is _____

(a) {0, 2, 4, 5, 9, 55, 46, 49, 99, 81} (b) {1, 4, 9, 16}

(c) {0, 1, 4, 9, 16, 25, 36, 49, 64, 81} (d) {0, 1, 4, 9, 25, 36, 49, 123}

4. If x is a set and the set contains an integer which is neither positive nor negative then the set x is _____

(a) Set is Empty (b) Set is Non-empty

(c) Set is Finite (d) Set is both Non-empty and Finite.

5. The least number of computers required to connect 10 computers to 5 routers to guarantee 5 computers can directly access 5 routers is _____

(a) 74 (b) 104 (c) 30 (d) 67

6. When four coins are tossed simultaneously, in _____ number of the outcomes at most two of the coins will turn up as heads.

(a) 17 (b) 28 (c) 11 (d) 43

7. ⅂(p ↔ q) is logically equivalent to _____

(a) q ↔ p (b) p ↔⅂q (c) ⅂p ↔ ⅂q (d) ⅂q ↔⅂p

8. p ∧ q is logically equivalent to _____

(a) ⅂(p → ⅂q) (b) (p → ⅂q) (c) (⅂p → ⅂q) (d) (⅂p → q)

9. In a 7-node directed cyclic graph, the number of Hamiltonian cycle is to be _____

(a) 728 (b) 450 (c) 360 (d) 260

10. If each and every vertex in G has degree at most 23 then G can have a vertex colouring of _____

(a) 24 (b) 23 (c) 176 (d) 54

PART B — (5 x 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find the rank of the matrix $\begin{pmatrix} 1 & 5 \\ 3 & 9 \end{pmatrix}$

Or

(b) Explain the inverse of matrix.

12. (a) Let the universal set be the set U = {a, b, c, d, e, f, g} and let A = {a, c, e, g} and let B = {d, e, f, g). Find A ∪ B, A ∩ B , B - A and $A^c$ .

Or

(b) Let a relation R be defined on the set Z by “aRb if a, b ϵ Z and a – b is divisible by 5". Is R an equivalence relation? Justify your answer.

13. (a) If (Kn + 1) pigeons are kept in n pigeon holes where K is a positive integer, what is the average number of pigeons per pigeon hole?

Or

(b) In a certain country, the car number plate is formed by 4 digits from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 followed by 3 letters from the alphabet. How many number plates can be formed if neither the digits nor the letters are repeated?

14. (a) Which of these are propositions? If the statement is a proposition, determine whether it is true or false.

(i) Delhi is the capital of India.

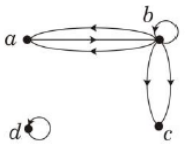
(ii) Can Sanya come to you?

(iii) 1 + 2 = 3 or 2 + 3 = 5

Or

(b) Write a note on propositional calculus.

15. (a) In the following graph drawn below, determine the number of vertices and edges and find the in-degree and out-degree of each vertex.




Or

(b) Write a note on subgraph.

PART C — (5 x 8 = 40 marks)

Answer ALL questions by choosing either (a) or (b).

16. (a) Find the inverse of $\begin{bmatrix} 5 & 6 \\ -1 & 2 \end{bmatrix}$.

Or

(b) Discuss the Cayley Hamilton Theorem with example.

17. (a) If n(A) =12, n(B) =17 and n(A∪B) = 21, find n(A∩B).

Or

(b) Compare the injective, subjective and objective functions.

18. (a) Suppose a survey of 100 people asks if they have a cat or dog as a pet. The results are as follows: 55 answered yes for cat, 58 answered yes for dog and 20 people checked yes for both cat and dog. How many people have a cat or a dog?

Or

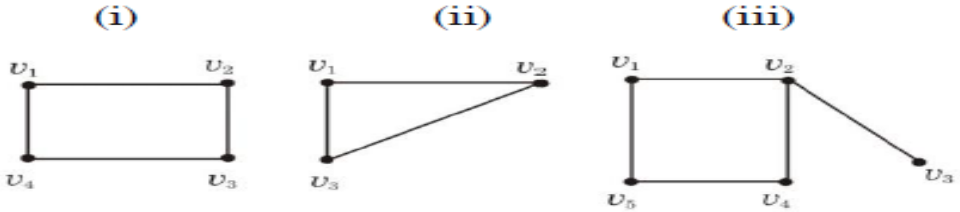
(b) By using mathematical induction prove that the given equation is true for all positive integers. $2+6+10+.....+(4n-2)=2n^2$.

19. (a) Prove ⌉(A∨B) and (⌉A ∧⌉B) are equivalent.

Or

(b) Analyze the statement, “if you get more doubles than any other player you will lose, or that if you lose you must have bought the most properties”, using truth tables.

(a) Find which of the following graphs are bipartite.




Or

(b) Illustrate the concept of Euler paths with simple example.