INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM - CHENNAI
ACCREDITED BY NAAC WITH 'A' GRADE
*Marching Beyond 30 Years Successfully*
INSTITUTION WITH UGC 12B STATUS

**POSTGRADUATE DEGREE PROGRAMME**

# M.Sc. INFORMATION TECHNOLOGY

**(1 Year for PG Diploma / 2 Years for Degree)**

## CURRICULUM & SYLLABUS

**REGULATION 2024**

**Choice Based Credit System (CBCS)**

**&**

**Learning Outcomes Based Curriculum Framework (LOCF)**

**Effective from the Academic Year**

**2024 -2025**

**Department of Information Technology**
**School of Computing Sciences**

VELS

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)

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## DEPARTMENT OF INFORMATION TECHNOLOGY

| VISION OF THE DEPARTMENT |
| --- |
| To produce globally competent graduates, skilled intellectual professionals, and a successful entrepreneur in the field of computer science and Information Technology to meet the current challenges in the fast-growing IT industry. |

| MISSION OF THE DEPARTMENT | |
| --- | --- |
| **M1** | To provide a strong theoretical and practical knowledge to the students in computer science discipline. |
| **M2** | To equip our students to attain a skill set imperative to harness the opportunities present in this dynamic environment. |
| **M3** | To Provide technical & skill-based quality training to the students in the field of Information Technology. |
| **M4** | To empower the Youth in rural communities with computer knowledge. |
| **M5** | To inculcate knowledge about socio-economic duties & responsibilities, human & ethical values to become an optimistic global citizen and a life-long learner. |
| **M6** | To provide environmental education to empower knowledge on ecological issues and to protect and conserve invaluable natural resources for healthy and sustainable livelihoods. |

| PROGRAMME EDUCATIONAL OUTCOMES (PEO) | |
|---|---|
| **PEO1** | Graduates are prepared to be employed in IT industries by providing expected domain Knowledge. |
| **PEO2** | Graduates are provided with practical training, hands-on and project experience to meet the industrial needs. |
| **PEO3** | Graduates are motivated in career and entrepreneurial skill development to become Global leaders. |
| **PEO4** | Graduates are trained to demonstrate creativity, develop innovative ideas and to work in teams to accomplish a common goal. |
| **PEO5** | Graduates are addressed with social issues and guided to operate problems with Solution. |

| PROGRAMME OUTCOMES (PO) | |
|---|---|
| **PO1** | **Critical Thinking:** Apply knowledge of Cyber Security to identify, analyses problems and to provide effective solution in the area of Computing. |
| **PO2** | **Computing Skills and Ethics:** Analyze a problem, and identify and define the Computing requirements appropriate to its solution. |
| **PO3** | **Analytical skill:** Ability to design, develop algorithms and provide software solutions to cater the industrial needs. |
| **PO4** | **Modern Tool Usage:** Use current techniques, skills, and tools necessary for computing practices. |
| **PO5** | **Employability Skills:** Inculcate skills to excel in the fields of Information Technology and its Enabled services, Government and Private sectors, Teaching and Research. |
| **PO6** | **Ethics:** Insists ethical responsibilities, human and professional values and make their Contribution to the society. |
| **PO7** | **Self-Directed and Life-long Learning:** Engaged in lifelong learning to equip them to the changing environment and be prepared to take-up mastering programmes. |
| **PO8** | **Individual and Team Work:** Function effectively as an individual, and as a member or a leader in diverse team and multidisciplinary settings. |

| | |
|---|---|
| **PO9** | **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO10** | **Project management and finance:** Demonstrate knowledge and understanding of the problem and management principles and apply these to one's own work, as a member and engineering and management principles and apply these to one's own work, as a member. |
| **PO11** | **Conduct investigations of complex problems:** Use research-based knowledge research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO12** | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |

| **PROGRAMME SPECIFIC OUTCOMES (PSO)** | |
|---|---|
| **PSO1** | Professionally trained in the areas of programming, multimedia, and animation, web designing, and networking to acquire knowledge in various domain-based electives. |
| **PSO2** | Abet students to communicate effectively and to improve their competency skills to solve real time problems. |
| **PSO3** | The ability to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies. |

## BOARD OF STUDIES

### List of Members

### Department of Information Technology

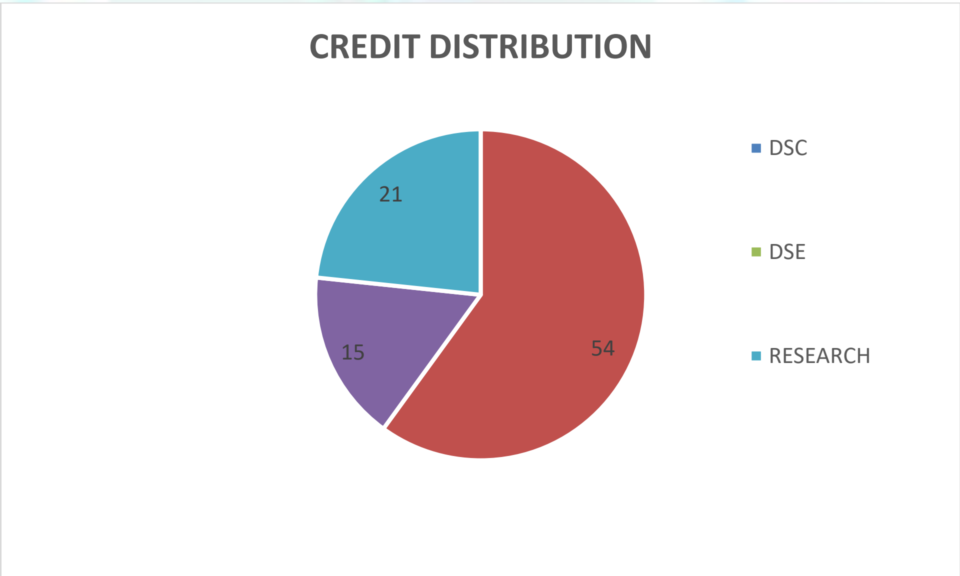
| S. No | Name & Designation | Address | Role |
|---|---|---|---|
| 1. | Dr. P. Magesh Kumar, Director | School of Computing Sciences, VISTAS.. | Chairperson |
| 2. | Dr.S.Gopinathan, Associate Professor And Head | Department of Computer Science, University of Madras, Chennai. | External Member (Academic Expert) |
| 3. | Mr. John Britto Chris, Senior Manager-Projects | Cognizant Technologies (P) Ltd., Chennai | External Member (Academic Expert) |
| 4. | Dr. P.Sujatha, Professor and Head | Department of Information Technology, VISTAS | Internal Member |
| 5. | Dr. T. Kamalakannan, Professor | Department of Information Technology, VISTAS | Internal Member |
| 6. | Dr. Y. Kalpana, Professor | Department of Information Technology, VISTAS | Internal Member |
| 7. | Dr. K.Rohini, Professor | Department of Information Technology, VISTAS | Internal Member |
| 8. | Dr. B.Booba, Professor | Department of Information Technology, VISTAS | Internal Member |
| 9. | Dr. R.Devi, Associate Professor | Department of Information Technology, VISTAS | Internal Member |
| 10. | Dr. K. Dharmarajan Associate Professor | Department of Information Technology, VISTAS | Internal Member |
| 11. | Dr.S Sathya Assistant Professor | Department of Information Technology, VISTAS | Internal Member |
| 12. | Dr.A Vidhya Assistant Professor | Department of Information Technology, VISTAS | Internal Member |
| 13. | Mr. PV Vishnu, Chief Innovation Officer | Xerago, Digital Impact Consulting & Services, Chennai | Alumni, VISTAS |

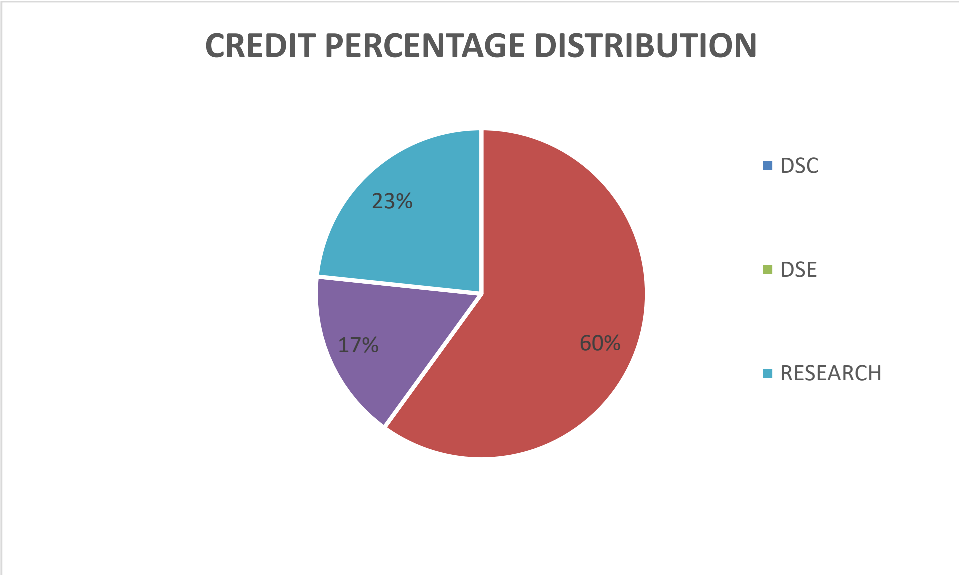
## CREDIT DISTRIBUTION

**(M.Sc. IT PG Diploma minimum credits to be earned 47 /**

**M.Sc. IT PG Degree minimum credits to be earned 90)**

| Component | I Sem | II Sem | III Sem | IV Sem | Total Credits |
|---|---|---|---|---|---|
| DSC | 16 | 20 | 14 | 4 | 54 |
| DSE | 6 | 3 | 6 | - | 15 |
| RESEARCH | - | 3 | 8 | 10 | 21 |
| Total Credits | 22 | 25 | 26 | 14 | 90 |






## ABBREVIATIONS

| | |
|---|---|
| **DSC** | Disciplinary Specific Core |
| **DSE** | Disciplinary Specific Elective |
| **RM** | Research Methodology, internship, Mini project & Research Project |

## CURRICULUM STURCTURE

| | (MSc IT PG Diploma minimum credits to be earned 47 / MSc IT PG Degree minimum credits to be earned 90) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SEMESTER 1 | | | | | | | | | |
| | | | Hours/Week | | | | | Maximum Marks | | |
| Category | Code | Course | L | T | P | O | C | CIA | SEE | Total |
| DSC | 24CMIT11 | Object Oriented Programming using Java | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| DSC | 24CMIT12 | Data Structures | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| DSC | 24CMIT13 | Relational Data Base Management Systems | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| DSC | 24PMIT11 | Object Oriented Programming using Java Lab | 0 | 0 | 4 | 1 | 2 | 40 | 60 | 100 |
| DSC | 24PMIT12 | Relational Database Management Systems Lab | 0 | 0 | 4 | 1 | 2 | 40 | 60 | 100 |
| DSE | 24DMIT11 | DSE 1 | 3 | 0 | 0 | 2 | 3 | 40 | 60 | 100 |
| DSE | 24DMIT21 | DSE2 | 3 | 0 | 0 | 2 | 3 | 40 | 60 | 100 |
| | | | **18** | **-** | **8** | **-** | **22** | - | - | - |

**CIA - Continuous Internal Assessment** **SEE - Semester End Examination**

***L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study**

| SEMESTER 2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Category** | **Code** | **Course** | **L** | **T** | **P** | **O** | **C** | **CIA** | **SEE** | **Total** |
| **DSC** | 24CMIT21 | Software Testing Techniques and Tools | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24CMIT22 | Programming in Python using Django | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24CMIT23 | Cryptography &Network Security | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24CMIT24 | Advanced Operating Systems | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24PMIT21 | Software Testing Techniques and Tools Lab | 0 | 0 | 4 | 1 | 2 | 40 | 60 | 100 |
| **DSC** | 24PMIT22 | Programming in Python using Django Lab | 0 | 0 | 4 | 1 | 2 | 40 | 60 | 100 |
| **DSE** | 24DMIT31 | DSE3 | 3 | 0 | 0 | 2 | 3 | 40 | 60 | 100 |
| **RM** | 24INPG21 | Internship | 0 | 0 | 0 | 2 | 3 | 40 | 60 | 100 |
| | | | **19** | **0** | **8** | - | **26** | - | - | - |

| SEMESTER 3 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Category** | **Code** | **Course** | **L** | **T** | **P** | **O** | **C** | **CIA** | **SEE** | **Total** |
| **RM** | 24CMIT31 | Research Methodology | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24CMIT32 | Deep Learning | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24CMIT33 | DevSec Ops Tools and Techniques | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24CMIT34 | Project Management | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **DSC** | 24PMIT31 | DevSec Ops Tools and Techniques Lab | 0 | 0 | 4 | 1 | 2 | 40 | 60 | 100 |
| **RM** | 24PMIT32 | Mini Project | 0 | 0 | 4 | 2 | 4 | 40 | 60 | 100 |
| **DSE** | 24DMIT-- | DSE4 | 3 | 0 | 0 | 2 | 3 | 40 | 60 | 100 |
| **DSE** | 24DMIT-- | DSE5 | 3 | 0 | 0 | 2 | 3 | 40 | 60 | 100 |
| | | **TOTAL** | **22** | **0** | **8** | **-** | **28** | **-** | **-** | **-** |

| SEMESTER 4 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Category** | **Code** | **Course** | **L** | **T** | **P** | **O** | **C** | **CIA** | **SEE** | **Total** |
| **DSC** | 24CMIT41 | Industrial Internet of Things | 4 | 0 | 0 | 2 | 4 | 40 | 60 | 100 |
| **RM** | 24RMIT41 | Research Project | 0 | 0 | 10 | 5 | 10 | 40 | 60 | 100 |
| | | | **4** | **-** | **10** | **-** | **14** | **-** | **-** | **-** |

## DISCIPLINE SPECIFIC CORE COURSES

| Category | Code | Course | L | T | P | O | C |
|---|---|---|---|---|---|---|---|
| **DSC 1** | 24CMDS11 | Programming Logic using Python | 4 | 0 | 0 | 2 | 4 |
| **DSC 2** | 24CMIT12 | Advanced DBMS | 4 | 0 | 0 | 2 | 4 |
| **DSC 3** | 24CMIT13 | Fundamentals of Data Science | 4 | 0 | 0 | 2 | 4 |
| **DSC 4** | 24PMIT11 | Python Programming Lab | 0 | 0 | 4 | 1 | 2 |
| **DSC 5** | 24PMIT12 | Advanced DBMS Lab | 0 | 0 | 4 | 1 | 2 |
| **DSC 6** | 24CMIT21 | Software Testing Techniques and Tools | 4 | 0 | 0 | 2 | 4 |
| **DSC 7** | 24CMIT22 | Programming in Python using Django | 4 | 0 | 0 | 2 | 4 |
| **DSC 8** | 24CMIT23 | Cryptography &Network Security | 4 | 0 | 0 | 2 | 4 |
| **DSC 9** | 24CMIT24 | Advanced Operating Systems | 4 | 0 | 0 | 2 | 4 |
| **DSC 10** | 24PMIT21 | Software Testing Techniques and Tools Lab | 0 | 0 | 4 | 1 | 2 |
| **DSC 11** | 24PMIT22 | Programming in Python using Django Lab | 0 | 0 | 4 | 1 | 2 |
| **DSC 12** | 24CMIT32 | Deep Learning | 4 | 0 | 0 | 2 | 4 |
| **DSC 13** | 24CMIT33 | DevSec Ops Tools and Techniques | 4 | 0 | 0 | 2 | 4 |
| **DSC 14** | 24CMIT34 | Project Management | 4 | 0 | 0 | 2 | 4 |
| **DSC 15** | 24PMIT31 | DevSec Ops Tools and Techniques Lab | 0 | 0 | 4 | 1 | 2 |
| **DSC 16** | 24CMIT41 | Industrial Internet of Things | 4 | 0 | 0 | 2 | 4 |

## DISCIPLINE SPECIFIC ELECTIVE COURSES

| Category | Course code &Title | L | T | P | O | C |
|---|---|---|---|---|---|---|
| DSE 1 | 24DMIT11- Object Oriented Software Engineering<br>24DMIT12- Scripting Languages<br>24DMIT13- Bio Informatics<br>24DMIT14- Compiler Design | 3 | 0 | 0 | 1 | 3 |
| DSE 2 | 24DMIT21- Data Mining &Data Warehousing<br>24DMIT22- Mobile Computing<br>24DMIT23- Parallel and Distributed Computing System<br>24DMIT24- Soft Computing | 3 | 0 | 0 | 1 | 3 |
| DSE 3 | 24DMIT31- Natural Language Processing<br>24DMIT32 Cloud Computing<br>24DMIT33- Neural Networks<br>24DMIT34- Multimedia Systems | 3 | 0 | 0 | 1 | 3 |
| DSE 4 | 24DMIT41- Block Chain Technology<br>24DMIT42- Embedded Systems<br>24DMIT43- Security Issues in Machine Learning<br>24DMIT44- Green Computing | 3 | 0 | 0 | 1 | 3 |
| DSE 5 | 24DMIT51 Big Data Analytics<br>24DMIT52 Quantum Computing<br>24DMIT53 Theory of computation<br>24DMIT54 Computational Intelligence | 3 | 0 | 0 | 1 | 3 |

## RESEARCH METHODOLOGY
## (RM)

| Category | Code | Course | L | T | P | O | C |
|---|---|---|---|---|---|---|---|
| **RM** | 24INPG21 | Internship | 0 | 0 | 0 | - | 3 |
| **RM** | 24CMIT31 | Research Methodology | 4 | 0 | 0 | 2 | 4 |
| **RM** | 24PMIT32 | Mini Project | 0 | 0 | 4 | 2 | 4 |
| **RM** | 24RMIT41 | Research Project | 0 | 0 | 10 | - | 11 |

# SEMESTER I

| 24CMIT11 | OBJECT ORIENTED PROGRAMMING USING JAVA | L | T | P | O | C |
|---|---|---|---|---|---|---|
| | | 4 | 0 | 0 | 2 | 4 |

## COURSE OBJECTIVES:

This course is to develop object-oriented programming skills in java. It will focus on more sophisticated features such as design of classes, interfaces, packages and APIs. To design and implementation of both GUI applications and standalone applications.

## UNIT I - INTRODUCTION TO OOP AND JAVA 12

Overview of OOP – Object oriented programming paradigms – Features of Object-Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors Methods -Access specifiers – Static members- Java Doc comments

## UNIT II - INHERITANCE, PACKAGES AND INTERFACES 12

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

## UNIT III EXCEPTION HANDLING AND MULTITHREADING 12

Exception handling basics – Multiple catch Clauses – Nested try Statements – Java's Built- in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model– Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

## UNIT IV I/O, GENERICS, STRING HANDLING 11

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

## UNIT V JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS 13

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, Toggle Button – Radio Buttons – List View – Combo Box – Choice Box – Text Controls – Scroll Pane.

Layouts – Flow Pane –HBox and VBox – Border Pane – Stack Pane – Grid Pane. Menus – Basics – Menu – Menu bars – Menu Item.

**Total: 60 Hours**

**COURSE OUTCOMES:**

**On Completion of this course, the students will be able to**

**CO1:** Describe java features and explain the supporting OOPs concepts

**CO2:** Develop the Java Classes make use of Constructors and Inheritance.

**CO3:** Create and import user defined Packages.

**CO4:** Analyze exceptions and handle them effectively

**CO5:** Analyze about multi-threading and thread synchronization

**CO6:** Apply String handling functions and file handling

**CO7:** Develop GUI applications using javaFX events and controls.

***Text Books:***

1. M.T. Somashekara, D.S. Guru, K.S. Manjunatha (2017), Object Oriented Programming with Java, First Edition ,PHI Learning .
2. Daniel Liang(2004) ,Introduction to Java Programming (Comprehensive Version), Eighth Edition, Pearson.

***Reference Books:***

1. Herbert Schildt (2014), Java The complete reference, 8th editon, , TMH.
2. Horstmann & Cornell(2007) ,Core Java Volume-I Fundamentals, Eight Edition,Pearson Education.

***Web Sites:***

1. www.javapoint.com
2. www.geeksforgeeks.org
3. www.w3schools.com
4. www.tutorialspoint.com

***Web Sources:***

1. https://www.electronicshub.org/basics-of-embedded-c-program/
2. https://www.mygreatlearning.com/blog/embedded-c/

| L | T | P | O | C |
|---|---|---|---|---|
| 4 | 0 | 0 | 2 | 4 |

**24CMIT12** **DATA STRUCTURES**

## COURSE OBJECTIVES:

Knowledge about the importance of data structures. To impart knowledge in application of data structures.

### UNIT I LISTS 12

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial operations.

### UNIT II STACKS AND QUEUES 12

Stack ADT – Operations – Applications –Evaluating arithmetic expressions- Infix to Postfix conversion –Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

### UNIT III TREES 12

Tree ADT – Tree Traversals – Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees –. B-Tree – B+ Tree.

### UNIT IV MULTIWAY SEARCH TREES AND GRAPHS 12

Graph Definition – Representation of Graphs – Types of Graph – Breadth-first traversal – Depth- first traversal –– Bi-connectivity –Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm.

### UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 12

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

**Total: 60 Hours**

## COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Apply different linear and nonlinear data structures in problem solving

**CO2:** Understand and create Abstract data types

**CO3:** Use stack and Queue concepts in computer applications

**CO4:** Analyse and Practice Tree concept in day to day applications

**CO5:** Realize and exercise graph traversal methods.

**CO6:** Develop Applications using shortest path methods

**CO7:** Generate solutions for common problems using tree traversal concepts

**CO8:** Understand and use searching and hashing techniques in real time applications

***Text Books:***


1. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft (2002), Data Structures and Algorithms, 1st edition, Pearson.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (2010), Introduction to Algorithms, Third Edition, PHI Learning.
3. Robert Lafore (2002), Data Structures and Algorithms in Java, second Edition,SAMS publications.


***Web Sources:***

1. https://www.shiksha.com/online-courses/articles/data-structures-and-algorithms-in-java/
2. https://www.coursera.org/learn/algorithms-part1
3. https://onlinecourses.nptel.ac.in/noc23_cs85/preview

## 24CMIT13 RELATIONAL DATA BASE MANAGEMENT SYSTEMS

| L | T | P | O | C |
|---|---|---|---|---|
| 4 | 0 | 0 | 2 | 4 |

### COURSE OBJECTIVES:

To impart the knowledge of basic concepts of Database systems. Establish a basic understanding of background materials needed for technical support using MySQL.To understand the fundamental concepts of MySql.

.

### UNIT I - INTRODUCTION TO DATABASE SYSTEM 12

Introduction (Basic Concepts: Data, Database, Database systems, Database Management Systems), Characteristics of Database Approach, Advantages of using the DBMS approach Database System Concepts and Architecture: Data Models,

Schemas, Instances, the three schema architectures and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMS, Classifications of Database Management Systems.

### UNIT II - ENTITY RELATIONSHIP MODELLING 12

Entity, Entity Sets, Attributes and keys – Super Key, Primary Key, Candidate Key, Alternate Key, Relationship Types, Composite entities, Weak entity, Subclass, Super class with Attribute inheritance, Generalization and Specialization. Relational Database design by ER and EER to Relational Mapping, Mapping EER model construct to Relations.

### UNIT III DATABASE DESIGN 12

Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal Form.

### UNIT IV SQL & MySQL 12

SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery. Basics of MySQL

Features of MySQL, Data types, Difference between SQL and MySQL, Integrity

Constraints-(Primary key, Foreign key, unique key, not Null, default, check)DDL, DML, DCL, TCL Commands, Select Statement with Clauses-Where, Having, ORDERBY and GROUPBY.

## UNIT V FUNCTIONS AND JOINS IN MYSQL 12

Functions in MySQL-Aggregate functions, String Functions, Math Functions, Date and Time Functions, Joins and Sub queries in MySQL, MySQL control statements and stored procedures, MySQL Triggers.

**Total: 60 Hours**

## COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Grasp the foundational principles of database systems, including their purpose, components, and importance in data management.

**CO-2:** Understand the concepts of Entity Relationship Model

**CO-3:** Able to understand and design simple ER model

**CO-4:** Apply normalization techniques to ensure database efficiency.

**CO-5:** Apply normalization techniques, including identifying functional dependencies and normal forms, to design efficient and well-structured databases.

**CO-6:** Analyze various types of SQL statements and their applications.

**CO-7:** Understand and describe the basic concepts of Mysql

**CO-8:** Able to write queries using Mysql

***Text Books:***

1. Ramez Elmsari, Shamkant B Navathe(2007), Fundamentals of Database Systems,7th Edition, Pearson Education.
2. VaswaniVikram(2004),MySQL: The Complete Reference, Tata McGrawHill.

***Reference Books:***

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, (2019), Database System Concepts,7th Edition ,Tata McGrawHill,.
2. Alexis Leon & Mathews Leon,(2014), Fundamentals of DBMS, 2nd Edition,Vijay Nicole Publications,

***Web Sites:***

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.javapoint.com

***Web Sources:***

1. www.guru99.com
2. www.youtube.com/watch?v=D6Q_wHrzxDs

## 24PMIT11 OBJECT ORIENTED PROGRAMMING USING JAVA LAB

| L | T | P | O | C |
|---|---|---|---|---|
| 0 | 0 | 4 | 1 | 2 |

### COURSE OBJECTIVES:

This course gives practical training in java programming. It will focus on more sophisticated features such as design of classes, interfaces, packages and javaFX applications. Provide the foundation of good programming skills by discussing keys issues to the design of object-oriented software..

### APPLICATIONS

1. Program to define a structure of a basic JAVA program
2. Program to define the data types, variable, operators, arrays and control structures.
3. Program to define class and constructors. Demonstrate constructors.
4. Program to define class, methods and objects. Demonstrate method overloading.
5. Program to define inheritance and show method overriding.
6. Program to demonstrate Packages.
7. Program to demonstrate Exception Handling.
8. Program to demonstrate Multithreading.
9. Program to demonstrate I/O operations.
10. Program to demonstrate Calendar class and Vector class manipulations.
11. Program to create javaFX application to display welcome message
12. Program to create javaFX application to display 2D shapes

**Total: 30 Hours**

### COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Develop simple java application using java features and OOPs concepts.

**CO2:** Develop Java application for Constructors

**CO3:** Develop Java application for method Overriding

**CO4:** Create packages and to import them

**CO5:** Create user-defined Exceptions and to handle exceptions

**CO6**: Perform Multi-Threading and I/O operations

**CO7:** Manipulate utility Package classes

**CO8:** Build JavaFX applications to handle Events

***Web Sources:***


1. https://www.javatpoint.com
2. https://docs.oracle.com/javase/8/javafx/events-tutorial/events.htm
3. https://www.w3schools.com
4. https://www.tutorialspoint.com

## 24PMIT12 RELATIONAL DATA BASE MANAGEMENT SYSTEMS LAB

| L | T | P | O | C |
|---|---|---|---|---|
| 0 | 0 | 4 | 1 | 2 |

### COURSE OBJECTIVES:

This course gives practical training in design and implementation of relational data bases for the selected set of problems.

### APPLICATIONS

Write a program for

1. Table creation, renaming a table, copying another table, dropping a table.
2. DDL commands
3. DML commands
4. Joins and subqueries.
5. Select statements with all clauses /options
6. Index and view.
7. Application development: students mark sheet processing, pay roll processing.
8. Functions in MySQL.
9. MySQL control statements.
10. MySQL triggers.

**Total: 30 Hours**

### COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO-1:** Creating a table using basic commands.

**CO-2:** Apply DDL, DML statement

**CO-3:** Apply various types of joins in tables.

**CO-4:** Apply various types of joins in tables.

**CO-5:** Evaluate the functionalities of trigger.

**CO-6:** Analyse different types of built-in function.

**CO-7:** Able to write queries using Mysql

***Web References:***

1. https://docs.oracle.com/en/database/index.html
2. https://docs.oracle.com/database/121/SQLRF/toc.html

***Web sites:***

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.javapoint.com

# SEMESTER II

| L | T | P | O | C |
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| 4 | 0 | 0 | 2 | 4 |

## 24CMIT21 SOFTWARE TESTING SYSTEMS

### COURSE OBJECTIVES:

To understand the basics of software testing. To learn how to do the testing and planning effectively. To build test cases and execute them. To focus on wide aspects of testing and understanding multiple facets of testing.

### UNIT I - FOUNDATIONS OF SOFTWARE TESTING 11

Why do we test Software? Black-Box Testing and White-Box Testing, Software Testing Life Cycle, V-model of Software Testing, Program Correctness and Verification, Reliability versus Safety, Failures, Errors and Faults (Defects), Software Testing Principles, Program Inspections, Stages of Testing: Unit Testing, Integration Testing, System Testing.

### UNIT II - TEST PLANNING 12

The Goal of Test Planning, High Level Expectations, Intergroup Responsibilities, Test Phases, Test Strategy, Resource Requirements, Tester Assignments, Test Schedule, Test Cases, Bug Reporting, Metrics and Statistics.

### UNIT III TEST DESIGN AND EXECUTION 13

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Design, Test Procedures, Test Case Organization and Tracking, Bug Reporting, Bug Life Cycle.

### UNIT IV ADVANCED TESTING CONCEPTS 12

Performance Testing: Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Security testing, Testing in the Agile Environment, Testing Web and Mobile Applications.

**UNIT V TEST AUTOMATION AND TOOLS** **12**

Automated Software Testing, Automate Testing of Web Applications, Selenium: Introducing Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events, Testing: Understanding Testing.xml, Adding Classes, Packages, Methods to Test, Test Reports.

**Total: 60 Hours**

**COURSE OUTCOMES:**

**On Completion of this course, the students will be able to**

**CO1:** Understand the basic concepts of software testing and the need for software testing

**CO2:** Design Test planning and different activities involved in test planning.

**CO3:** Design effective test cases that can uncover critical defects in the application.

**CO4:** Carry out advanced types of testing.

**CO5:** Automate the software testing using Selenium

***Text Books:***


1. Yogesh Singh, (2012 ),Software Testing, Cambridge University Press,.
2. Unmesh Gundecha, Satya Avasarala,( 2018), Selenium WebDriver 3 Practical Guide, Second Edition. Packt Publishing


***Reference Books:***


1. Glenford J. Myers, Corey Sandler, Tom Badgett,( 2012), The Art of Software Testing, 3rd Edition, , John Wiley & Sons, Inc.
2. Paul C. Jorgensen,( , 2014), Software Testing: A Craftsman's Approach, Fourth Edition, Taylor & Francis Group
3. Carl Cocchiaro, (2018), Selenium Framework Design in Data-Driven Testing, Packt Publishing.
4. Elfriede Dustin, Thom Garrett, Bernie Gaurf, (2009), Implementing Automated Software Testing, Pearson Education, Inc.


***Web Sites:***

1. www.javapoint.com
2. www.geeksforgeeks.org
3. www.w3schools.com
4. www.tutorialspoint.com

***Web Sources:***


1. https://www.javatpoint.com/software-testing-tutorial
2. https://mrcet.com/downloads/digital_notes/ME/III%20year/Software%20Testing%20Techni ques.pdf
3. https://mrcet.com/downloads/digital_notes/ME/III%20year/Software%20Testing%20Techni ques.pdf
4. https://malenezi.github.io/malenezi/SE401/Books/Software-Testing-A-Craftsman-s- Approach-Fourth- Edition-Paul-C-Jorgensen.pdf

## 24CMIT22 PROGRAMMING IN PYTHON WITH DJANGO

| L | T | P | O | C |
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### COURSE OBJECTIVES:

To describe the core syntax of python programming language. To discover the need for working with the strings and functions. To illustrate the process of structuring the data using lists, dictionaries, tuples and sets. To understand the basic theory underlying web technologies. To install Django in a development and production environment. To acquire knowledge about the architecture of a Django-based web site in real time.

To understand the utilization of Django models to build an interface with powerful Sqlite database.

### UNIT I - CONTROL STRUCTURES AND OOPS CONCEPTS 12

Python Program Execution Procedure – Statements – Expressions – Flow of Controls – Functions – Numeric Data Types – Sequences – Strings – Tuples – Lists – Dictionaries. Class – Constructors – Object Creation – Inheritance – Overloading. Python arrays, Access the Elements of an array, array methods, Numpy- Modules Overview - Modules Search Path - Import Statement -dir() Function - Executing A Module - Renaming A Module - Python Packages - Packages initialization - Importing modules from a package- Sub Packages.

### UNIT II - ERRORS AND EXCEPTION HANDLING, FILES 12

Errors- Exception Handling: try block, except block and finally block- Files: Opening a File - Closing a File- Reading and Writing a File - File Methods – Renaming and Deleting a File - Built-in file directories in Python.

### UNIT III INTRODUCTION TO DJANGO AND TEMPLATES 12

Installing Django-The MVC framework-Starting a project with Django-Creating an application-Configuring the application- Creating a Django Project-Hello World with Django-Creating our first URL-Creating our first view-Testing our application. Injecting

the data from view to the template-Built-in Tags & filters. Working with Templates Working with Templates Integrating variables in templates-Extending the templates using static files in templates

### UNIT IV DATABASE MODEL USING SQLITE 12

Define models - Creating a simple model - Save a model into a Database - Inserting & Editing Data - Getting a Model data with Query set - Deleting Objects Implementing Foreign key - Extending a model. Define models.

**UNIT V DJANGO ADMIN INTERFACE AND SECURITY** 12

Activating the Admin Interface- Using the Admin Interface - Users, Groups and Permissions-Customizing the Admin Interface's Look and Feel- Customizing the Admin Index Page- When and Why to Use the Admin Interface- Form Processing- Form Validation- Save Form Response. Security in Django: Cross Site Request Forgery (CSRF) protection - SQL injection protection. Real time projects in Django– Evaluation of projects – Doubts and discussions – Assessment.

**Total: 60 Hours**

## COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Interpret the fundamental python syntax and be fluent in the use of python control flow statements and OOPS concepts.

**CO2:** Apply the concept of sets, dictionaries & tuples in python.

**CO3:** Understand the concepts of errors, exception handling.

**CO4:** Explain the concepts of file handling.

**CO5:** Illustrate and Configure Django in a development and production environment.

**CO6:** Make use of Django Models to build an interface with powerful relational databases in realtime.

**CO7:** Design a form to automate the validation and verification of data in those forms and implement user authentication and access control using Django sessions.

**CO8:** Apply the Concept to a real-world problem to implement, maintain, and manage complete e-commerce, publishing, and other content-management systems using Django.

***Text Books:***


1. Gowrishanker and Veena, (2019 ), Introduction to Python Programming, CRC Press,.
2. Kameron Hussain,Frahaan Hussain(2023) ,Django Unleashed : Building Web Applications with Python's Framework, 1st Edition,Sonar Publishing.
3. Aidas Bendoraitis and Jake Kronika(2020),Django 3 Web Development Cookbook: Actionable solutions to common problems in Python web development, 4th Edition, Packt Publishing.


***Reference Books:***


1. Leo Chin and Tanmay Dutta, (2016), NumPy Essentials,1st Edition, Packt Publishing..
2. Leonardo Luis Lazzaro(2024), Ultimate Django for Web App Development Using Python: Build Modern, Reliable and Scalable Production-Grade Web Applications with Django and Python, First Edition, Orange Education Pvt Ltd

3. Allen B. Downey(2016), Think Python: How to Think Like a Computer Scientist, Second Edition, Green Tea Press.
4. Dr. Charles Russell Severance (2016),Python for Everybody: Exploring Data in Python 3, Create Space Publishing.

***Web Sources:***

1. https://www.javatpoint.com/python- programs.
2. https://www.datacamp.com/community/tutorials/mysql-python
3.https://django-book-new.readthedocs.io/en/latest4.

## 24CMIT23 CRYPTOGRAPHY AND NETWORK SECURITY

| L | T | P | O | C |
|---|---|---|---|---|
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### COURSE OBJECTIVES:

To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes. To familiarize Digital Signature Standard and provide solutions for their issues.

To familiarize with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message.

### UNIT I – INTRODUCTION 12

Security trends, The OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Network security. Classical Encryption Techniques: Symmetric Cipher Modes, Substitute Techniques, Transposition Techniques, Rotor Machines, Stenography.

### UNIT II - BLOCK CIPHER AND DATA ENCRYPTION STANDARDS 12

Block Cipher Principles, Data Encryption Standards, the Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles. Advanced Encryption Standards: Evaluation Criteria for AES, the AES Cipher. More On Symmetric Ciphers: Multiple Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4. Introduction To Number Theory: Prime Numbers, Fermat’s and Euler’s Theorem, Testing for Primality, The Chinese Remainder Theorem, Discrete logarithms.

### UNIT III PUBLIC KEY CRYPTOGRAPHY AND RSA 12

Principles Public key crypto Systems, Diffie Hellman Key Exchange, the RSA algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography. Message Authentication And Hash Functions: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs. Hash And Mac Algorithm:Secure Hash Algorithm,Whirlpool, HMAC, CMAC. Digital Signature: Digital Signature, Authentication Protocol, Digital Signature Standard.

### UNIT IV AUTHENTICATION APPLICATION 12

Kerberos, X.509 Authentication Service, Public Key Infrastructure. EMAIL ECURITY: Pretty Good Privacy (PGP) and S/MIME. IP SECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT V NETWORK SECURITY** **12**

**Firewalls - Firewall Design principles, Trusted Systems - IP Security – VPN - Intrusion Detection - Viruses and related threats - Web Security – SSL – TLS.**

**Total: 60 Hours**

## COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Identify basic security attacks and services

**CO2:** Use symmetric and asymmetric key algorithms for cryptography

**CO3:** Design a security solution for a given application

**CO4:** Analyze Key Management techniques and importance of number Theory.

**CO5:** Understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.

**CO6:** To examine the issues and structure of Authentication Service and Electronic Mail Security

**CO7:** Understand network security concepts and study different Web security mechanisms.

**CO8:** Understand authentication requirements and study various authentication mechanisms.

***Text Books:***

1. William Stallings (2006), Cryptography and Network Security: Principles and Practice, 4th Edition, Pearson Education, India.
2. William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education, India.

***Reference Books:***

1. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall of India, New Delhi.
2. Atul Kahate (2008), Cryptography and Network Security, 2nd edition, Tata Mc Graw hill, India.
3. Robert Bragg, Mark Rhodes (2004), Network Security: The complete reference, Tata McGraw hill, India.

***Web Sources:***

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-857-network-and-computer-security-spring-2014/index.htm
2. https://nptel.ac.in/courses/106105031/
3. https://medium.com/analytics-vidhya/cryptography-in-data-security-cf610303fd46

4. https://www.jaroeducation.com/blog/difference-between-cryptography-and-network- security/

## 24CMIT24 ADVANCED OPERATING SYSTEM

| L | T | P | O | C |
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| 4 | 0 | 0 | 2 | 4 |

### COURSE OBJECTIVES:

To study the characteristics of OS for Multiprocessor and Multicomputer. To learn the issues related to designing OS. To learn the latest trends in building Mobile OS.

### UNIT I – MULTIPROCESSOR OPERATING SYSTEMS 12

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

### UNIT II - DISTRIBUTED OPERATING SYSTEMS 12

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

### UNIT III FILE SYSTEMS 12

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

### UNIT IV DATABASE OPERATING SYSTEMS 12

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

### UNIT V MOBILE OPERATING SYSTEMS 12

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

**Total: 60 Hours**

### COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Know the advanced concepts in OS

**CO2:** Design an OS for multiprocessor system

**CO3:** Develop OS for distributed systems

**CO4:** Analyze the memory and file system in distributed environment.

**CO5:** Address the issues related to Synchronization and Concurrency control

**CO6:** Understand Mobile OS Architectures

**CO7:** Develop modules for mobile devices.

***Text Books:***

1. M Singhal and NG Shivaratri(2001), Advanced Concepts in Operating Systems, Tata McGraw Hill Inc.
2. A S Tanenbaum(2001), Distributed Operating Systems, Pearson Education Asia.

***Web Resources***

1. https://www.javatpoint.com/distributed-operating-system
2. https://nptel.ac.in/courses/106106147
3. https://www.javatpoint.com/mobile-operating-system

| L | T | P | O | C |
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## 24PMIT21 SOFTWARE TESTING LAB

### COURSE OBJECTIVES:

To understand the basics of software testing. To learn how to do the testing and planning effectively. To build test cases and execute them

### APPLICATIONS

Write a program for

1. Preparing SRS document for Online Ticket Booking System
2. Creating a Test Case using Boundary Value Analysis Method
3. Creating a Test Case and Test Matrix to check Cyclomatic Complexity using Path Coverage Method.
4. Creating a Test Case using Equivalence class partitioning.
5. Performing black box testing of given programs using boundary value analysis (BVA)
6. Performing white box testing of given programs using branch coverage method.
7. Performing white box testing of given programs using path coverage method.
8. Performing white box testing of given programs using condition coverage method
9. Testing a given program using Equivalence Class Partitioning.

**Total: 30 Hours**

### COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO-1:** Prepare SRS document for testing.

**CO-2:** Design Test planning and different activities involved in test planning.

**CO-3:** Design effective test cases that can uncover critical defects in the application.

**CO-4:** Perform Black Box testing using Boundary Value Analysis.

**CO-5:** Perform White Box testing using Path Coverage Method.

**CO-6:** Test a given program using Equivalence Class Partitioning.

***Web Sources***

1. https://www.guru99.com/testers-write-code.html
2. https://www.browserstack.com/guide/code-based-testing
3. https://www.javatpoint.com/software-testing-tutorial

| L | T | P | O | C |
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## 21PMIT22 PROGRAMMING IN PYTHON USING DJANGO LAB

### COURSE OBJECTIVES:

To introduce to write programs using basic concepts of python programming. To practice the student to write simple programs using function. To improve the logical thinking in python programming. To develop the web application using Django. To demonstrate the CRUD operation with SQLite database using Django.

### APPLICATIONS

Write a program for

1. Editing and executing Programs involving Flow Controls.
2. Editing and executing Programs involving Functions.
3. Program in String Manipulations.
4. Creating and manipulating a Tuple.
5. Creating and manipulating a List.
6. Creating and manipulating a Dictionary.
7. Object Creation and Usage.
8. Program involving Inheritance.
9. Program involving Overloading.
10. Reading and Writing with Text Files and Binary Files.
11. Installing Django and create a first web application.
12. Create a simple web application using view and template in Django.
13. Develop a web application using admin interface.
14. Create a Django web application using back end as sqlite and perform CRUD operation in the data base.
15. Create an ecommerce web application using Django

**Total: 30 Hours**

### COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Develop the program using fundamental python syntax and be fluent in the use of control flow statements as well as OOPS concepts.

**CO2:** Apply the concept of sets, dictionaries & tuples in python and demonstrate the program.

**CO3:** Create the program using the concepts of errors, exception handling.

**CO4:** Develop the programs using file handling.

**CO5:** Configure the Django in a development production environment.

**CO6:** Make use of Django Models to build an interface with powerful relational databases in realtime.

**CO7:** Design a form to automate the validation and verification of data in those forms and implement user authentication and access control using Django sessions.

**CO8:** Apply the Concept and build a real-world problem to implement, maintain, and manage complete e-commerce, publishing, and other content-management systems using Django.

# DISCIPLINE SPECIFIC ELECTIVES

DSE-I

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## 24DMIT11 OBJECT ORIENTED SOFTWARE ENGINEERING

### COURSE OBJECTIVES:

To understand software process and Agile process. To be familiar with software project development process. To develop software project using Devops.

### UNIT I – SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process-Case Study.

### UNIT II - REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram- CASE TOOLS.

### UNIT III SOFTWARE DESIGN 9

Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Model-view-controller – Publish-subscribe – Adapter – Command – Strategy – Observer – Proxy – Facade – Architectural styles – Layered – Client Server – Tiered Pipe and filter- User interface design-Case Study.

### UNIT IV SOFTWARE TESTING AND MAINTENANCE 9

Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging – Program analysis – Symbolic execution – Model Checking-Case Study.

### UNIT V PROJECT MANAGEMENT 9

Software Project Management- Software Configuration Management – Project Scheduling- DevOps: Motivation-Cloud as a platform-Operations- Deployment Pipeline: Overall Architecture Building and Testing-Deployment- Tools- Case Study.

**Total: 45 Hours**

## COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Compare various Software Development Lifecycle Models

**CO2:** Evaluate project management approaches as well as cost and schedule estimation strategies.

**CO3:** Perform formal analysis on specifications.

**CO4:** Use UML diagrams for analysis and design.

**CO5:** Architect and design using architectural styles and design patterns.

**CO6:** Test the system with different techniques and tools.

**CO7:** Understand Devops tools.

**CO8:** Design cloud architecture and deployment.

### *Text Books:*


1. Bernd Bruegge and Allen H. Dutoit(2009), Object-Oriented Software Engineering: Using UML, Patterns and Java, Third Edition, Pearson Education.
2. Roger S.Pressman(2014),Object-Oriented Software Engineering: An Agile Unified Methodology, First Edition, Mc Graw-Hill International Edition.


### *Reference Books:*


1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli(2010), Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd.
2. Craig Larman(2005), Applying UML and Patterns, 3rd ed, Pearson Education.
3. Len Bass, Ingo Weber and Liming Zhu(2016), DevOps: A Software Architect's Perspective, Pearson Education,.
4. Rajib Mall(2009), Fundamentals of Software Engineering, 3rd edition, PHI Learning Pvt. Ltd.
5. Stephen Schach(2010), Object-Oriented and Classical Software Engineering, 8th ed, McGraw- Hill,


### *Web Sources:*


1. https://www.javatpoint.com/software-engineering-object-oriented-design
2. https://www.javatpoint.com/software-engineering-object-oriented-design
3. https://onlinecourses.nptel.ac.in/noc20_cs84/preview
4. https://developer.ibm.com/articles/an-introduction-to-uml/

DSE-II

**24DMIT21 DATA MINING & DATA WAREHOUSING**

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## COURSE OBJECTIVE:

To understand the principles of Data warehousing and Data Mining. To be familiar with the Data warehouse architecture and its Implementation. To know the Architecture of a Data Mining system. To understand the various Data preprocessing Methods. To perform classification and prediction of data.

## UNIT I – INTRODUCTION 9

Data mining – Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- Architecture Of A Typical Data Mining Systems. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

## UNIT II – CLASSIFICATION 9

Introduction to Classification- Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines –
Associative Classification – Lazy Learners – Other Classification Methods.

## UNIT III – PREDICTION 9

Introduction to Prediction- Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Regression Analysis - Model Section.

## UNIT IV MINING OBJECT, SPATIAL, MULTIMEDIA, TEXT AND WEB DATA 9

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

**UNIT V DATA WAREHOUSING** 9

Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

**Total: 45 Hours**

## COURSE OUTCOMES:

**On Completion of this course, the students will be able to**

**CO1:** Analyze different classification & clustering techniques.

**CO2:** Understand steps involved in data mining.

**CO3:** Understand the basic functionalities & issues of data mining.

**CO4:** Understand the basic components & benefits of Data Warehousing.

**CO5:** Understand the concept of OLAP tools.

**CO6:** Understand the functionality of the various data mining and data warehousing component.

**CO7:** Compare different approaches of data ware housing and data mining with various technologies.

**CO8:** Describe different methodologies used in data mining and data ware housing.

***Text Books:***


1. Jiawei Han and MichelineKamber(2012), Data Mining Concepts and Techniques, Third Edition, Elsevie.
2. Alex Berson and Stephen J.Smith(2016), Data Warehousing, Data Mining & OLAP, 35th Reprint Tata McGraw – Hill Edition.


***Reference Books:***


1. Alex Berson and Stephen J. Smith(2007),Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, Tenth Reprint.
2. K.P. Soman, Shyam Diwakar and V. Ajay(2006),Insight into Data mining Theory and Practice, Easter Economy Edition, Prentice Hall of India.
3. G. K. Gupta(2006),Introduction to Data Mining with Case Studies, Easter Economy Edition, Prentice Hall of India,.
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar(2007), Introduction to Data Mining, Pearson Education.

***WebSites:***

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.geeksforgeeks.org

***Web Sources:***

1. https://lecturenotes.in/subject/32/data-mining-and-data-warehousing-dmdw/note
2. https://www.smartzworld.com/notes/data-warehousing-and-data-mining-pdf-notes-dwdm

DSE-III

## 24DMIT31 NATURAL LANGUAGE PROCESSING

| L | T | P | O | C |
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| 3 | 0 | 0 | 2 | 3 |

### COURSE OBJECTIVES:

To learn the fundamentals of natural language processing. To understand the use of CFG and PCFG in NLP. To understand the role of semantics of sentences and pragmatics. To apply the NLP techniques to IR application.

### UNIT I – INTRODUCTION 9

Origins and challenges of NLP – Language Modelling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules-Tokenization, -Detecting and Correcting Spelling Errors-Minimum Edit Distance.

### UNIT II – WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of Speech Tagging-Rule-based-Stochastic and Transformation-based tagging- Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

### UNIT III – SYNTACTIC ANALYSIS 9

Concept of Grammars, Chomsky hierarchy of grammars,-concept of parsing, top-down parsing, bottom up parsing, bidirectional parsing-generating parse tree-data structures and algorithms used for parsing-tokenizer-Case study of parsers of NLP systems like ELIZA, LUNAR.

### UNIT IV SEMANTIC ANALYSIS 9

Understanding meaning-CASE grammars-transformational grammars used for performing semantic analysis. Resolving ambiguities to generate correct meaning-Word Sense Disambiguation -Case study of Toolkit of word sense disambiguation used in WORDNET.

**UNIT V SOFTWARE TOOLS FOR PERFORMING NLP** **9**

English WORDNET-components of WorldNet-understanding NLTK tool for using wordnet- HINDI wordnet-Indian Govt initiative for language analysis and machine translation.

**Total: 45 Hours**

**COURSE OUTCOMES:**

**On Completion of this course, the students will be able to**

**CO1:** To tag a given text with basic Language features

**CO2:** To understand and Compare different parsing methods.

**CO3:** To design an innovative application using NLP components.

**CO4:** To implement a rule based system to tackle morphology/syntax of a language.

**CO5:** To design a tag set to be used for statistical processing.

**CO6:** Use grammars for Semantic Analysis

**CO7:** To compare and contrast the use of different statistical approaches or different types of NLP applications.

***Text Books:***


1. Allen,James(1995), Natural Language Understanding, Second Edition, Benjamin/ Cumming.
2. Jurafsky, Danand Martin, James(2008),Speech and Language Processing, Second Edition, Prentice Hall.
3. Ela Kumar(2014), " Natural Language Processing", second edition ,IK international Publication,


***Reference Books:***


1. Bharati Akshar, Chaitanya Vineet, Sangal, Rajeev(1995), Natural Language Processing: A Paninian Perspective, EASTERN ECONOMY ed. edition Prentice Hall India Learning Private Limited;, 1995
2. Philipp Koehn(2009), Statistical Machine Translation, Cambridge University Press; 1st edition,
3. U.S. Tiwari and Tanveer Siddiqui(2008), Natural Language Processing and Information Retrieval, Oxford UniversityPress.


***WebSites:***

1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/nlp1-4.pdf
2. https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing- NLP
3. https://www.cs.jhu.edu/~phi/ai/slides/lecture-natural-language-processing.pdf