# STATE BOARD OF TECHNICAL EDUCATION, BIHAR
## Scheme of Teaching and Examinations for
# IVth SEMESTER DIPLOMA IN COMPUTER SCIENCE & ENGINEERING

### (Effective from Session 2020-21 Batch)

## THEORY

| Sr. No. | SUBJECTS | SUBJECT CODE | TEACHING SCHEME | EXAMINATION – SCHEME | | | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per Week | Hours of Exam. | Teacher's Assessment (TA) Marks (A) | Class Test (CT) Marks (B) | End Semester Exam. (ESE) Marks (C) | Total Marks (A+B+C) | Pass Marks ESE | Pass Marks in the Subject | |
| 1. | Operating System | 2018401 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 2. | Database Management System | 2018402 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 3. | Data Structure & Algo. Using C | 2018403 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 4. | Python Programming | 2018404 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 5. | Computer Graphics | 2018405 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| | | | Total: - 15 | | | | 350 | 500 | | | 15 |

## PRACTICAL

| Sr. No. | SUBJECTS | SUBJECT CODE | TEACHING SCHEME | EXAMINATION – SCHEME | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per Week | Hours of Exam. | Practical (ESE) | | Total Marks (A+B) | Pass Marks in the Subject | |
| | | | | | Internal (A) | External (B) | | | |
| 6. | Database Management System (LAB) | 2018406 | 04 50% Physical 50% Virtual | 03 | 15 | 35 | 50 | 20 | 02 |
| 7. | Data Structure & Algo. Using C (LAB) | 2018407 | 04 50% Physical 50% Virtual | 03 | 15 | 35 | 50 | 20 | 02 |
| 8. | Python Programming (LAB) | 2018408 | 04 50% Physical 50% Virtual | 03 | 15 | 35 | 50 | 20 | 02 |
| | | | Total: - 12 | | | | 150 | | 06 |

## TERM WORK

| Sr. No. | SUBJECTS | SUBJECT CODE | TEACHING SCHEME | EXAMINATION – SCHEME | | | | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Marks of Internal Examiner (X) | Marks of External Examiner (Y) | Total Marks (X+Y) | Pass Marks in the Subject | |
| 9. | MOOCs / SWAYAM / SPOKEN TUTORIAL / Others (T.W) | 2018409 | 04 | 15 | 35 | 50 | 20 | 02 |
| 10. | Operating System (Case Study Linux) (T.W) | 2018410 | 02 | 15 | 35 | 50 | 20 | 01 |
| | | | Total: - 06 | | | 100 | | 03 |
| Total Periods per week Each of duration one Hours = 33 | | | | | | Total Marks = 750 | | 24 |

# OPERATING SYSTEM

| SUBJECT CODE: 2018401 | Theory | | | No. of period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 100 | 03 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | - | - | T. A | : | 10 | |
| | | | | C.T | : | 20 | |

## Course Learning Objective:

The course provides the students with an understanding of human computer interface existing in computer system and the basic concepts of operating system and its working. Further, good working knowledge to work in Windows and Unix environments is provided by this course.

## Objective:

The objectives of this course are to make the students able to

1. To teach the requirement of Operating System in Computers.

2. To teach Windows Operating System and to make familiar with special features of Windows Operating System.

3. To teach multi-user Operating System Unix Operating System and Unix File Structure.

| Contents: Theory | | Hrs. | Marks |
|---|---|---|---|
| **Unit – 1** | **Introduction to operating system:**<br><br>An Introduction to O.S & its services, Evolution of O.S, various types of O.S, Batch Processing, Multiprogramming, Multiprocessing, Multitasking, Operation system structure. Concepts of: Process – files – system calls – Interrupt – shell. Introduction to Unix, Shell commands. | [8] | |
| **Unit – 2** | **Process Management:**<br><br>An Introduction to process, process state & Transition, Process control Block, Process Context, Context switch. | [6] | |
| **Unit – 3** | **Process Scheduling:**<br><br>(Pre-emptive & Non-pre-emptive Algorithms), FCFS (First Come First Served) Algorithm, Shortest Job First, Priority Scheduling, Round Robin Scheduling.<br>Performance criteria of scheduling Algorithm, CPU utilization, throughput, Turnaround time, waiting time, Response time.<br>Overview of: Inter-process communication – Race condition critical section, Semaphores. | [10] | |

| Unit | | Topic | Hours | |
|---|---|---|---|---|
| **Unit – 4** | | **Deadlock:**<br><br>Introduction to Deadlock, Necessary condition for Deadlock, Method for Handling Deadlock, Brief overview of Deadlock prevention, Deadlock Avoidance (Banker's Algorithm), Deadlock Detection & Recovery. | [8] | |
| **Unit – 5** | | **Memory Management:**<br><br>Introduction to Memory management, Contiguous allocation, Fixed Partition, Dynamic partition, Non-contiguous allocation – paging, segmentation.<br>Introduction to Virtual-memory management – Demand paging, Cop-on-write, page replacement, Allocation of frames, Thrashing. | [10] | |
| **Unit – 6** | | **Files and protection:**<br><br>Introduction to file systems – File system design, Access methods – sequential, Direct, Swapping, File allocation methods<br>OS-security: Authentication, Access control, Access Rights, System logs, Protection. | [8] | |

**Books /Reference Books :-**

1. Operating Systems-Concept and Design, McGraw-Hill Milan Milenkovic international Edition-Computer Science Series, 1992
2. An introduction to Operating Systems, Addition-Wesley Harvey M. Deitel
   Publishing Company, 1984.
3. Operating System Concepts, Addition-Wesley Publishing James L. Paterson, Abraham Company, 1989. Silberschatz
4. Modern Operating Systems, Prentice-Hall of India Private Andrew S. Tanenbaum Ltd., 1995.
5. Microsoft Windows Manual
6. First Course in Computers, Vikash Publishing House Pvt. - Sanjay Saxena Ltd., Jungpura, New Delhi.
7. Operating Systems A Practical approach. S Chand And Company Dr. Rajiv Chopra Limited, Ram Nagar , New Delhi.

# DATABASE MANAGEMENT SYSTEM

| | | Theory | | No. of period in one session: 60 | | | Credits |
|---|---|---|---|---|---|---|---|
| **SUBJECT CODE: 2018402** | No. of Periods per Week | | | Full Marks: | : | 100 | 03 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | - | - | T. A | : | 10 | |
| | | | | C.T | : | 20 | |

## Course Learning Objective:

This subject will allow students to develop understanding of the basic concepts of data in general and Relational Database System in particular. The students will learn Database concept, Data Structure, Data Models, various approaches to Database design, strengths of relational model, Normalization.

## Objective:

- At the end of the course the student will be able to:
- Develop Database System to handle the real-world problem.
- Understand Database design and normalization techniques.
- Use Standard Query Language and its various versions.
- Understand Importance

| Contents: Theory | | Hrs. | Marks |
|---|---|---|---|
| **Unit – 1** | **An Overview of the Database Management System:** <br> What is database? Why database? Database system, Database management system (DBMS), advantage of DBMS. | [5] | |
| **Unit – 2** | **An Architecture of the Database system:** <br> Three level of architecture, logical view, physical view, conceptual view, logical data independence, physical data independence. | [7] | |
| **Unit – 3** | **Relational Database Management System (RDBMS):** <br> Introduction, RDBMS terminology, relational model, base tables, keys, primary key, foreign key, constraints, code rules. | [8] | |
| **Unit – 4** | **Database Design:** <br> Normalization Normal forms – 1NF , 2NF , 3NF , BCNF , 4NF , and 5NF, E-R Diagram , Mapping E-R diagram to database tables. | [10] | |
| **Unit – 5** | **MariaDB:** <br> Introduction to MariaDB, Data types, SQL commands, Create, insert, update, delete, drop, alter, SQL function (string function, date function ), indexing , Key , primary key , foreign key. | [8] | |

| | | | |
|---|---|---|---|
| **Unit – 6** | **Manipulating Data with MariaDB:**<br><br>SQL statements, select, like clause , group-by , order-by , joins-left join, natural join , right join , union , correlated and nested queries , Backup & restore. | [8] | |
| **Unit – 7** | **NoSQL Database Technology:**<br><br>Introduction to NoSQL database, Difference between relational & NoSQL database, NoSQL features, types, advantage, Architecture of MongoDB, documents, collections, dynamic schemas, Mongo shell, Mongo sever & client, data types, embedded documents, creating configuration file for Mongo. | [8] | |
| **Unit – 8** | **Selecting the Right Database:**<br><br>Selecting of right database, RDBMS or NoSQL, selection of database based on performance, data size, type of data, frequency of accessing data, business needs, type of application. | [6] | |

**Books /Reference Books: -**

1. Database Management Systems, First Edition, 2002, Vikas Publishing

House- A. Leon & M. Leon

2. Fundamentals of Database Systems, Third Edition, 2000, Addison Wesley-

R. Elmasri, S. Navathe

3. Database System Concepts, Third Edition, 1997, McGraw-Hill Internation-

H. Korth, A. Silberschatz

4. An Introduction to Database Systems, Galgotia Publication-  B. Desai


5. Database Processing: Fundamentals, Design Implementation, Prentice Hall of

-D.K. Kroenke India.

6  Database Management Systems, First Edition, 1996, McGraw Hill  -  P.

Bhattacharya and A.K. Majumdar

7   Database System Concepts, Fourth Edition, 1997, Tata McGraw Hill -

Abraham Silberschtz, Henry Korth & S. Sudarshan

# DATA STRUCTURE & ALGORITHMS USING "C"

| SUBJECT CODE: 2018403 | Theory | | | No. of period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 100 | 03 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | - | - | T. A | : | 10 | |
| | | | | C.T | : | 20 | |

**Course Learning Objective:**

Data Structure is a subject which deals with data and their structures. In system programming, application programming, the method and techniques of data structures are widely used. This study of data structure helps the students in developing logic & structured programs.

**Objective:**

After completion of this course student will be able to: -

- Understand and use the process of abstraction using a programming language such as 'C'.
- Analyze step by step and develop algorithm to solve real world problems.
- Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs
- Understanding various searching & sorting techniques

| | **CONTENTS: Theory** | Hrs. | Marks |
|---|---|---|---|
| **UNIT – 01** | **Introduction to Data Structure: -**<br><br>Data & Information, Concept and Need of DS, Abstract Data Type. Types of Data Structure: Linear & Non-linear. Algorithm Complexity: Time & Space. Operation on Data Structure: | [08] | |
| **UNIT – 02** | **Searching & Sorting: -**<br><br>Searching: Implementation of Different searching algorithm. Sorting: Implementation of Different Sorting algorithm. | [08] | |
| **UNIT – 03** | **Stacks & Queues: -**<br><br>Stack: Introduction to Stack: Stack Operation Conditions: Application of Stack: Infix- to-Postfix Transformation Evaluation Postfix.<br>Introduction to Queue, Dequeue: Array Representation of Queue; Operation on Queue: Types of Queues: Linear Queue Circular Queue, Priority Queue, Application of Queue. | [10] | |

| | | | |
|---|---|---|---|
| **UNIT – 04** | **Linked List: -**<br><br>Introduction to Linked List Terminology: Node, Address, Pointer, Data field and Next Pointer, Empty List.<br>Types of Lists: Singly Linked List, Doubly Link list, Circular Linked List.<br>Operation on Linked List: | [10] | |
| **UNIT – 05** | **Trees and Graphs: -**<br><br>Introduction to Trees: Basic Terminology: Tree, Degree of a Node and Tree, Level of Node, Leaf Node, Depth & Height of a Tree; Type of Tree.<br>Introduction to Binary Tree (BT): Operation on BT: Insertion, Deletion, Searching, and traversing the Tree (Pre-order, Post order, In order); Application of BT.<br>Introduction to Binary Search Tree (BST): Operation on BT: Insertion, Deletion, Finding Min-Max Element, Sorting Element;<br>Introduction to AVL Tree: Insertion, Deletion;<br>Intrusions to Graph basic terminology:<br>Adjacency List, Adjacency Matrix. | [14] | |

**Books Recommended: -**

1. Data Structure Using C and C++, Second Addition, 2000,

- Y. Langsam, M. **J.** Augustein and A. M. Tanebaum Prentice Hall of India.

2. Data Structure Using C and C++, Second Addition, 2000,

- R. Kruse, C. L. Tonodo and B. Leung Prentice Hall of India.

3. Data Structure through "C" Language, First Edition, 2001,

- S.Chottopadhyay, D. Ghoshdastidar & M.Chottopadhyay BPB Publication

4. Data Structures, Algorithms and Object Oriented   -   G. L. Heileman

5. Programming, First Edition, 2002, Tata McGraw Hill

6. Fundamental of Data Structures in C++, 2002, Galgotia

- E. Horowitz, Salmi and D. Mehta Publication 2002

# PYTHON PROGRAMMING

| SUBJECT CODE: 2018404 | **Theory** | | | No. of period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 100 | **03** |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | - | - | T. A | : | 10 | |
| | | | | C.T | : | 20 | |

**Course Learning Objective:**

- In this course, you will develop simple command-line programs in Python. You will:
- Set up Python and develop a simple application.
- Declare and perform operations on simple data types, including strings, numbers, and dates.
- Declare and perform operations on data structures, including lists, ranges, tuples, dictionaries, and sets.
- Write conditional statements and loops.
- Define and use functions, classes, and modules.
- Manage files and directories through code.
- Deal with exceptions.

| CONTENTS: Theory | | Hrs. | Marks |
|---|---|---|---|
| **UNIT – 01** | **Introduction, Variables and Data Types: -** <br> History, Features., Setting up path, Installation and Working with Python. <br> Basic Syntax, Understanding Python variables, Numeric data types. <br> Using string data type and string operations, Basic Operators, Understanding coding blocks. <br> Defining list and list slicing, Other Data Types- Tuples. <br> List, Python Dictionary, Arrays, Associative Arrays/Hashes. | [08] | |
| **UNIT – 02** | **Control Structures: -** <br> Conditional blocks using if, else and else if. <br> For loops and iterations. <br> while loops, Loop manipulation using continue break and else (and pass in Python). <br> Programming using conditional and loops block. | [10] | |
| **UNIT – 03** | **Functions, Modules and Packages: -** <br><br> Organizing Python codes using functions. <br> Organizing Python projects into modules. <br> Importing own module as well as external modules. <br> Understanding Packages. | [10] | |

| | | | | |
|---|---|---|---|---|
| **UNIT – 04** | **File I/O, Text Processing, Regular Expressions: -**<br><br>Understanding read functions.<br>Understanding write functions.<br>Programming using file operations.<br>Powerful pattern matching and searching.<br>Power of pattern searching using regex. | [10] | |
| **UNIT – 05** | **Frameworks: -**<br><br>Frameworks - Web2Py, Django (any one of these or any other). | [12] | |

**Books Recommended: -**
1. Let Us Python second edition by Yashavant Kanetkar and Aditya Kanetkar

2. 'O' LEVEL made simple MODULE-3 Programming and Problem solving Through 'Python' Language by Satish Jain & Shashi Singh

# COMPUTER GRAPHICS

| SUBJECT CODE: 2018405 | Theory | | | No. of period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 100 | 03 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | - | - | T. A | : | 10 | |
| | | | | C.T | : | 20 | |

## Course Learning Objective:

This course will provide an introduction to fundamental concepts in Computer Graphics from a practical perspective. It aims to cover mathematical concepts essential for computer graphics, graphic devices, various algorithms and multimedia systems. Ideally, a student who successfully completed these courses will be familiar with modern methods in computer graphics, with the use of commonly used tools in this area and having knowledge to write algorithms for generating images.

## Objective:

This course is an introduction to computer graphics and provides familiarity with graphics software and hardware systems. The course covers the following concepts:

- Understanding of graphics and its applications.
- The fundamentals of input, display and hardcopy devices, scan conversion of geometric primitives.
- Output primitives.
- Geometric representations.
- Two and Three-dimensional Transformations.
- Windowing and clipping methods.
- Segments.
- Three-dimensional concepts.
- Hidden-element removal.
- Multimedia hardware and applications.

| | CONTENTS: Theory | Hrs. | Marks |
|---|---|---|---|
| **UNIT – 01** | **INTRODUCTION AND APPLICATIONS:** What is CG, Characteristics & Classification of CG Applications: Presentation graphics, painting and drawing, scientific visualization, image processing, digital art, entertainment, CAD in architecture, animation. | [08] | |
| **UNIT – 02** | **Display devices:** Random-scan and raster scan monitors, Colour CRT, Plasma panel displays, LCD Panels Input/ Output Devices. | [08] | |
| **UNIT – 03** | **2 D DRAWING GEOMETRY:** 2D transformation: Use of homogeneous coordinate systems, translation, scaling, rotation, mirror reflection, rotation about an arbitrary point. Interactive techniques: Constraints, Grids, Gravity field, Rubber-band, Dragging, Painting & drawing | [08] | |
| **UNIT – 04** | **CONICS AND CURVES:** | [08] | |

| | | |
|---|---|---|
| | DDA lines circle drawing algorithm, Bresenham's lines circle drawing algorithm, Generation of ellipses, Curve drawing, Parametric representation, need of cubic curves, Drawing cubic Bezier and B-spline curves & their properties. (No derivations needed) | |
| **UNIT – 05** | **Window-port and viewport: -**<br><br>Explicit line clipping algorithm - Sutherland Cohen algorithm, Mid-point sub-division algorithm, Polygon Clipping: Sutherland- Hodgeman algo - Polygon representation, Inside & outside test of Polygon Filling: - Stack based and queue-based seed fill algorithms - Scan line fill algorithm Character generation | [08] |
| **UNIT – 06** | **3 D GRAPHICS: Transformations: -**<br><br>Transformation matrices for translation, scaling and rotation around axis Parallel Projection: Orthographic, Axonometric, Oblique projection with multi views<br><br>Perspective Projection: - Vanishing point: Single – point, Two- point & Three-point Hidden Surface Removal:<br><br>Back face removal | [07] |
| **UNIT – 07** | **ANIMATION:**<br><br>Basics of animation, Types of animation, Types of animation system. Tweaking and Morphing | [03] |

**Books Recommended:**
**Text Books**
 1. Computer Graphics, 2nd Edition 2010 - Udit Agarwal, Katson Publications
 2. Computer Graphics, Second Edition, 1995. - D. Hearn & P.M. Baker Prentice Hall of India

 3. OpenGL Programming Guide, Third Edition, 2000 - Woo, Nelder, Davis, Shreiner
        Pearson Education Asia

 4. Multimedia, Making It Working, Fifth Edition, 2001 - T. Vaughan McGraw Hill
**Reference Books**
1. Fundamentals of Interactive Computer Graphics, Second Edition - J.D. Foley & A. Van Dam Addison Wesley
2. Computer Graphics - A Programming - S. Harrington McGraw Hill Approach International Ed.
3. Multimedia Systems, 2000 - Rajneesh Agrawal & Bharat Bhushan Tiwari, Excel Publications

# DATABASE MANAGEMENT SYSTEM LAB

| SUBJECT CODE: 2018406 | Practical | | | No. of period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 50 | 02 |
| | L | T | P/S | ESE | : | 50 | |
| | - | - | 04 | Internal | : | 15 | |
| | | | | External | : | 35 | |

## Course Objective:

This Lab course is intended to practice whatever is taught in theory class of 'Introduction to DBMS'. A few sample case studies are listed with some suggested activities. More case studies may be added to this list. You need to develop these case studies, apply all relevant concepts learnt in theory class as the course progress, identify activities/operations that may be performed on the database. It will be a good idea to also use concepts learnt in the course on Software Engineering/SSAD.

## Practical Outcomes: After completing the course, the students will understand

(i)     How to design a database, database-based applications
(ii)    How to use a DBMS
(iii)   The critical role of database system in designing several information system-based software systems or applications.

| CONTENTS: Practical | | Hrs. | Marks |
|---|---|---|---|
| UNIT – 01 | Know installation of Oracle / MY SQL / Mongo DB | [05] | |
| UNIT – 02 | Exercise on creating tables, Exercise on inserting records, Exercise on updating records | [04] | |
| UNIT – 03 | Exercise on modifying the structure of the table | [03] | |
| UNIT – 04 | Exercise on Select command | [03] | |
| UNIT – 05 | Exercise on querying the table using clauses like WHERE, ORDER, IN, AND, OR, NOT | [03] | |
| UNIT – 06 | Exercise on various group functions | [03] | |
| UNIT – 07 | Exercise on Number functions, character functions, conversion functions and date functions | [03] | |
| UNIT – 08 | Exercise on set operators | [03] | |
| UNIT – 09 | Exercise on sub queries | [03] | |
| UNIT – 10 | Exercise on Joins | [03] | |
| UNIT – 11 | Exercise on various date and number format models | [03] | |
| UNIT – 12 | Exercise on creating tables with integrity constraints | [03] | |
| UNIT – 13 | Exercise on Creation and Dropping of Database | [04] | |
| UNIT – 14 | Exercise on Creation and Dropping of Collections. | [04] | |
| UNIT – 15 | Exercise on Commands of MongoDB- Insert, update, find, delete and sorting of Documents. | [03] | |

**Reference Book:**

1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education
2. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw- Hill, Delhi, India.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw- Hill, New Delhi, India.

4. Introduction to Database Systems, C.J.Date, Pearson Education
5. Introduction to SQL, Rick F.Vander Lans, Pearson Education

# DATA STRUCTURE & ALGORITHM USING C (LAB)

| SUBJECT CODE: 2018407 | Practical | | | No. of period in one session: | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 50 | |
| | L | T | P/S | ESE | : | 50 | |
| | - | - | 04 | Internal | : | 15 | 02 |
| | | | | External | : | 35 | |

Course Objective:

Implement relevant algorithms using Data structure.

**Practical Outcomes: After completing the course, the students will understand**

(1) Perform basic operations on array.
(2) Apply different searching and sorting techniques.
(3) Implement basic operations on stack and queue using array representation

| | **CONTENTS: Practical** | Hrs. | Marks |
|---|---|---|---|
| **UNIT – 01** | Develop a 'C' program to create and implement a SINGLY LINKED LIST. Write functions to insert, delete, and display elements of the list. | [04] | |
| **UNIT – 02** | Develop a 'C' program to create and implement a SINGLY CIRCULAR LINKEDLIST. | [04] | |
| **UNIT – 03** | Develop a 'C' program to create and implement a STACK using arrays. | [03] | |
| **UNIT – 04** | Develop a 'C' program to create and implement a STACK using linked lists. | [03] | |
| **UNIT – 05** | Develop a 'C' program to create and implement a QUEUE using arrays. | [03] | |
| **UNIT – 06** | Develop a 'C' program to create and implement a QUEUE using linked lists. | [04] | |
| **UNIT – 07** | Develop a 'C' program to create and implement a CIRCULAR QUEUE using arrays. | [03] | |
| **UNIT – 08** | Develop a 'C' program to create a BINARY TREE. Write functions to perform the various traversals on the tree. | [03] | |
| **UNIT – 09** | Develop a 'C' program to create a BINARY SEARCH TREE. Write functions to perform the various traversals on the tree. | [04] | |
| **UNIT – 10** | Develop a 'C' program to create and implement SELECTION SORTING. | [03] | |
| **UNIT – 11** | Develop a 'C' program to create and implement INSERTION SORTING. | [03] | |
| **UNIT – 12** | Develop a 'C' program to create and implement BUBBLE SORTING. | [03] | |
| **UNIT – 13** | Develop a 'C' program to create and implement MERGE SORTING on two sortedlist. | [04] | |
| **UNIT – 14** | Develop a 'C' program to create and implement LINEAR SEARCHING. | [03] | |
| **UNIT – 15** | Develop a 'C' program to create and implement BINARY SEARCHING | [03] | |

Reference Book:

1. Data Structure Using 'C', Balaguruswami, mcGraw Hill Education, 2013
2. Data Structure Using 'C', Lipschutz, mcGraw Hill Education, 2013
3. Data Structure Using 'C',ISRD , mcGraw Hill Education, 2013
4. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing House
5. Data Structure and Algorithms, narasimha karumanchi, Made Easy

# PYTHON PROGRAMMING (LAB)

| SUBJECT CODE: 2018408 | Practical | | | No. of period in one session: 45 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 50 | |
| | L | T | P/S | ESE | : | 50 | |
| | - | - | 04 | Internal | : | 15 | 02 |
| | | | | External | : | 35 | |

## Course Objective:

**1**. To make the student learn python programming language.

2. Learn Syntax and Semantics and create Functions in Python.

3. To learn problem solving techniques.

4. To teach the student to write programs in Python and to solve the problems.

## Practical Outcomes:

**1.** Read, understand and trace the execution of programs written in Python language.

**2.** Write the Python code for a given algorithm.

**3.** Define and demonstrate the use of built-in data structures "lists" and "dictionary".

**4.** Design and implement a program to solve a real-world problem.

| CONTENTS: Practical | | Hrs. | Marks |
|---|---|---|---|
| **UNIT – 01** | Write a program to demonstrate basic data type in python. | [6] | |
| **UNIT – 02** | Write a program to compute distance between two points taking input from the user (Pythagorean Theorem) | [4] | |
| **UNIT – 03** | Write a python program Using for loop, write a program that prints out the decimal equivalent of $1+\frac{1}{2}+1/3\ldots..1/n$ | [4] | |
| **UNIT – 04** | Write a Python program to find first n prime numbers.      Write a program to demonstrate list and tuple in python. | [4] | |
| **UNIT – 05** | Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero. | [4] | |
| **UNIT – 06** | Write a Python Program to add matrices. Write a Python program to multiply matrices. | [4] | |
| **UNIT – 07** | Write a Python program to check if a string is palindrome or not | [4] | |

| | | | |
|---|---|---|---|
| | Write a Python program to Check if a Substring is Present in a Given String | | |
| **UNIT – 08** | Write a Python program to Extract Unique values dictionary values <br> Write a Python program to find the sum of all items in a dictionary | [5] | |
| **UNIT – 09** | Write a Python program to read file word by word <br> Write a Python program to Get number of characters, words, spaces and lines in a file | [5] | |
| **UNIT – 10** | Write a Python program for Linear Search <br> Write a Python program for Binary Search (Recursive and Iterative) | [5] | |

**References Books:**

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House

2. Starting Out with Python, Tony Gaddis, Pearson

3. Core Python Programming, Wesley J. Chun, Prentice Hall

4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University

5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press.

# MOOCS / SWAYAM / SPOKEN TUTORIAL / OTHERS ( T.W)

| SUBJECT CODE: 2018409 | Practical | | | | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 50 | 02 |
| | L | T | P/S | ESE | : | 50 | |
| | - | - | 04 | Internal | : | 15 | |
| | | | | External | : | 35 | |

# OPERATING SYSTEM (Case Study Linux) ( T.W)

| SUBJECT CODE: 2018410 | **Term Work** | | | No. of period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods per Week | | | Full Marks: | : | 50 | 01 |
| | L | T | P/S | ESE | : | 50 | |
| | - | - | 02 | Internal | : | 15 | |
| | | | | External | : | 35 | |

**Course Objective:**

1. To make the student learn python programming language.
2. Learn Syntax and Semantics and create Functions in Python.
3. To learn problem solving techniques.
4. To teach the student to write programs in Python and to solve the problems.

**Practical Outcomes:**

1. Read, understand and trace the execution of programs written in Python language.
2. Write the Python code for a given algorithm.
    3. Define and demonstrate the use of built-in data structures "lists" and "dictionary".
4. Design and implement a program to solve a real-world problem

| | Contents: Term Work | Hrs. | Marks |
|---|---|---|---|
| **Unit-1** | Revision practice of various commands like man, cp, mv, ln, rm, unlink, mkdir, rmdir etc and many more that were learnt in IT Workshop course and later. | [5] | |
| **Unit-2** | Implement two-way process communication using pipes | [5] | |
| **Unit-3** | Implement message queue form of IPC | [5] | |
| **Unit-4** | Implement shared memory and semaphore form of IPC | [5] | |
| **Unit-5** | Simulate the CPU scheduling algorithms-Round Robin, SJF, FCFS, priority | [5] | |
| **Unit-6** | Simulate Bankers algorithm for Deadlock Avoidance and Prevention | [5] | |
| **Unit-7** | Simulate all FIFO Page Replacement Algorithm using C program | [5] | |
| **Unit-8** | Simulate All LRU Page Replacement Algorithms using C program | [5] | |
| **Unit-9** | Simulate Paging Technique of Memory Management | [5] | |
| **Unit-10** | Practice various commands/utilities such as catnl, uniq, tee, pg, comm, cmp, diff, tr, tar, cpio, mount, umount, find, umask, ulimit, sort, grep, egrep, fgrep, cut,paste,join,du,df,ps,who,etc and many more | [5] | |

## Reference Book:

1. Operating System Concepts, Silberschatz, Abraham and Galvin, Peter, Wiley India Limited

2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education
3. Operating System Concepts, Ekta Walia, Khanna Publishing House