



VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Virudhunagar – 626 001.

Course Name : **Bachelor of Science**
Discipline : **Information Technology.**
(For those who join in June 2024 and after)

COURSE OBJECTIVE:

The course is broadly based, covering the areas of IT and Software development, providing a good foundation for a rapidly changing IT industry. In addition to the core area of study, the students are given sufficient exposure to all necessary skill enhancement tools and techniques in the field of IT. With the above intention the students are provided with sufficient laboratory sessions comprising of qualitative experiments in computer programming.

ELIGIBILITY FOR ADMISSION

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Govt. of Tamilnadu or any other Examinations accepted by the syndicate as equivalent there to with Mathematics/Computer Science as one of the Subjects.

Medium of Instruction : English

- i) A candidate shall be eligible for the award of the degree on completion of the prescribed course of study and passing all the prescribed external examinations.
- ii) Attendance, Progress and conduct certification from the head of the department shall be required for taking the external examinations.
- iii) The passing minimum is 40% and a candidate will be declared to have passed.
 - a) In I Class if he / she has obtained 60% and above in the III Part.
 - b) In II Class if he / she has obtained 50% and above in the III Part.
 - c) In III Class if he / she has obtained 40% and above in the III Part.

Ranking will be made for the candidates who have successfully completed the course without any arrears in each semester with the candidates scored the maximum total in III part be put in the I Rank and the minimum total in III Part be put in the last rank.

DURATION OF THE COURSE: Three Years.



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COURSE SCHEME:

I year B.SC. INFORMATION TECHNOLOGY

| Semester | Part | Subject Name | Hours | Credit | Int + Ext =Total | Local | Regional | National | Global | Professional Ethics | Gender | Human Values | Environment & Sustainability | Employability | Entrepreneurship | Skill Development | Subject Code | Revised / New / No Change / Interchanged & Percentage of Revision |
|-----------|--------------|---|-------|-----------|------------------|-------|----------|----------|--------|---------------------|--------|--------------|------------------------------|---------------|------------------|-------------------|---|---|
| I | Part 1 | Tamil | 6 | 3 | 25+75=100 | | | | | | | | | | | | U24PT11 | New |
| | Part 2 | English | 6 | 3 | 25+75=100 | | | | | | | | | | | | U23PE11 | No Change |
| | Core 1 | Programming in C | 5 | 5 | 25+75=100 | | | | ✓ | | | | | ✓ | | | U24NTC11 | Credit Change |
| | Core 2 | Lab: Programming in C | 5 | 3 | 40+60=100 | | | | ✓ | | | | | ✓ | | | U24NTCP11 | Revised 30% |
| | Allied | Mathematical Foundation | 4 | 3 | 25+75=100 | | | | ✓ | | | | | | ✓ | | U24MAAN11 | New |
| | SBS1 | Lab: HTML and SASS | 2 | 2 | 40+60=100 | | | | ✓ | | | | | ✓ | | ✓ | U24NTSP11 | New |
| | SBS2 | Digital Principles | 2 | 2 | 25+75=100 | | | | ✓ | | | | | | ✓ | | U24NTS11 | New |
| | Total | | | 30 | 21 | | | | | | | | | | | | | |
| II | Part 1 | Tamil | 6 | 3 | 25+75=100 | | | | | | | | | | | | U24PT21 | New |
| | Part 2 | English | 6 | 3 | 25+75=100 | | | | | | | | | | | | U23PE21 | No Change |
| | Core 3 | Python Programming | 5 | 5 | 25+75=100 | | | | ✓ | | | | | ✓ | | ✓ | U24NTC21 | Sem Changed and Revised 25% |
| | Core 4 | Lab: Python Programming | 6 | 3 | 40+60=100 | | | | ✓ | | | | | ✓ | | ✓ | U24NTCP21 | Sem Changed and Revised 15% |
| | Elective 1 | Data Structures/ Mobile Computing/ Computer Graphics | 5 | 4 | 25+75=100 | | | | ✓ | | | | | ✓ | | ✓ | U24NTE21/ U24NTE22/ U24NTE23 | Revised 5%/ New/ New |
| | SBS3 | Lab: Data Structures | 2 | 2 | 40+60=100 | | | | ✓ | | | | | ✓ | | ✓ | U24NTSP21 | New |
| | Total | | | 30 | 20 | | | | | | | | | | | | | |



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| Year | Part | Subject | Credit | Int = Total | Code |
|--------|--------|---|--------|-------------|--|
| I & II | Part V | NSS / NCC / Physical Education/ YRC / RRC | 3 | 100 = 100 | U22NS4 / U22NC4 / U22PS4 / U22YR4 / U22RR4 |

SEMESTER III

| S.No. | Part | Course Code | Course Title | Hours | Credit | Marks | | |
|-------|------------|-------------|--|-------|--------|-------|----|-------|
| | | | | | | I | E | Total |
| 1 | Part 1 | | Tamil | 6 | 3 | 25 | 75 | 100 |
| 2 | Part 2 | | English | 6 | 3 | 25 | 75 | 100 |
| 3 | Core 5 | | Java Programming | 5 | 5 | 25 | 75 | 100 |
| 4 | Core 6 | | Lab: Java Programming | 5 | 3 | 40 | 60 | 100 |
| 5 | Elective 2 | | Web Programming/ Soft Computing/ Cyber Forensics | 4 | 4 | 25 | 75 | 100 |
| 6 | Core 7 | | Lab: Web Programming | 4 | 2 | 40 | 60 | 100 |
| 7 | SLC | | Value Education | - | 3 | 25 | 75 | 100 |
| Total | | | | 30 | 23 | | | |

SEMESTER IV

| S.No. | Part | Course Code | Course Title | Hours | Credit | Marks | | |
|-------|---------|-------------|---------------------------------|-------|--------|-------|----|-------|
| | | | | | | I | E | Total |
| 1 | Part 1 | | Tamil | 6 | 3 | 25 | 75 | 100 |
| 2 | Part 2 | | English | 6 | 3 | 25 | 75 | 100 |
| 3 | Core 8 | | Lab: Android | 5 | 4 | 40 | 60 | 100 |
| 4 | Core 9 | | Data Communication and Networks | 4 | 4 | 25 | 75 | 100 |
| 5 | Core 10 | | Lab: Open Source Programming | 5 | 3 | 40 | 60 | 100 |
| 6 | Allied | | Statistics | 4 | 4 | 25 | 75 | 100 |
| 7 | SLC | | Environmental Studies | - | 2 | 25 | 75 | 100 |
| Total | | | | 30 | 23 | | | |



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SEMESTER V

| S.No. | Part | Course Code | Course Title | Hours | Credit | Marks | | |
|-------|-----------|-------------|---|-------|--------|-------|----|-------|
| | | | | | | I | E | Total |
| 1 | Core11 | | Relational Database Management Systems | 5 | 5 | 25 | 75 | 100 |
| 2 | Elective3 | | Operating Systems/ Object Oriented Analysis and Design/ Bio Informatics | 5 | 5 | 25 | 75 | 100 |
| 3 | Core 12 | | Python Machine Learning | 5 | 5 | 25 | 75 | 100 |
| 4 | Core13 | | Python Machine Learning Lab | 5 | 3 | 40 | 60 | 100 |
| 5 | Core14 | | Lab: Relational Database Management Systems | 3 | 2 | 40 | 60 | 100 |
| 6 | NME | | Introduction to IT | 2 | 2 | 25 | 75 | 100 |
| 7 | Skill 4 | | Software Development lab | 2 | 2 | 100 | - | 100 |
| 8 | Skill 5 | | Lab: Network Simulator | 2 | 2 | 40 | 60 | 100 |
| 9 | Skill 6 | | Employability Skills | 1 | 1 | 25 | 75 | 100 |
| Total | | | | 30 | 27 | | | |

SEMESTER VI

| S.No. | Part | Course Code | Course Title | Hours | Credit | Marks | | |
|-------|-----------|-------------|--|-------|--------|-------|----|-------|
| | | | | | | I | E | Total |
| 1 | Core15 | | Artificial Intelligence | 5 | 5 | 25 | 75 | 100 |
| 2 | Core16 | | Cryptography and Cyber Security | 4 | 4 | 25 | 75 | 100 |
| 3 | Core17 | | LAB:Dot Net Programming | 5 | 3 | 40 | 60 | 100 |
| 4 | Elective4 | | Software Engineering / Software Metrics/ Natural Language Processing | 4 | 4 | 25 | 75 | 100 |
| 5 | Core18 | | LAB: Hardware Trouble shooting | 5 | 3 | 100 | - | 100 |
| 6 | NME | | Introduction to Internet | 2 | 2 | 25 | 75 | 100 |
| 7 | Core19 | | Project | 5 | 4 | 100 | - | 100 |
| Total | | | | 30 | 25 | | | |



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SEMESTER 1

Core 1

| | |
|--|-----------------------------|
| Course Title : Programming in C | Total Hours : 65 Hrs |
| Course Code : U24NTC11 | Total Credits : 5 |

Course Outcomes:

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|--|
| CO1 | Learn the fundamental programming concepts and methodologies which are essential to building good C programs |
| CO2 | Identify solution to a problem and apply control structures, decision making and looping for solving the problem |
| CO3 | Work with Arrays, characters and strings |
| CO4 | Write reusable modules using Functions and learn about Structures and Unions |
| CO5 | Understand the basic idea of pointers and managing files |

Unit I

13 Hours

Overview of C: History of C - Importance of C - Basic Structure of C Programs – Programming style. **Constants, Variables and Data types :** Introduction - Character set – C Tokens – Keywords and identifiers – Constants – Variables - Data types - Declaration of variables, storage class – Assigning values to variables - Defining symbolic constants - Declaring a variable as constant, volatile.

Operators and expressions: Arithmetic, relational, logical, assignment operators - Increment and decrement operators - Conditional operator, Bitwise operators - Special operators - Arithmetic expressions - Evaluation of expressions - Precedence of arithmetic operators - Type conversions in expressions - Operator precedence and associativity - Mathematical functions.

Managing I/O operations: Introduction - Reading and writing a character - Formatted input and output.

Unit II

13 Hours

Decision making and branching: Introduction – Decision making with if statement- Simple if statement – The if...else statement - Nesting of if...else statements – The else if Ladder – The switch statement –The ? : operator –The goto statement.

Decision making and looping: Introduction - The while statement – The do statement - The for statement - Jumps in loops.

Unit III

13 Hours

Array: Introduction – One-dimensional arrays - Declaration, initialization of one-dimensional arrays - Two dimensional arrays – Initializing two-dimensional arrays- Multi dimensional arrays - Dynamic arrays –More about arrays.

Character arrays and strings: Introduction - Declaring and initializing string variables - Reading strings from terminal – Writing strings to screen- Arithmetic operations on characters - Putting strings together – Comparison of two strings - String handling functions – Tables of strings – Other features of strings.



Unit IV

13 Hours

User defined functions: Introduction - Need for user-defined functions – A multi-function program - Elements of user-defined functions - Definition of functions - Return values and their types - Function calls - Function declaration – Category of functions- No arguments and No return values – Arguments but no return values – Arguments with return values – No Arguments but returns a value – Functions that return multiple values - Nesting of functions - Recursion - Passing arrays to functions – Passing strings to functions –The scope, visibility and life time of variables - Multifile programs.

Structures and unions: Introduction - Defining a structure - Declaring structure variables – Accessing structure members – Structure initialization - Copying and comparing structure variables- Operations on individual members - Arrays of structures - Arrays within structures -Structures within structures - Structures and functions - Unions - Size of structures - Bit fields.

Unit V

13 Hours

Pointers: Introduction – Understanding pointers - Accessing the address of a variable – Declaring pointer variables - Initialization of pointer variables - Accessing a variable through its pointer – Chain of pointers - Pointer expressions - Pointer increments and scale factor - Pointers and arrays - Pointers and character strings - Array of pointers - Pointers as function arguments - Functions returning pointers - Pointers to functions - Pointers and structures.

File Management in C: Introduction - Defining, opening, closing a file - I/O operations on files - Error handling during I/O operations - Random access to files - Command line arguments.

Text Book:

1. E.Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education (India) Private Limited, Chennai, Fifth Reprint 2017.

| | |
|-----------------|--|
| Unit I | Chapters: 1,2,3,4 Pg. Nos. : Chapter 1 (12-13) Chapter 2 (22 – 44) Chapter 3 (51 – 64) Chapter 4 (66 – 71) |
| Unit II | Chapters: 5, 6 Pg. Nos. : Chapter 5 (111 – 135) Chapter 6 (149 - 173) |
| Unit III | Chapters: 7, 8 Pg. Nos. : Chapter 7 (189 – 214) Chapter 8 (234 – 257) |
| Unit IV | Chapters: 9, 10 Pg. Nos. : Chapter 9 (267 – 309) Chapter 10 (320 – 341) |



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|---------------|--|
| Unit V | Chapters: 11, 12 Pg. Nos. : Chapter 11 (353 – 379) Chapter 12 (391 – 411) |
|---------------|--|

Reference Book:

1. Yashavant Kanetkar, “Let us C: Authentic Guide to C Programming Language”, 17th Edition, BPB Publications, 2020
2. Ashok N.Kamthane and Amit Ashok Kamathane, “Programming in C”, Third Edition, Pearson Publication, 2016.
3. Byron Gotfried, “Programming with C (Schaum's Outlines Series)”, Third Edition,
4. McGraw Hill Publishing Company, 2017.

e- Resources:

1. <https://www.geeksforgeeks.org/c-programming-language/>
2. <https://www.javatpoint.com/c-programming-language-tutorial>
3. <https://www.w3schools.in/c-tutorial/>
4. <https://www.tutorialspoint.com/cprogramming/index.htm>

Core 2

| | |
|---|-----------------------------|
| Course Title : Lab: Programming in C | Total Hours : 65 Hrs |
| Course Code : U24NTCP11 | Total Credits : 3 |

Course Outcomes:

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|--|
| CO1 | Apply the specification of syntax rules for numerical constants and variables, data types |
| CO2 | Read, understand and trace the execution of programs written in C language |
| CO3 | Write programs that perform operations using derived data types |
| CO4 | Apply and Write C programs to implement one dimensional and two dimensional arrays |
| CO5 | Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor |

1. Write a C program to check whether the given number is odd or even.
2. Write a C program to find the largest of 3 numbers.
3. Write a C program for arithmetic calculation using switch statement.
4. Write a C program to reverse a given number using for loop.
5. Write a C program to display multiplication table using for loop.
6. Write a C program to check whether the given number is Prime or not using do while loop.



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7. Write a C program to display N Fibonacci numbers using while loop.
8. Write a C program to check the given number is perfect or not using while loop.
9. Write a C program to count the number of positive, negative and zero in an array.
10. Write a C program to sort the array of numbers in ascending order.
11. Write a C program to search an element in an array.
12. Write a C program to perform String operations.
13. Write a C program to find the largest and smallest numbers in an array using function
14. Write a C program to find Mean, Variance and Standard Deviation for the given numbers in an array using function
15. Write a C program to implement nesting of functions
16. Write a C program to calculate the factorial value of a given number using recursion.
17. Write a C program to find the nth Fibonacci term using recursion
18. Write a C program to check the given string palindrome or not without using library functions.
19. Write a C program to perform Matrix Addition and Matrix Subtraction
20. Write a C program to perform Matrix Multiplication
21. Write a C program to prepare an Electricity Bill Using Structure.
22. Write a C Program to store Information of 10 Students using array of Structure
23. Write a C Program to perform Swapping using Call By Reference.
24. Write a C program to sort an array using Pointer
25. Write a C program to implement Arithmetic Operations using function pointer
26. Write a C program to read the content of the file
27. Write a C program to store inventory stock details in file (Read, write and append)
28. Write a C program to read integers and store odd numbers and even numbers in different file

Course IV

| | |
|--|-----------------------------|
| Course Title : MATHEMATICAL FOUNDATIONS | Total Hours : 52 hrs |
| Course Code : U24MAAN11 | Total Credits : 3 |

Course Outcomes

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|---|
| CO1 | Understand sets and perform operations and algebra on sets |
| CO2 | Determine the Properties of Relations, Equivalence Relation, Properties of Relations Matrix and Graph Representation of Relations |



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| | |
|-----|--|
| CO3 | Analyse logical propositions via truth tables. |
| CO4 | Perform the Matrix Operations and Rank of a Matrix |
| CO5 | Able to define the basic concepts of Graphs, Directed graphs and Weighted Graphs |

Unit I

11 Hours

Set Theory: Introduction – Sets – Notation and Description of sets – Subsets - Venn – Euler Diagrams – Operations on sets – Properties of set operations – Verification of basic laws and algebra by Venn diagram.

Unit II

10 Hours

Relations: Relations – Representation of a relation - Operations on relations – equivalence relation – Closures & Warshalls Algorithm.

Unit III

10 Hours

Logic: Introduction – IF statements – Connectives – Truth table of a formula – Tautology – Tautological implications and Equivalence of formulae.

Unit IV

10 Hours

Matrix Algebra: Introduction – Matrix Operations – Inverse of a Square Matrix – Elementary Operations and Rank of a Matrix (For all the theorems, consider statement only - Solved examples only)

Unit V

11 Hours

Graph Theory: Basic concepts – Matrix representations of graphs –shortest path problem. (For all the theorems, consider statement only)

Text Book:

1. M Venkataraman, N. Sridharan and N. Chandrasekaran, “Discrete Mathematics”, The National Publishing Company, May 2009.

| | |
|------------|--|
| Unit – 1 | Chapter 1 (Sec 1.1 – 1.8) |
| Unit – II | Chapter 2(Sec 2.2 to 2.6) |
| Unit – III | Chapter 9 (Sec 9.1 to 9.3, 9.6 to 9.8) |
| Unit – IV | Chapter 6 (Sec 6.1 – 6.4) |
| Unit – V | Chapter 11 Sec 11.1 (P.No: 11.1 – 11.9) Sec 11.2 (P.No: 11.34 – 11.42 & 11.47 – 11.51) Sec 11.4 (P.No: 11.69 – 11.71) Sec 11.5 (P.No: 11.79 – 11.80) |

Reference Book:

1. Kenneth H.Rosen , “Discrete Mathematics and its Applications”, 8th edition, TMH, 2018

e – Resources:

1. [https://notendur.hi.is/mbh6/html/_downloads/Discrete%20Mathematics%20and%20Its%20Applications%20-%20Kenneth%20Rosen%20\(2012\).pdf](https://notendur.hi.is/mbh6/html/_downloads/Discrete%20Mathematics%20and%20Its%20Applications%20-%20Kenneth%20Rosen%20(2012).pdf)
2. <https://home.iitk.ac.in/~aral/book/mth202.pdf>
3. <https://nptel.ac.in/courses/106/106/106106183/>
4. <https://youtu.be/wRMC-ttjhwM>
5. <https://youtu.be/2spTnAiQg4M>



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SBS 1

| | |
|--|-----------------------------|
| Course Title : LAB: HTML and SASS | Total Hours : 26 Hrs |
| Course Code : U24NTSP11 | Total Credits : 2 |

Course Outcomes:

Upon completion of the course, students will be able to

| Cos | CO Statement |
|------------|--|
| CO1 | Analyze a web page and identify its elements and attributes. |
| CO2 | Paraphrase the effect of various HTML tags like Lists, Links, Table and combination of them for web page design. |
| CO3 | Learn a stylesheet language compatible with any CSS version |
| CO4 | Compile and work with the core features of Sass |
| CO5 | Analyze a web page and identify its elements and attributes. |

1. Write a paragraph about our nation. Create a HTML page to display it. Use all paragraph attributes.
2. Write a paragraph about your friends. Create a HTML document with different font attributes to display it
3. Design a HTML document describing your bio-data. Assign suitable background design, background color and text color.
4. Design a webpage for anyone of our national leaders with suitable headings and horizontal rule.
5. Write a HTML code to generate the following output:
 - a. Diamond Shape

| | | | |
|---|---|---|---|
| 1 | 5 | | |
| 2 | 3 | 6 | 7 |
| 4 | 8 | | |
 - b. Chemical Equations
 - i. $Ba(BrO_3)_2 \cdot 2H_2O$
 - ii. $BaFeSi_4O_{10}$
 - iii. CO_3^{2-}
 - iv. $C_{21}H_{36}N_7O_{16}P_3S$
 - v. $ab^2x^4 + bx^3 + cx^2 + dx + ad^2 = 0$
 - vi. $a_0x^{2n} + a_1x^{2n-1} + a_2x^{2n-2} + \dots + a_2x^2 + a_1x + a_0 = 0$
6. Write a HTML code to print the library book details
7. Design a webpage that describes the forests in India. Use all link attributes.
8. Design a main page contains list of states in India. When we click one of the states it should open that state file and display the tourist places of that state. When we click one place it should open a file which contains information about that place with appropriate contents and images.
9. Write a HTML program to display student mark table using <table> tag.
10. Design a class timetable and display it in tabular format
11. Create a web page which shows the map of India. The cities of Chennai, Delhi, Mumbai, Calcutta are in the coordinates (115,240), (100,100), (70, 70), (200,150).



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Define them with hot spots and when we click the city corresponding HTML document is opened which shows the history of the city.

12. Design few HTML documents which describe the top IT companies in India. The list of companies is shown in one frame. When we click one company the details must appear in another frame.
13. Design a college application form using all input types.
14. Write a HTML code for changing the style and color of the text using Sass.
15. Write a HTML code to change the style for Navigation using Sass Nested rule.
16. Write a HTML code to demonstrate the usage of external Sass.
17. Design a web page using Sass Color functions
18. Write a HTML code to change the appearance of the form elements using Sass Inheritance.

SBS 2

| | |
|--|-------------------------------|
| Course Title : Digital Principles | Total Hours : 30 Hours |
| Course Code : U24NTS11 | Total Credits : 2 |

Course Outcomes:

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|---|
| CO1 | Understand the basic number systems and conversion techniques |
| CO2 | learn about the design principles of different digital electronic circuits and their applications |
| CO3 | Examine the principles of Boolean law and theorems |
| CO4 | Analyze the performance of multiplexer and encoding and decoding principles. |
| CO5 | Understand and binary addition, subtraction and 2's complement representation |

UNIT – I

7 Hours

Number System and Codes: Binary numbers system - binary to decimal conversion decimal to binary conversion - octal numbers - hexadecimal numbers - ASCII code - Excess-3 Code - Gray Code.

Digital Logic: Basic Gates - AND, OR, NOT- Universal Logic Gates - NOR, NAND,-ANDOR-Invert Gates - Positive and Negative logic.

UNIT – II

7 Hours

Combinational Logic Circuits: Boolean Law and theorems - sum of product method – Kmap truth tables - Pairs, Quads, Octets - K-Map simplification - Don't care - product of sum method - product of sum simplifications.



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UNIT – III

5 Hours

Data Processing Circuits: Multiplexers - Demultiplexers - 1-of-16 - Decoders BCD-to-Decimal Decoders - 7 segment decoders - Encoders - Exclusive - OR gates – parity generators - checkers.

UNIT – IV

6 Hours

Arithmetic Circuits: Binary Addition - Binary Subtraction - 2's complement representation - Complement Arithmetic - Arithmetic building blocks - the adder - subtracter.

UNIT V

5 - Hours

Flip-Flops: RS flip-flop - Gated Flip-Flops- Edge-Triggered RS Flip-Flop - Edge Triggered D Flip-Flop - Edge-Triggered JK Flip-Flop- Flip-Flop Timing- Edge-Triggered through Input Lock out- JK Master Slave Flip-Flop.

Text Book:

- Albert Paul Malvino, Donald P. Leach, Goutam Saha, “Digital Principles and Applications”, Special Indian Edition, 7th Edition, 2012.

| | |
|-----------------|--|
| Unit I | Chapters : 2, 5 Pg. Nos. : Chapter 5 (171 – 193) Pg. Nos.: Chapter 2 (40 – 60) |
| Unit II | Chapter : 3 Pg. Nos. : Chapter 3 (75-101) |
| Unit III | Chapter : 4 Pg. Nos. : Chapter 4 (118-145) |
| Unit IV | Chapter : 6 Pg. Nos. : Chapter 6 (207-231) |
| Unit V | Chapter : 8 Pg. Nos. : Chapter 8 (271-288) |

Reference Book:

1. J.S. Leenajasmine, Joshua kumaresan, “Digital Principles and Computer organization” Magnus publications.
2. Arun Kumar Singh, Digital Principles Foundation Of Circuit Design And Application 2nd Edition 2014 New Age International (P) Ltd Publishers

e-Resources:

1. [Digital Circuits and Their Applications \(tutorialspoint.com\)](http://tutorialspoint.com)
2. [Digital Electronics Tutorial - Javatpoint](http://javatpoint.com)
3. <https://www.geeksforgeeks.org/principles-in-digital-system-design/>



SEMESTER II

Core 3

| | |
|----------------------------------|---------------------|
| Course Title: PYTHON PROGRAMMING | Total Hours : 65hrs |
| Course Code: U24NTC21 | Total Credits: 5 |

Course Outcome:

Upon completion of the course, students will be able to

| COs | CO Statement |
|-----|--|
| CO1 | Learn the Basics of Python Environment and Data Types |
| CO2 | Learn to process Inputs and Outputs |
| CO3 | Design programs using Arrays and Subroutines |
| CO4 | Describe the usage of the built-in data structures like „list“, „tuple“ and „dictionary“ |
| CO5 | Understand the basics of OOPs and Database and Connectivity |

UNIT I

13 Hours

Introduction to Python: The History of Python-Getting Started with Python-Programming Style and Documentation- Programming Errors- Getting Started with Graphics Programming.

Elementary Programming: Introduction-Writing a Simple Program-Reading Input from the Console-Identifiers-Variables, Assignment Statements, and Expressions - Simultaneous Assignments- Named Constants-Numeric Data Types and Operators-Evaluating Expressions and Operator Precedence- Augmented Assignment Operators-Type Conversions and Rounding.

Mathematical Functions, Strings, and Objects: Introduction-Common Python Functions-Strings and Characters-Introduction to Objects and Methods -Formatting Numbers and Strings- Drawing Various Shapes -Drawing with Colors and Fonts.

UNIT II

13 Hours

Selections: Introduction-Boolean Types, Values, and Expressions-Generating Random Numbers-**if** Statements-Two-Way **if-else** Statements-Nested **if** and Multi-Way **if-elif-else** Statements-Common Errors in Selection Statements-Logical Operators-Conditional Expressions-Operator Precedence and Associativity-Detecting the Location of an Object.

Loops: Introduction-The **while** Loop-The **for** Loop-Nested Loops-Minimizing Numerical Errors-Keywords **break** and **continue**.

Functions: Introduction-Defining a Function-Calling a Function-Functions with/without Return Values- Positional and Keyword Arguments- Passing Arguments by Reference Values-Modularizing Code-The Scope of Variables- Default Arguments-Returning Multiple Values- Function Abstraction and Stepwise Refinement.



UNIT III

13 Hours

Objects and Classes: Introduction- Defining Classes for Objects- UML Class Diagrams-Immutable Objects vs. Mutable Objects-Hiding Data Fields-Class Abstraction and Encapsulation-Object-Oriented Thinking.

GUI Programming Using Tkinter: Introduction- Getting Started with Tkinter-Processing Events- The Widget Classes- Canvas- The Geometry Managers -Displaying Images- Menus - Popup Menus- Mouse, Key Events, and Bindings- Animations- Scrollbars-Standard Dialog Boxes.

Lists: Introduction- List Basics- Deck of Cards GUI-Copying Lists- Passing Lists to Functions-Returning a List from a Function- Searching Lists-Sorting Lists.

UNIT IV

13 Hours

Multidimensional Lists: Introduction- Processing Two-Dimensional Lists-Passing Two-Dimensional Lists to Functions- Multidimensional Lists.

Inheritance and Polymorphism: Introduction- Super classes and Subclasses-Overriding Methods- The **object** Class- Polymorphism and Dynamic Binding- The **is instance** Function.

Files and Exception Handling: Introduction-Text Input and Output- File Dialogs-Retrieving Data from the Web-Exception Handling-Raising Exceptions-Processing Exceptions Using Exception Objects- Defining Custom Exception Classes-Binary IO Using Pickling.

UNIT V

13 Hours

Tuples, Sets, and Dictionaries: Introduction- Tuples- Sets-Comparing the Performance of Sets and Lists-Dictionaries

Web development with Flask: Initialization – Routes and View functions – Server startup –A Complete application – The Request-Response Cycle – Flask Extensions.

Text Book:

1. Y. Daniel Liang, “Introduction to Programming using Python”, Prentice Hall,2012.
2. Miguel Grinberg, “Flask Web Development”, O’Reilly, Second Indian Reprint, 2015.

| | |
|----------------|---|
| Unit I | Chapters: 1, 2,3 Pg. Nos. : Chapter 1(13 – 21) Pg. Nos. : Chapter 2(31 – 45) Pg. Nos. : Chapter 3(63 – 83) |
| Unit II | Chapters: 4,5, 6 Pg. Nos. : Chapter 4(91 - 95,100 - 105,110,116 - 118) Pg. Nos. : Chapter 5(133 - 151) Pg. Nos. : Chapter 6(171 - 183,187 - 190,192) |



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|-----------------|---|
| Unit III | Chapters: 7, 9,10 Pg. Nos. : Chapter 7(215 - 233) Pg. Nos. : Chapter 9(271 - 301) Pg. Nos. : Chapter 10(313 - 315,329 - 334,338 – 341) |
| Unit IV | Chapters: 11,12,13 Pg. Nos. : Chapter 11(361 - 365,377) Pg. Nos. : Chapter 12(399 - 411) Pg. Nos. : Chapter 13(439 - 448,452 – 465) |
| Unit V | Book 1: Chapter :14 Pg. Nos.: Chapter 14(475 - 485,487) Book 2: Chapter:2 Pg. Nos.: (7 – 17) |

Reference Books:

1. Margnus Lie Hetland, “Beginning Python from novice to Professional”, Second Edition, Dream TechPress, , 2008.
2. Allen Downey et al ,“Learning with Pythons” , , First edition, Dream tech Press, 2015
3. .Matic C.Brown ,“The Complete Reference Python”, First edition MCGraw Hill Education, 2001.

e- Resources:

1. <https://www.w3schools.com/python/>
2. <https://docs.python.org/3/tutorial/>
3. <https://www.tutorialspoint.com/python/index.htm>
4. <https://www.programiz.com/python-programming>
5. <https://www.geeksforgeeks.org/python-programming-language/learn-python-tutorial/>
6. <https://intellipaat.com/blog/tutorial/python-tutorial/>

Core 4

| | |
|--|----------------------------|
| Course Title: LAB: PYTHON PROGRAMMING | Total Hours: 65 hrs |
| Course Code: U24NTCP1 | Total Credits: 3 |

Course Outcome:

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|---|
| CO1 | Demonstrate programs using simple Python statements and expressions |
| CO2 | Explain control flow and functions in Python for solving problems |
| CO3 | Develop Python programs by defining functions and calling them |



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| | |
|------------|--|
| CO4 | Use Python data structures – lists, tuples & dictionaries for representing compound data |
| CO5 | Design programs using OOP concepts in Python |
| CO6 | Interpret different database operations |

1. Program to get a value from the User and print the following
 - Display Python version
 - Display Current Date and Time
2. Program to get values from the user through command line and perform addition operation.
3. Program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700.
4. Program to guess a number between 1 and 9. Note: User is prompted to enter a guess. If the user guesses wrong then the prompt appears again until the guess is correct, on successful guess, user will get a "Well guessed!" message, and the program will exit.
5. Program to check the validity of password inputted by the users. Validation:
 - At least 1 letter between [a-z] and 1 letter between [A-Z].
 - At least 1 number between [0-9].
 - At least 1 character from [!@#].
 - Minimum length 6 characters.
 - Maximum length 16 characters.
6. Program to check whether a given array of integers contains any duplicate element. Return true if any value appears at least twice in the said array and return false if every element is distinct.
7. Perform any FIVE indexing and slicing operations in an array.
8. Program using function that accepts a string and calculate the number of upper case letters and lower case letters.
9. Program to print the even numbers from a given list using function.
10. Program to accept variable length arguments in a function and print the count of the non-negative values.
11. Program to return multiple values in a function.
12. Program to convert a given Decimal number to binary using recursion.
13. Write an anonymous function to sort the values in a list.
14. Write a program to square every item of a list.
15. Write a program using list to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings. Example: ['abc','xyz','aba','1221'] Result: 2
16. Write a program to append a list to the second list.
17. Program to add elements dynamically to a set and find the maximum and minimum element.
18. Program to find the length of a set.
19. Program to check if a given value is present in a set or not.
20. Program to demonstrate any TWO operations in tuple.
21. Create a dictionary by keeping the usernames of 5 users as key and set the password as a value. Perform login validation using the available credentials.
22. Create a class and access its methods using the object.
23. Develop a program using two classes and perform inheritance.



24. Develop a program to initialize a variable using constructor.
25. Program to demonstrate operator overloading.
26. Program to perform read and write operations on a file.
27. Program to copy the contents of a file to another file.
28. Program to implement try, except and finally block statements.
29. Design a loan calculator using TKinter.
30. Pop up menu based arithmetic operations using TKinter.
31. Program to display an image using TKinter.
32. Create a web application using Flask to display a home page along with FIVE links and create web pages for each link.

Elective 1

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|--------------------------------------|----------------------------|
| Course Title: Data Structures | Total Hours: 65 Hrs |
| Course Code: U24NTE21 | Total Credits: 4 |

Course Outcome:

Upon completion of the course, students will be able to

| COs | CO Statement |
|-----|---|
| CO1 | Understand the basics of data structures and the concepts of algorithm analysis |
| CO2 | Acquire knowledge about arrays and various types of Linked List and its operations. |
| CO3 | Learn Stack and Queue and understand how these concepts are implemented using array and linked list. |
| CO4 | Gain Knowledge about Binary Tree, Binary search trees and its operations. |
| CO5 | Able to understand Sorting and searching techniques, representation of Graphs Structure and graph algorithms. |

Unit I

13 hours

Introduction to Data structures: Overview: Need for Data Structures – Definitions : Types – Data types – Abstract Data Type – Advantages of ADT – Pre and Post conditions – Data Structures – Types of Data Structures – Choice of Data Structures – Definitions related to Data Structures.

Algorithm Analysis: Overview – Introduction – Problem Solving: Categories of problem solving – Problem Solving strategies – Modular design: Bottom up design – Top down design – Implementation of Algorithms: Choice of Data Structure – Common errors in Implementation – Testing: Functional testing – Performance testing – Verification: Loop invariants – Program verification – Verification of programs using Arrays – Algorithm analysis: Operations count – Time complexity classes – Asymptotic Analysis: Asymptotic Upper Bound-Big O.

Unit II

13 hours

Arrays: Introduction – Range of an array: Primitive operations – Element access in an Array – Addressing function – One Dimensional array – Two dimensional array: Storage representation – Multidimensional arrays: Addressing function of a 3D array – Special types of matrices: Lower triangular matrices – Upper triangular matrices – Tridiagonal matrices – Sparse matrices.



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Linked Lists: Introduction – Memory allocation – Benefits of Linked Lists – Limitations of Linked Lists – Types – Basic operations in Linked Lists – Singly Linked Lists and its operations – Circular Linked Lists and its operations – Doubly Linked Lists and its operations – Circular Doubly Linked List and its operations.

Unit III **13 hours**

Stacks: Overview – Introduction – ADT Stack – Array Implementation of Stack – Linked List Implementation of Stack – Applications of Stack: Well formedness of parenthesis – Syntax checking – Evaluation of postfix expressions – Conversion of Infix expressions to Postfix expressions – Evaluation of recursive functions – Solving Tower of Hanoi problem – Solving Maze problem.

Queues: Overview – Introduction – Implementation of Queues – Implementations of basic operations on Array-Based Implementations of Queues - Implementations of basic operations on linked list-Based Implementations of Queues – Implementation of Queue Operations using Stack – Circular Queues – Dequeue.

Unit IV **13 hours**

Trees: Overview – Introduction – Binary Trees – Types of Binary Trees – Number of nodes in Binary Trees – Operations on Binary Trees: Inorder, Pre order, Post order and Breadth First Traversal – Representation of Binary Trees: Linear representation – Linked representation – Node representation – C function to create a binary tree node –Construction of simple Binary Tree – Function to count number of nodes, determine the depth of the tree – Identical Trees – Binary Tree Traversal in C – Inorder Traversal – Non-recursive Algorithm for preorder traversal.

Binary Search Trees: Overview – Introduction: Creation, Searching an element, Ordering elements, Minimum element, Maximum element, Deletion of an element, Predecessor of a node, Successor of a node in a BST.

Unit V **13 hours**

Sorting and Searching: Overview – Sorting – Classification of Sorting Algorithms: Classification based on structure of algorithm, computational complexity, stability of sorting and memory usage – Selection of sorting method – Selection sort – Binary tree sort – Heap sort – Simple insertion – Shell sort – Counting sort – Merge sort.

Graphs: Overview – Introduction: Representation of Graphs – Adjacency Matrix – Adjacency Lists – Operations on Graphs: Insertion, Deletion and Traversal – Breadth First Search – Data structure used in BFS – BFS on Adjacency matrix and Adjacency list representation – BFS tree – Depth First Search – DFS(G) – DFS_VERTEX(U) – Shortest path Algorithm – Dijkstra's Algorithm – All Pairs Shortest path – Minimum Spanning tree – Kruskal's Algorithm – Implementation of Kruskal's Algorithm - Prim's Algorithm..

Text book:

1. A.Chitra and P.T.Rajan, "Data Structures", Vijay Nicole Imprints Private Limited, Second Edition 2016.

| | |
|----------------|---|
| Unit I | Chapters 1, 2 |
| Unit II | Chapters 3, 4 Pg. Nos. : Chapter 3 (29 – 39) |



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|-----------------|--|
| | Chapter 4 (47 – 82) |
| Unit III | Chapters 5,6 |
| Unit IV | Chapters 7,8 Pg. Nos. : Chapter 7 (139 – 162) Chapter 8 (205 – 227) |
| Unit V | Chapters 11, 12 Pg. Nos. : Chapter 11 (291 – 338) Chapter 12 (363 – 400) |

Reference Books:

1. Seymourlipschutz,“Schaum”s Outline Data structures” 2014,Mc Graw Hill Ltd 2014.
2. D.Samanta,“Classic Data Structures” 2nd Edition, Prentice Hall of India Private Limited 2009.

e-Resources:

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://www.javatpoint.com/data-structure-tutorial>
3. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Elective-1(b)

| | |
|---------------------------------------|----------------------------|
| Course Title: Mobile Computing | Total Hours: 65 Hrs |
| Course Code: U24NTE22 | Total Credits: 4 |

Course Outcome:

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|---|
| CO1 | Understand the basics of communication Technologies and Wireless networks |
| CO2 | Acquire the knowledge about Mobile internet Protocols. |
| CO3 | Understand about the Mobile transport layer and Mobile Databases |
| CO4 | Gain knowledge about Mobile Adhoc Networks and wireless sensor Networks |
| CO5 | Able to understand Mobile OS and mobile application development. |

UNIT I

13 Hours

Basics of communication technologies: Mobile Handsets,Wireless Communications server applications – Cell phone System – Types of Telecommunication Networks – Computer Networks – Traditional LAN – LAN architecture – Components of a wireless



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communication system – Architecture of a Mobile Telecommunication System – Wireless Networking Standards – Wireless Local Area Networks – Bluetooth Technology.

Introduction to Mobile Computing and Wireless Networking :What is Mobile Computing? – Mobile Computing vs. Wireless Networking – Mobile Computing Applications – Characteristics of Mobile Computing – Structure of Mobile Computing Application – Cellular Mobile Communications – Global system for Mobile Communications – General Packet Radio Service – Universal Mobile Telecommunications System – Mobile Phone and Human Body.

UNIT II

13 Hours

MAC Protocol: Properties required MAC Protocols – Wireless MAC Protocols – A Taxonomy of MAC protocols – Fixed Assignment Scheme – Random Assignment Schemes – Reservation based schemes – The 802.11 MAC Standards – MAC Protocols for AdHoc Networks.

Mobile internet protocol: Mobile IP – Packet Delivery – Overview of Mobile IP – Desirable features of Mobile IP – Key Mechanism in Mobile IP – Route Optimization – Dynamic Host Configuration Protocol

UNIT III

13 Hours

Mobile Transport Layer: Overview of TCP/IP – Terminologies of TCP/IP – Architecture of TCP/IP – An overview of the operation of TCP/IP – Application layer Protocols of TCP/IP – TCP/IP versus ISO/OSI model – Adaptation of TCP window – Improvement in TCP Performance.

Mobile Databases : Issues in Transaction Processing – Transaction Processing Environment – Data Dissemination – Transaction Processing in Mobile Environment – Data Replication – Mobile Transaction Models – Rollback Process – Two Phase Commit Protocol – Query Processing – Recovery.

UNIT IV

13 Hours

Mobile Ad Hoc Network: A few basic Concepts – Characteristics of Mobile Ad Hoc Networks – Applications of MANETs – MANET Design Issues – Routing – Essentials of Traditional Routing Protocols – Routing in MANET – Popular MANET Routing Protocols –



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Vehicular Ad Hoc Networks – MANET vs, VANET – Security issues in a MANET – Attacks on Ad Hoc Networks – Security Attack Counter Measures.

Wireless Sensor Networks : WSN vs. MANET – Applications – Architecture of Sensor Node – Challenges in the design of an effective WSN – Characteristics of Sensor Networks – WSN Routing Protocols – Target Coverage.

UNIT V

13 Hours

Operating System for Mobile Computing : Operating system responsibilities in mobile devices – A few basic concepts – Special Constraints and Requirement of Mobile OS – A survey of commercial Mobile Operating System – A Comparative study of Mobile Oss – Operating Systems for Sensor Networks.

Mobile Application Development and Protocols : Mobile Device as Web Clients – WAP – J2ME – Android Application Development.

Mobile Commerce – Applications of M-Commerce – Business to Business Application – Structure of Mobile Commerce – Pros and Cons of M-commerce – Mobile Payment Systems – Security Issues

Text Book:

1. Prasant Kumar Pattnaik and Rajib Mall, "Fundamental of Mobile Computing", Second Edition, PHI Learning Private Ltd 2016.

| | |
|-----------------|---|
| Unit I | Chapters: 1,2 Pg. Nos. : Chapter 1(1 – 24) Chapter 2(25 – 51) |
| Unit II | Chapters: 3,4 Pg. Nos. : Chapter 3(52 – 71) Chapter 4(72 – 85) |
| Unit III | Chapters: 5,6 Pg. Nos. : Chapter 5(87 – 110) Chapter 6(112 – 127) |
| Unit IV | Chapters: 7,8 Pg. Nos. : Chapter 7(128 – 163) Chapter 8 (164 – 186) |
| Unit V | Chapters: 9,10,11 Pg. Nos. : Chapter 9 (187-206) Chapter 10 (207-222) Chapter 11 (223-236) |



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Reference Book:

1. Asoke K Talukder, Roopa R Yavagal, “Mobile Computing, Technology applications and Service creation”, TMH publishing company New Delhi 2007.

e – Resources:

1. <https://www.techtargget.com/searchmobilecomputing/definition/nomadic-computing>
2. https://www.tutorialspoint.com/mobile_computing/mobile_computing_overview.htm

Elective 1(c)

| | |
|--|----------------------------|
| Course Title: Computer Graphics | Total Hours: 65 Hrs |
| Course Code: U24NTE23 | Total Credits: 4 |

Course Outcome:

| Cos | CO Statement |
|------------|--|
| CO1 | Understand the basics of computer graphics and graphics systems |
| CO2 | Acquire the knowledge about Line, circle and ellipse Generating Algorithms |
| CO3 | Understand the attributes of output primitives |
| CO4 | Gain knowledge about Two dimensional transformation and Matrix |
| CO5 | Able to understand the two dimensional viewing and Clipping operations. |

UNIT I

13 hours

A Survey of Computer Graphics: Computer – Aided Design – Presentation Graphics – Computer Art Entertainment – Education and Training – Visualization – Image Processing – Graphical User Interfaces.

Overview of Graphics System: Video Display Devices – Raster Scan Systems – Random Scan Systems – Input Devices – Hard Copy Devices – Graphics Software.

UNIT II

13 Hours

Output Primitives: Points and Lines – Line Drawing Algorithms – Circle Generating Algorithms – Ellipse Generating Algorithms – Filled Area Primitives.

UNIT III

13 Hours

Attributes of Output Primitives: Line Attributes – Curve Attributes – Color and Gray Scale Levels – Area Fill Attributes – Character Attributes – Bundled Attributes – Inquiry Functions – Antialiasing.



UNIT IV

13 Hours

Two – Dimensional Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations – Transformations between Coordinate Systems.

UNIT V

13 Hours

Two – Dimensional viewing : The Viewing Pipeline – Viewing Coordinate Reference Frame – Window to-Viewport Coordinate Transformation – Two-Dimensional Viewing Functions – Clipping Operations – Point Clipping – Line Clipping – Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping.

Text Book:

1. Donald Hearn, M. Pauline Baker, "Computer Graphics" C Version", Second Edition, Pearson Education, 2018

| | |
|-----------------|---|
| Unit I | Chapters: 1.1 – 1.8, 2.1 - 2.3, 2.5 – 2.7 Pg. Nos. : Chapter 1 (2-35) Chapter 2 (36-56,60-81) |
| Unit II | Chapters: 3.1 – 3.2, 3.5 – 3.7, 3.11 Pg. Nos. : Chapter 3 (84-93,97-112,117- 130) |
| Unit III | Chapter : 4.1 – 4.8 Pg. Nos. : Chapter 4 (143 – 182) |
| Unit IV | Chapter : 5.1 – 5.5 Pg. Nos. : Chapter 5 (183 – 208) |
| Unit V | Chapter : 6.1 – 6.11 Pg. Nos. : Chapter 6 (217-249) |

Reference Books:

1. Pradeep K. Bhatia, "Computer Graphics", I. K. International Pvt Ltd, 2008
2. Peter Shirley, Michael Ashikhmin, "Fundamentals of Computer Graphics", Second Edition, 2005.

e-Resources:

1. https://www.freebookcentre.net/CompuScience/Free-Computer-Graphics-Books-Download.html#google_vignette
2. https://ia902203.us.archive.org/22/items/DonaldHearnM.PaulineBakerComputerGraphicsBookFi.org/%5BDonald_Hearn%2C_M.Pauline_Baker%5D_Computer_Graphics%28BookFi.org%29.pdf



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SBS 3

| | |
|--|-----------------------------|
| Course Title : LAB: Data Structures | Total Hours : 26 Hrs |
| Course Code : U24NTSP21 | Total Credits : 2 |

Course Outcomes:

Upon completion of the course, students will be able to

| COs | CO Statement |
|------------|--|
| CO1 | Describe, analyze, and solve problems using mathematics and systematic problem-solving techniques. |
| CO2 | Implement data structures for problem solving. |
| CO3 | Implement linear and non-linear data structure operations using C programs |
| CO4 | Implement Stack, Queue and their applications |
| | Arrange data using different sorting techniques. |
| CO5 | Perform basic operations on trees and graphs and determine minimum spanning tree. |

1. Program to search an element in an array using binary search.
2. Program to perform array operations.
3. Program to implement single linked list
4. Program to implement Double linked list.
5. Program to implement stack using array.
6. Program to implement stack using linked list.
7. Program to implement queue using array.
8. Program to implement queue using linked list.
9. Program to evaluate postfix expression using stack.
10. Program to convert infix expression to postfix expression using stack.
11. Program to implement tree traversals.
12. Program to sort array elements using the following techniques.
a) Insertion Sort b) Merge Sort c) Selection Sort
13. Program to perform Graph traversals.
14. Program to implement Dijkstra's Algorithm
15. Program to find minimum spanning tree using Kruskal's Algorithm.