

**VIGNAN'S**

Foundation for Science, Technology &amp; Research

(Deemed to be University)

-Estd. u/s 3 of UGC Act 1956

## Department of Information Technology & Computer Applications

### MASTER OF COMPUTER APPLICATIONS (With effect from 2024-25)

**Total Credits: (22 + 25 + 21 + 12): 80**

I YEAR I SEMESTER						
S.No.	Course code	Course Title	L	T	P	C
1	24MC101	Data Structures	2	2	2	4
2	24MC102	Python Programming	2	-	2	3
3	24MC103	Web Technologies	-	2	2	2
4	24MC104	Computer Organization and Operating Systems	3	2	-	4
5	24MC105	Probability and Statistics	3	2	-	4
6	24MC106	Software Engineering	2	2	-	3
7	24MC107	Technical English Communication	1	-	2	2
		<b>Total</b>	<b>13</b>	<b>10</b>	<b>8</b>	<b>22</b>
			<b>31 hrs</b>			
I YEAR II SEMESTER						
S.No.	Course Code	Course Title	L	T	P	C
1	24MC108	Database Systems	3	-	2	4
2	24MC109	Object Oriented Programming	3	-	2	4
3	24MC110	Computer Networks	2	2	-	3
4	24MC111	Organization Behavior	2	2	-	3
5	24MC112	Soft Skills Laboratory	-	-	2	1
6	24MC113	Socially Relevant Project using Design Thinking	-	-	4	2
7		Department Elective - 1	3	-	2	4
8		Department Elective - 2	3	-	2	4
		<b>Total</b>	<b>16</b>	<b>4</b>	<b>14</b>	<b>25</b>
			<b>34 hrs</b>			

<b>II YEAR I SEMESTER</b>						
<b>S.No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	24MC201	Cryptography and Network Security	3	-	2	4
2	24MC202	Full Stack Technologies	3	-	2	4
3	24MC203	Big Data Analytics	3	-	2	4
4		Department Elective - 3	3	-	2	4
5		Department Elective - 4	2	2	-	3
6		MOOCS/NPTEL/ Dept. Elective	-	-	-	2
		<b>Total</b>	<b>14</b>	<b>2</b>	<b>8</b>	<b>21</b>
			<b>24 hrs</b>			
<b>II YEAR II SEMESTER</b>						
<b>S.No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	24MC204/ 24MC205	Internship/ Project	-	2	22	12
		<b>Total</b>		<b>24</b>		<b>12</b>

<b>DEPARTMENT ELECTIVES (Data Science)</b>						
<b>S.No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	24MC801	Machine Learning	3	-	2	4
2	24MC802	Deep Learning	2	2	2	4
3	24MC803	Fundamentals of Image Processing	2	2	-	3
4	24MC804	Reinforcement Learning	2	2	-	3
5	24MC805	Evolutionary Computing	2	2	-	3
6	24MC806	Computer Vision	2	2	-	3
7	24MC807	Text Analytics	2	2	-	3
8	24MC808	Nature Inspired Computing Methods	2	2	-	3
9	24MC809	Soft Computing	2	2	-	3
10	24MC810	Data Analysis and Visualization	2	2	2	4
11	24MC811	Artificial Intelligence and Neural Network	3	-	2	4
12	24MC812	Data Wrangling and Visualization	2	2	2	4
13	24MC813	Social Media Analytics	2	2	-	3

<b>DEPARTMENT ELECTIVES (General)</b>						
<b>S.No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	24MC801	Machine Learning	3	-	2	4
2	24MC814	Mobile Application Development	3	-	2	4
3	24MC812	Data Wrangling and Visualization	2	2	2	4
4	24MC815	Formal Languages and Automata Theory	3	-	2	4
5	24MC816	Digital Image Processing	2	2	-	3
6	24MC817	Design and Analysis of Algorithms	2	2	2	4
7	24MC818	Block Chain Technology	2	2	-	3
8	24MC819	Cloud Computing	3	-	2	4
9	24MC820	Cyber Security	2	2	-	3
10	24MC806	Computer Vision	2	2	-	3
11	24MC821	Mobile Computing	3	-	2	4
12	24MC822	Advanced Web Technologies	3	-	2	4
13	24MC802	Deep Learning	2	2	2	4
14	24MC823	Natural Language Processing	2	2	-	3

## 24MC101-DATA STRUCTURES

Hours per week:6

L	T	P	C
2	2	2	4

**PREREQUISITE KNOWLEDGE:** C Programming.

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course is aimed at offering fundamental concepts of programming language to the students. It starts with the basics of C-programming and deals with the structure and various attributes required for writing a 'C' program. It also introduces various operators and control statements used in programming. Then it switches to functions and arrays. It goes on with strings, pointers, files & the user defined data types. As a first-level course in computer science, it forms the basis to understand usage of various attributes in writing a program.

### **MODULE – 1**

#### **UNIT – 1**

**8L+8T+8P=24 Hours**

#### **BASIC PROGRAMMING AND INTRODUCTION**

Structure of C program – Basic Data types, Operators, Control statements, functions and Arrays

#### **UNIT – 2**

**8L+8T+8P=24 Hours**

#### **INTRODUCTION TO STRINGS, POINTERS AND STRUCTURES**

Strings, pointers, structures, sorting and searching.

#### **PRACTICES:**

- Compute the factors of a number.
- Compute the average of 'n' numbers.
- Find whether a number is palindrome or not.
- Find whether a number is a power of 2 or not.
- Compute the factorial of a number.
- Swap two values using call by value and call by reference.
- Find the frequency of each number in the array.
- Reverse the contents of the array.
- Find the factorial of a number using recursion.
- Access the structure and union members.
- Quick, Merge, Heap and Radix sorting techniques.
- Linear and Binary search algorithms.

### **MODULE – 2**

#### **UNIT – 1**

**8L+8T+8P=24 Hours**

#### **LINKED LISTS**

Introduction, Types of Linked List - Singly Linked List, Doubly Linked List, Circular Linked List; Operations - Insertion, Deletion, Traverse forward/reverse order.

**STACKS AND QUEUES:** Stacks - Introduction, Array representations, Implementation; Queues - Introduction, Array representations, Implementation.

#### **UNIT – 2**

**8L+8T+8P=24 Hours**

**TREES:** Introduction, Properties, Binary Tree - Tree traversals and their Implementation, Expression trees, Binary Search Tree (BST) - Definition and implementation.

**GRAPHS:** Introduction, Properties, Modelling problems as graphs representations - Adjacency matrix, Adjacency list; Traversals - Breath first search and Depth first search.

**PRACTICES:**

- Singly linked list, doubly linked list and circular linked list.
- Stack using an array.
- Queue using an array.
- Tree using an array.
- Check if given expression is fully parenthesis or not using stack.
- Tree traversing techniques.
- Binary Search Tree
- Graph traversal techniques.

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Explore the organization of several ADTs and the manipulation (searching, insertion, deletion, traversing) of data stored in various data structures.	Apply	1,2	1
2	Apply different data structures to solve a given problem	Apply	1,2	1
3	Analyse the efficiency of using different data structures and choose the efficient data structure for solving a given problem.	Analyse	1,2	2
4	Develop new algorithms to solve various problems.	Create	1,2	3,4

**TEXT BOOKS:**

1. Ajay Mittal, “Programming in C - A practical Approach”, 1st edition, Pearson Education India, 2015.
2. Reema Thareja, “Introduction to C Programming”, 2nd edition, Oxford University Press India, 2015.
3. Reema Thareja, “Data Structures Using C”, 2nd edition, Oxford University Press, 2014.

**REFERENCE BOOKS:**

1. Herbert Schildt, C, “The Complete Reference”, 4th edition, Tata McGraw-Hill, 2000.
2. E. Balagurusamy, “Programming in ANSI C”, 4th edition, Tata McGraw- Hill, 2008.
3. Richard F. Gilberg and Bhrouz A. Forouzan, “Data Structures: A Pseudocode Approach with C”, 2nd edition, Cengage Learning, 2004.
4. Jean Paul Tremblay and Paul G. Sorenson, “An Introduction to Data Structures with Applications”, 2nd edition, Tata Mc-Graw Hill, 2004.
5. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd edition, Pearson Education, 2006.

## 24MC102-PYTHON PROGRAMMING

Hours per week:4

L	T	P	C
2	0	2	3

**PREREQUISITE KNOWLEDGE:** Computer Programming.

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course offers sufficient knowledge required to understand the fundamental concepts of Python programming language. This course enables students to choose appropriate data structures (lists, dictionaries, tuples, sets, strings) for the given problem. In addition, the students will be able to create reliable, modular and reusable applications using Object-Oriented Programming approaches. At the end they will get an idea of how to access database using python programming, develop web applications, and using web Services using python programming.

## **MODULE – 1**

### **UNIT – 1**

**8L+0T+8P=16 Hours**

#### **INTRODUCTION TO PYTHON**

Python Installation and Working, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Type Conversions, Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements

### **UNIT – 2**

**8L+0T+8P=16 Hours**

#### **VARIETIES OF DATA STRUCTURES**

Hands on string handling and looping with range, list, Tuples, Sets and dictionaries. hands on to organize python code with functions, modules, python packages.

### **PRACTICES:**

- Installation of python and relevant packages in windows.
  - Installation of python and relevant packages in Linux.
  - Practice Execution of python statements in REPL (shell).
- Implement a python program to display all the python keywords and display each of them in separate lines.
  - Develop a python program to read two integers and perform all possible arithmetic operations on those two numbers.
- Develop a program to accept three numbers as command line arguments and find biggest, smallest and average of those three numbers.
  - Implement a python program to find first n prime numbers.
  - Implement a program that prints the decimal equivalents of  $1/2$ ,  $1/3$ , . . . ,  $1/n$ .
  - Implement a python program to read n and find sum of even and odd numbers.
- Write python code to achieve the following
  - To remove vowels in the given string using control transfer statements.
  - To count number of uppercase and lowercase letters in the given string.
  - To remove all punctuation characters from given string.
- Implement python code to illustrate the following on Lists and Tuples.
  - Creation
  - Accessing elements
  - Apply operators
  - Usage of different methods
- Implement python code to illustrate the following on Sets and Dictionary.
  - Creation
  - Accessing elements
  - apply operators
  - Usage of different methods
- Implement python code to illustrate the following.

- i) Positional arguments
- ii) Keyword arguments
- iii) Default arguments
- iv) Variable length arguments
- b) Implement a function to find nth Fibonacci number.
- c) Develop a recursive function to find the factorial of a given number.
- d) Implement function to compute GCD, LCM of two numbers (use Lambda function).

## MODULE – 2

### UNIT – 1

**8L+0T+8P=16 Hours**

**FILES:** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files.

**EXCEPTION HANDLING:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User defined Exceptions

### UNIT – 2

**8L+0T+8P=16 Hours**

#### **OBJECT-ORIENTED PROGRAMMING**

Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Method overloading, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism, NumPy with Python, Pandas.

#### **PRACTICES:**

1. a) Develop a python code to handle the following built-in exceptions
  - i) Value Error      ii) Zero Division Error      iii) Type Error      iv) Name Error
  - b) Implement python code to handle multiple exceptions.
  - c) Implement Python code to raise an exception.
2. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
3. Python program to print each line of a file in reverse order.
4. Python program to compute the number of characters, words and lines in a file.
5. Write a program to create, display, append, insert and reverse the order of the items in the array.
6. Write a program to add, transpose and multiply two matrices.
7. Implement python code to read contents of a file and write the contents to another file.
8. Create a class called Student and perform operations such as display, calculate percentage, add, delete and modify student data.
9. Design python code to depict the following oops concepts.
  - i) Data hiding                      ii) Inheritance                      iii) Overriding
10. Develop python code to calculate the following statistical parameters using python 'numpy'.
  - a) Mean                      b) Harmonic Mean                      c) Median                      d) Mode
  - e) Standard Deviation                      f) Variance                      g) Percentile
11. Design python code to illustrate the following plots using 'matplotlib' package.
  - a) Line plot                      b) Bar plot                      c) Histogram                      d) Scatter Plot
12. Python Program to demonstrate NumPy arrays creation using array () function.
13. Python program to demonstrate use of ndim, shape, size, dtype.
14. Python program to demonstrate basic slicing, integer and Boolean indexing.
15. Python program to find min, max, sum, cumulative sum of array

16. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
  - a) Apply head () function to the pandas data frame
  - b) Perform various data selection operations on Data Frame
17. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib.

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	<b>Experiment with</b> the basic terminology used in computer programming to write, compile and debug programs in python language.	Apply	1	1
2	<b>Make use of</b> different data types to design programs involving decisions, loops, and functions.	Apply	1	1, 2
3	<b>Apply</b> functional, reliable and user-friendly python programs for a given problem application.	Apply	1	3
4	<b>Analyze</b> the usage of different data structures for practical and contemporary applications which uses data stored in files.	Analyze	1,2	1, 2, 4
5	<b>Develop</b> solutions using the concepts of object-oriented programming paradigm.	Apply	2	2

**TEXT BOOKS:**

1. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.
2. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
3. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024

**REFERENCE BOOKS:**

1. Reema Thareja, “Python Programming: Using Problem Solving Approach”, Oxford University Press, 2019.
2. Kenneth A. Lambert, “The Fundamentals of Python: First Programs”, Cengage Learning, 2011.
3. Allen B. Downey, “Think Python” 1st edition, Orielly publishing,2015.
4. James Payne, “Beginning Python using Python 2.6 and Python 3”, Wrox publishing.
5. Vamsi Kurama, “Python Programming: A Modern Approach”, 1st Edition, Pearson Publishers, 2018.



## 24MC103-WEB TECHNOLOGIES

Hours per week:4

L	T	P	C
0	2	2	2

**PREREQUISITE KNOWLEDGE:** NIL

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course offers the basic concepts used to develop static web pages and it also provides knowledge of Internet programming concepts. Further, this course is to build web applications using HTML, CSS, and client and server-side script technologies that span multiple domains.

### **MODULE – 1**

#### **UNIT – 1**

**0L+8T+8P=16 Hours**

#### **INTRODUCTION**

Web technologies, WWW, web browser, web server, global and local impact of web Technologies on modern society. Understanding the working of Internet-Web Application Architecture.

**HTML:** Creating structured documents, Links and navigation, Tables, Forms, and Frames.

**HTML 5:** Introduction to HTML5, The HTML5 Canvas, HTML5 audio and Video;

#### **UNIT – 2**

**0L+8T+8P=16 Hours**

#### **CASCADING STYLE SHEETS**

**Cascading Style Sheets (CSS):** The style tag, Tag selectors, font size, font family, color, & line-height properties, and Hexadecimal color codes.

**CSS Properties:** Text, background, border, list and font.

**CSS Class Selectors:** The class attribute, CSS class selectors, The span tag, CSS opacity.

#### **PRACTICES:**

- Practice Basic HTML tags
- Create links on same page and other pages
- Insert images on a web page
- Create lists on a web page
- Create Tables on a web page
- Create forms such as login form and registration form etc.
- Working with Frames
- Add different types of CSS to web pages
- Usage of div tag in the web page
- Create a personal website using HTML and CSS.

### **MODULE – 2**

#### **UNIT – 1**

**0L+8T+8P=16 Hours**

#### **JAVA SCRIPT**

Introduction, Document Object Model, Language Syntax, Variable declaration, Operators, Control Statements, Understanding Arrays, Function Declaration.

**Built-in Functions:** Standard Date and Time, String, Array and Math.

## UNIT – 2

0L+8T+8P=16 Hours

### SERVER-SIDE PROGRAMMING WITH PHP

PHP basic syntax-PHP Variables and basic data Structures-Using PHP to manage form Submissions-File Handling -Cookies and Sessions with PHP-Working with WAMP and PHPMYADMIN-Establishing connectivity with MySQL using PHP.

#### PRACTICES:

- Practice basic JavaScript programs such as the variable declaration and operators.
- Usage of Control Statements in JavaScript.
- Creating and accessing arrays in JavaScript.
- Working with functions in JavaScript.
- Perform validations on HTML forms using JavaScript.
- Design a web page using PHP, upload image into web page and display image, when user clicking on view button.
- Design a personal Information form, Submit & Retrieve the form data using \$ GET(), \$\_POST() and \$\_REQUEST() Variables.
- Design a login page to validate username and password through MySQL. If login is successful display user information on home page and modify user information on edit page using sessions, when user logged out, destroy all user-related sessions.

#### COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Familiar with HTML Tags	Apply	1	1
2	Create static web pages using forms	Apply	1	1, 2, 3
3	Apply Cascading Style Sheets to HTML static webpages.	Apply	1	1, 2, 3
4	Familiar with JavaScript functions and form validations.	Analyze	2	1, 2, 3,4, 5
5	Design and develop dynamic websites	Evaluate	2	1, 2, 3,4, 5

#### TEXT BOOKS:

1. Jon Duckett, “Beginning Web Programming with HTML, XHTML, and CSS”, 2<sup>nd</sup> Edition, Wiley India Pvt. Ltd, 2008.
1. Julie C. Meloni , “HTML, CSS, and JavaScript All in One”, Sams Teach Yourself, 3<sup>rd</sup> Edition, Pearson, 2015.

#### REFERENCE BOOKS:

1. Chris Bates, “Web Programming, Building Internet Applications”, 3 rd Edition, Wiley Dream Tech, 2006.
2. Jon Duckett, “HTML & CSS: Design and Build Websites”, 1 st Edition, John Wiley & Sons, 2011.

## 24MC104-COMPUTER ORGANIZATION AND OPERATING SYSTEMS

Hours per week:5

**PRE-REQUISITE KNOWLEDGE:** Digital Logic Design

L	T	P	C
3	2	0	4

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course aims at modern Computer Organization and Architecture. The emphasis is on understanding the design of computer and its components. The student will learn the concepts of data representation, micro-operations, memory organizations and input output organization. Further, it also helps students to understand the different scheduling policies, process synchronization mechanisms, deadlock handling mechanisms, memory management techniques and file management system.

### **MODULE – 1**

#### **UNIT – 1**

**12L+8T+0P=20 Hours**

#### **FUNDAMENTAL CONCEPTS**

Organization and Architecture, Register Transfers, Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

#### **BASIC COMPUTER ORGANIZATION AND DESIGN**

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Register reference instructions, Input-Output and Interrupt.

#### **UNIT – 2**

**12L+8T+0P=20 Hours**

#### **CENTRAL PROCESSING UNIT**

Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.

#### **MEMORY AND INPUT-OUTPUT ORGANIZATION**

Main memory, Associative memory, Cache memory, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access.

### **MODULE – 2**

#### **UNIT – 1**

**12L+8T+0P=20Hours**

#### **INTRODUCTION TO OPERATING SYSTEMS**

Introduction to Operating System Concept: Defining Operating Systems, Types of Operating Systems, Operating-System Structure, Operating-System Operations

#### **PROCESS MANAGEMENT**

**Process:** Process concept, Process State Diagram, Process control block, Process Scheduling, Inter process Communication.

**CPU SCHEDULING:** Basic Concepts, Preemptive Scheduling, Scheduling Criteria, Scheduling Algorithms.

#### **PROCESS SYNCHRONIZATION**

The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, The Dining-Philosophers Problem.

#### **UNIT – 2**

**12L+8T+0P=20Hours**

#### **DEADLOCK**

System Model, Deadlock characterization, Resource-Allocation Graph, Deadlock handling, Deadlock Prevention, Detection and Avoidance, Recovery Starvation, Banker's Algorithm.

#### **MEMORY MANAGEMENT**

**Main Memory:** Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation.

**Virtual Memory Management:** Demand Paging, Page-Replacement Algorithms, Thrashing.

**PRACTICES:**

- Number system and conversions from one system to other system.
- Performing various micro-operations on binary data.
- Simulate the Following CPU Scheduling Algorithms
- A) FCFS B) SJF C) Priority D) Round Robin
- Multiprogramming-Memory Management- Implementation of fork(), wait(), exec() and exit()
- Simulate The Following a. Multiprogramming with A Fixed Number Of Tasks (MFT)
- b. Multiprogramming with A Variable Number Of Tasks (MVT)
- Write a program to implement first fit, best fit and worst fit algorithm for memory management.
- Simulate Bankers Algorithm for Dead Lock Avoidance
- Simulate Bankers Algorithm for Dead Lock Prevention.
- Simulate The Following Page Replacement Algorithms.
- FIFO b) LRU c) LFU (d) Optimal
- Simulate the Following File Allocation Strategies
- Sequenced b) Indexed c) Linked

**COURSE OUTCOMES:**

Upon the completion of the course the student will be able to

CO No.	Course Outcome	Blooms Level	Module No.	Mapping with POs
1	Design different digital circuits required to perform the micro-operations.	Create	1	1,2,3,4,9,10,12
2	Classify the organization and architecture of computer systems, analyses the performance of memory, I/O.	Analyze	1	1,2,3,4,9,10,12
3	Apply the concepts of process scheduling algorithms and process synchronization techniques to derive the efficiency of resource utilization.	Apply	2	1,2,3,4,9,10,12
4	Design the various memory management schemes and file system structure for a given scenario	Create	2	1,2,3,4,9,10,12

**TEXT BOOKS:**

1. M.Moris Mano, “Computer Systems Architecture”, 3rd edition, Pearson/Prentice Hall India, 2007.
2. Abraham Silberschatz Peter B. Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, Wiley, 2013.

**REFERENCE BOOKS:**

1. William Stallings, “Computer Organization and Architecture”, 6th edition, Pearson/Prentice Hall India, 2007.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th edition, Tata McGraw Hill, 2007.
3. Garry. J. Nutt, “Operating Systems: A Modern Perspective”, 3rd Edition, Addison-Wesley, 2016.
4. Andrew S. Tanenbaum and Herbert Bros, “Modern Operating Systems”, 4th Edition, Pearson, 2015.

## 24MC105-PROBABILITY AND STATISTICS

Hours per week:5

L	T	P	C
3	2	0	4

**PREREQUISITE KNOWLEDGE:** Basic knowledge in statistics and mathematics.

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course deals with descriptive statistics, correlation, regression, and their applications, probability, theoretical distributions and testing of hypothesis. It also enables the student to understand and apply statistical techniques, curve fitting, correlation and regression, probability and also to make the student familiar with discrete, continuous distributions and testing of hypothesis.

### **MODULE – 1**

#### **UNIT – 1**

**12L+8T+0P=20 Hours**

#### **DESCRIPTIVE STATISTICS**

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves; Measures of Central tendency, Arithmetic mean, Median, Mode, Mean deviation, Standard deviation; Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

#### **UNIT – 2**

**12L+8T+0P=20 Hours**

#### **PROBABILITY AND RANDOM VARIABLES**

**Probability:** Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem and Bayes theorem.

**Random Variables:** Random variables, Discrete and Continuous variables and distribution function.

#### **PRACTICES:**

- Various graphical presentation techniques
- Measures of central tendency
- Skewness
- Karl Pearson's coefficient of skewness
- Definitions of probability
- Applications of addition theorem
- Applications of multiplication theorem
- Applications of conditional probability
- Random variables and types of random variables
- Distribution function

### **MODULE – 2**

#### **UNIT – 1**

**12L+8T+0P=20 Hours**

#### **REGRESSION ANALYSIS AND DISTRIBUTIONS**

**Correlation and regression:** Correlation, Types, Pearson's Coefficient of correlation, Regression, Regression lines.

**Distributions:** Introduction to Distributions: Binomial, Poisson and Normal distributions with properties and applications.

**UNIT – 2****12L+8T+0P=20 Hours****TESTING OF HYPOTHESIS**

Testing large samples-one mean, two means, one proportion and two proportions. Testing small samples- one mean, two means (independent and paired samples), Chi square tests-goodness of fit and independence of attributes.

**PRACTICES:**

- Correlation
- Types of correlation
- Karl Pearson’s coefficient of correlation
- Regression and regression lines
- Binomial distribution
- Poisson distribution
- Normal distribution
- Testing the large sample tests-one mean and two sample means
- One proportion and two proportion tests
- Testing small samples-one, two samples and paired tests
- Chi-square test for goodness of fit
- Chi-square test for independence of attributes

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply measures of central tendency, skewness, and Karl Pearson’s coefficient of skewness to study the statistical data sets.	Apply	1	1,2
2	Apply the probability theory and their applications to measure the uncertainty.	Apply	1	1,2
3	Study the relations between statistical variables and can fit the mathematical models for association.	Analyze	2	1,2,3
4	Test the statistical significances for various samples.	Evaluate	2	1,2,4
5	Understand the small sample tests and chi-square tests	Evaluate	2	1,4,5

**TEXT BOOKS:**

1. Sheldon M. Ross, An Introduction to Probability and Statistics for Engineers and Scientists, 3rd Edition, Academic Press, Elsevier, 2010.
2. S. C. Gupta and V. K. Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand Sons, 2012.

**REFERENCE BOOKS:**

1. P. R. Vittal, “Mathematical Statistics”, Margham Publications, Chennai, 2018.
2. Kishore S. Trivedi, “Probability and Statistics with Reliability, Queueing and Computer Science Applications”, 2nd edition, Wiley Student edition, 2008.
3. A. Singaravelu, “Probability and Statistics”, 22nd edition, Meenakshi Agency, 2015.

## 24MC106-SOFTWARE ENGINEERING AND TESTING

Hours per week:4

L	T	P	C
2	2	0	3

**PREREQUISITE KNOWLEDGE:** Fundamentals of Computers, Basic Programming.

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course focuses on the concepts of software life cycle, role of process models and methods to prepare software requirement specification document. In addition to that, it also imparts knowledge of design, development and testing of software. The objective of this course is to enable the student to develop efficient, cost effective, feasible software as per user requirements.

### **MODULE – 1**

#### **UNIT – 1**

**8L+8T+0P=16 Hours**

#### **INTRODUCTION TO SOFTWARE ENGINEERING**

**GENERIC VIEW OF PROCESS-PROCESS MODELS:** The evolving role of software, Software, Changing Nature of Software, Software myths. Software Development Life Cycle (SDLC), The Capability Maturity Model Integration (CMMI), Process Assessment. The Waterfall Model, Incremental Process Models, Evolutionary Process Models (Spiral and Prototype models).

#### **UNIT – 2**

**8L+8T+0P=16 Hours**

#### **AN AGILE VIEW OF PROCESS-REQUIREMENTS ENGINEERING-BUILDING THE ANALYSIS MODEL**

Agile process models - The Unified process, Extreme Programming, Scrum. Inception, Elicitation, Elaboration, Negotiation, Specification (SRS Document, IEEE Standards for SRS), Validation, Requirements management, Feasibility Study. UML Diagrams, Use case diagram, State Chart diagram, Activity diagram, Class diagram and sequence diagram.

### **MODULE – 2**

#### **UNIT – 1**

**8L+8T+0P=16 Hours**

#### **INTRODUCTION TO SOFTWARE TESTING**

A strategic approach to software testing; Test strategies for conventional software; Validation testing; System testing. Black-Box and White-Box testing. Reactive vs Proactive risk strategies, Software risks; Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan. Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software Quality Assurance, Configuration management, assessing and controlling software quality.

#### **UNIT – 2**

**8L+8T+0P=16 Hours**

#### **SOFTWARE TESTING & TOOLS**

CASE tools – Functional Testing tools, Performance testing tools, projects management tools –Preparing bug report using defect tracking tool.



**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the basic concepts of software engineering.	Apply	1	1,11
2	Compare different process models and identify appropriate process model based on project requirements.	Apply	1, 2	2,4
3	Build Software Requirement Specification (SRS) document for any software product.	Analyze	1	3,5
4	Design of solution using UML diagrams like use case, sequence diagrams etc.	Create	1,2	3,4,5
5	Create different testing techniques to ensure bug free software and measure metrics such as software size and quality of the product.	Create	2	4,5,11

**TEXT BOOKS:**

1. Roger S. Pressman, "Software Engineering, A practitioner's Approach", 6th edition, McGrawHill International edition, 2008
2. Booch G., Rumbaugh J. and Jacobsons I, "The Unified Modeling Language User Guide", 2nd edition, Addison Wesley, 2005.

**REFERENCE BOOKS:**

1. Simon Sennet, Steve McRobb and Ray Farmer, "Object Oriented Systems Analysis and Design, 2nd edition, 2004.
2. Deepak Jain "Software Engineering, Principles and Practices", Oxford University Press,2010.
3. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.

## 24MC107-TECHNICAL ENGLISH COMMUNICATION

Hours per week:3

L	T	P	C
1	0	2	2

**PREREQUISITE KNOWLEDGE:** Basic sentence formation, Understanding contextual meanings, Basic writing skills and Moderate fluency in English.

### **COURSE DESCRIPTION AND OBJECTIVES:**

In this course students will read, analyze, and interpret material from technical and general fields, and practice reading, writing, listening and speaking skills to gain exposure and functional English on a variety of contemporary topics. The overall course objective is to provide English for Specific Purposes (ESP) instruction to enhance students' reading, writing, listening and speaking skills through a practice in the language. It will aim to build students' confidence and motivation through exposure to academic skills like Note making/taking, Paraphrasing, Summarizing, Report Writing, Making Presentations etc., so as to generate interest in the language from an ESP perspective. Finally, students are expected through the course to gain key strategies and expression for communicating with professionals and non-specialists

### **MODULE – 1**

#### **UNIT – 1**

**4L+0T+8P=12 Hours**

#### **GENETICS**

**READING:** Reading for **Note Making** Sub skills: Reading for global understanding (skimming), specific information (scanning), understanding main ideas and supporting ideas, guessing contextual meanings from the text.

**Vocabulary building:** commonly used roots, prefixes, and suffixes.

**WRITING:** **Note making**, organizing main points and sub points, numbering and sequencing, suggesting titles, paraphrasing and summarizing.

**Functional grammar:** Common Errors in Articles and Prepositions (Handout)

**LISTENING:** Listening for Note Taking: top down and bottom-up approach, listening for main ideas and supporting points.

**SPEAKING: PRESENTATION** in teams - ideas on the topic summarized, making a PPT, effective introductions and conclusions, logical organization of content, using appropriate structure and cohesive devices

#### **UNIT – 2**

**4L+0T+8P=12 Hours**

#### **GENETICS**

**READING:** Reading: predicting, skimming, scanning, reading for inference, extrapolative reading

**VOCABULARY BUILDING:** Academic vocabulary from the text: synonyms, antonyms, Words often confused

**WRITING:** Paragraph writing; writing a topic sentence, supporting sentences, effective introductions and conclusions, use of cohesive devices. Types of Paragraphs: Descriptive, narrative, argumentative and expository.

**FUNCTIONAL GRAMMAR:** Common Errors in Verb forms and Conditional sentences (Handout)

**LISTENING:** Listening for identifying parts from a description, listening to and sorting information, listening for specific information.

**SPEAKING:** Narrating/Retelling an incident, using suitable cohesive devices/discourse markers Speaking of past and present habits/ activities/events - Speaking of future plans.

**PRACTICES:**

- Note making
- Summarizing
- Paragraph Writing
- Error correction and Restructuring
- Vocabulary building
- Listening comprehension
- Note taking

**MODULE – 2**

**UNIT – 1**

**4L+0T+8P=12 Hours**

**SOCIAL MEDIA – HEALTH AND NUTRITION**

**Reading:** Reading for factual information researching for supporting evidence - skimming, scanning, **Vocabulary building:** One-word substitutes.

**Writing:** Letter Writing - E-mail writing – New age communication – Format, protocol, and style- WhatsApp, Facebook and Twitter **Functional grammar:** Common Errors in Sub-Verb Agreement and Modals

**Listening:** Listening to a **Business Presentation:** Listening for deducing information, for abstract details and specific details, listening for taking a message.

**Speaking:** Making a presentation with a PPT on a topic assigned- organizing the presentation using appropriate discourse markers - presenting a point of view - Extempore

**UNIT – 2**

**4L+0T+8P=12Hours**

**FASHION**

**Reading:** Reading for data interpretation and information transfer from graphical aids to text reports (pictograms. tables, graphs, pie charts, flow charts), deducing specific information and general information -**Vocabulary building:** business vocabulary, collocations, idioms and phrasal verbs

**Writing:** Writing a Report: Drafting general and factual reports - writing an overview - an effective introduction - organizing information into paragraphs (Stages of writing: planning /organizing /writing /editing /rewriting)

**Functional grammar:** transformations and miscellaneous common errors

**Listening:** Listening to a Ted talk and sorting information – taking notes from a discussion.

**Speaking: Group Discussion** – prerequisites -generating content - initiating a discussion - expressing one’s opinion ~ leading a discussion - agreeing/ disagreeing to someone’s view - cutting into a speech - body language and voice modulation.

**PRACTICES:**

- E-mail writing
- Letter writing

- Report writing
- Messaging in Social media
- Extempore
- Making PPTs

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to

COs	Course Outcomes	Blooms Level	Module No	POs
1	Possess comprehensive skills in listening and reading business texts in formal context	Apply	2	7
2	Communicate effectively both in their academic as well as professional environment	Apply and create	1&2	10
3	Clear grasp on the register of business language	Apply	1	8
4	Possess the ability to write business reports and proposals clearly and precisely to succeed in their future	Apply and create	1	12
5	Make effective presentations and participate in formal context	Apply and create	2	10

**TEXT BOOK:**

1. N P Sudharshana & C Savitha, English For Technical Communication, Cambridge University Press, 2016.

**REFERENCE BOOKS:**

1. Balasubramanian T, A Text book of Phonetics for Indian Students. Orient Longman, New Delhi, 1989.
2. Krishnaswamy, N and Sriraman, T, Current English for Colleges. Trinity publications, 2016.
3. Mohan Krishna and Meera Banerjee, Developing Communication Skills. Macmillan India Ltd. New Delhi, 1990.
4. Ashraf Rizvi M, Effective Technical Communication, 2nd Edition, McGraw Hill Education, 2017.
5. Narayanaswamy V R, Strengthen your Writing. Third Edition Orient Black Swan, New Delhi, 2005.
6. Naterop, Jean, B. and Rod Revell, Telephoning in English. Cambridge University Press, Cambridge, 1997.

**I Year II Semester**

## 24MC108-DATABASE SYSTEMS

Hours per week:5

L	T	P	C
3	0	2	4

**PREREQUISITE KNOWLEDGE:** Computer Programming, Data Structures

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course presents an introduction to database management systems with an emphasis on how to organize, maintain and retrieve data efficiently from a relational database. It also focuses on requirements gathering and conceptual, logical, physical database design. The objective of the course is to enable the student to understand database design, expressing queries using SQL, transaction processing.

### **MODULE-1**

#### **UNIT-1**

**12L+0T+8P=20 Hours**

**DATABASES AND DATABASE USERS:** Introduction, Characteristics of the database approach; Actors on the scene, Advantages of using the DBMS approach.

**DATABASE SYSTEM CONCEPTS AND ARCHITECTURE:** Data models, Schemas, and instances, Three-Schema architecture and data Independence, Database languages and interfaces, the database system environment, Centralized and Client-Server architectures for DBMS.

**CONCEPTUAL DATA MODELING AND DATABASE DESIGN:** Entity types, Entity sets, Attributes, and keys, Relationship types, Relationship Sets, Roles, and structural constraints, Weak entity types, Relationship types of degree higher than two.

**THE RELATIONAL DATA MODEL AND RELATIONAL DATABASE CONSTRAINTS:** Relational model concepts, Relational model constraints and Relational database schemas.

**BASIC SQL:** SQL data definition and data types, specifying constraints in SQL, Basic retrieval queries in SQL.

#### **PRACTICES:**

- Design Conceptual database schema using ER Modelling Software Tools.
- Development of Relational Database schemas for Company/Student/Sailors/ using SQL and Perform the simple CRUDELY Operations and create Database users give the permissions for access the database.

#### **UNIT-2**

**12L+0T+8P=20 Hours**

**MORE SQL: COMPLEX QUERIES, TRIGGERS, VIEWS:** More complex SQL retrieval queries, Views (virtual tables) in SQL, Introduction to PL/SQL Procedures, Functions Specifying constraints as assertions and actions as triggers.

#### **PRACTICES:**

- Development of Relational Database schemas by specifying different types of Constraints for Company/Student/Sailors/Library perform Aggregate Functions expressing Nested queries using SQL and apply clauses like GROUP BY, HAVING and ORDER BY clauses of SQL.

- Design and Development of Company/Student/Sailors database and specifying queries using different types of JOINS.
- Creation and dropping of VIEWS for Company/Student/Sailors Data Bases.
- Implementation of PL/SQL programs with Control Structures.
- Implementation of Procedure for computes the square of value of a passed value.
- Implementation of Function for finding total number of students in class.
- Implementation of Triggers for updating employee salary details.

## **MODULE-2**

### **UNIT-1**

**12L+0T+8P=20 Hours**

#### **BASICS OF FUNCTIONAL DEPENDENCIES AND NORMALIZATION FOR RELATIONAL DATABASES**

Informal design guidelines for relation schemas, Functional dependencies-inference rules, equivalence and minimal cover, Normal forms based on primary keys, Boyce-Codd normal form, multivalued dependency and 4NF, Join dependencies and 5N, Properties of relational decompositions.

#### **PRACTICES:**

##### **Case study on Normalization**

- Implement the conversion of the database to first, second and third normal form is appropriate in a college environment.
- Implement the conversion of the database to first, second and third normal form is appropriate in a Library Management.
- Implement the conversion of the database to first, second and third normal form is appropriate in a Car Insurance.
- Implement the conversion of the database to first, second and third normal form is appropriate in a Hostel Management.
- Implement the conversion of the database to first, second and third normal form is appropriate in a Hospital Management.

### **UNIT-2**

**12L+0T+8P=20 Hours**

#### **INTRODUCTION TO TRANSACTION PROCESSING CONCEPTS AND THEORY**

Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions, Characterizing schedules based on serializability.

**CONCURRENCY CONTROL TECHNIQUES:** Two-phase locking techniques for concurrency control, Concurrency control based on timestamp ordering.

**NOSQL DATABASES AND BIG DATA STORAGE SYSTEMS:** Introduction to NoSQL systems, Document-based NoSQL systems and MongoDB.

#### **PRACTICES:**

##### **1. Case study on Transaction Processing and Concurrency Control Transactions & TPS Activities in Indian Railways**

###### **A) Passenger Reservation System**

- Checking current position on any train
- Make a reservation from any origin to any destination in India
- Pay for the ticket using any option like debit card, credit card, etc
- Changing/ Cancellation of bookings and getting money refund

**B) Freight Operation Information System**

- Checking real-time position of goods trains
- Checking number of rakes being used and number of idle rakes
- Volume and weight of goods being carried

**C) Crew Management System**

- Monitoring of activities of crew members
- Checking the location, time of arrival and waiting time of crew members
- Maintaining records of payment schedule information, duty schedule, training schedule of the crew members

**D) Integrated Coach Management System**

- Checking real-time location and movement of trains
- Scheduling trains movement near bottlenecks and heavy traffic zones
- Improving train arrival time accuracy

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Devise queries using SQL Subsets.	Apply	1	3,5
2	Evaluating Transaction Techniques	Analyze	1,2	3,4,5
3	Express queries using database tools like Oracle, MYSQL.	Analyze	2	4,5,11
4	Develop an E-R model for real life applications	Create	1	1,11
5	Design and normalize databases for real time applications.	Create	1, 2	2,4

**TEXT BOOKS:**

1. Ramez, Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, 7<sup>th</sup> Edition, Pearson Education, 2016.
2. Database Systems: The Complete Book 2<sup>nd</sup> Edition by Hector Garcia Molina, Jeffrey Ullman, Jennifer Widom.

**REFERENCE BOOKS:**

1. Raghu Rama Krishnan and Johannes Gehrke, “Database Management Systems”, 3<sup>rd</sup> Edition, Tata McGraw Hill, 2013.
2. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, “Database System Concepts”, 6<sup>th</sup> Edition, Tata McGraw Hill, 2010.



# 24MC109-OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Hours Per Week:5

L	T	P	C
3	0	2	4

**PREREQUISITE KNOWLEDGE:** Computer Programming.

## **COURSE DESCRIPTION AND OBJECTIVES:**

This course is about the fundamentals of Object-Oriented Programming (OOP) Concept and OOP-based software development methodology. Java as a class-based and pure OOP language is used to demonstrate and implement appropriate concepts and techniques. The students are exposed to the concepts, fundamental syntax, and the thought processes behind object-oriented programming. By end of the course, students will acquire the basic knowledge and skills necessary to implement object-oriented programming techniques in software development using Java.

## **MODULE – 1**

### **UNIT – 1**

**12L+0T+8P=20Hours**

**INTRODUCTION TO OOP:** Introduction to JDK, JRE, JVM, Byte code, Java buzzwords, OOP principles, Data types, Operators, Control statements, Type conversion and casting, Arrays, String class, String Tokenizer.

### **UNIT – 2**

**12L+0T+8P=20 Hours**

**CLASSES AND METHODS:** Introduction to classes and methods, objects, Constructors, Overloading Methods and Constructors, Usage of static, Access control, this key word, Garbage Collection.

**INHERITANCE:** Basics of Inheritance, Types of inheritance, Usage of super key word.

## **PRACTICES:**

- Reading different types of data from the user and display that data using Scanner class.
- Illustrating type conversions.
- Implementing different operators.
- Generating electricity bill
- Implementing different patterns.
- Implementing logical programs.
- Implementing Arrays.
- Implementing String class.
- Implementing String Tokenizer class.
- Implementing constructor overloading using this keyword
- Implementing method overloading and overriding
- Implementing forms of Inheritance and super keyword.

## **MODULE – 2**

### **UNIT – 1**

**12L+0T+8P=20 Hours**

**ABSTRACTION:** Implementing Abstract classes and Interfaces, Usage of final, creating, defining and accessing Packages, importing packages.

**EXCEPTION HANDLING:** Concepts of exception handling, Types of exceptions, Built-in exceptions, Usage of try, catch, throw, throws and finally keywords, Custom Exception.

**MULTITHREADING:** Thread, Thread life cycle, Thread creation, Thread priorities, multithreading

**UNIT – 2**

**12L+0T+8P=20 Hours**

**AWT, APPLETS AND GUI PROGRAMMING WITH SWING:** Applet life cycle, AWT, AWT Hierarchy, AWT Controls, Delegation Event Model.

**EXPLORING SWING CONTROLS:** JLabel, JText Field, JButton, JCheckBox, JRadioButton, JTabbed Pane, JList, JCombo Box.

**PRACTICES:**

- Create an abstract class Media (id, description). Derive classes Book (page count) and CD (play time). Define parameterized constructors. Create one object of Book and CD each and display the details.
- Define an interface, operations which has method area (), volume (). Define a constant PI having value 3.14. Create class a Cylinder which implements this interface (memberid, height). Create one object and calculate area and volume.
- Implementing packages.
- Implementing Exception handling.
- Implement java program which accepts withdraw amount from the user and throws an exception “In Sufficient Funds” when withdraw amount more than available amount.
- Creating Thread and Implementing multithreading.
- Create three threads and that displays “good morning”, for every one second,” hello” for every2 seconds and “welcome” for every 3 seconds by using extending Thread class.
- Develop an Applet program to accept two numbers from user and output the sum, difference in the respective text boxes.
- Design student registration form using Swing Controls. The form which having the following fields and button SAVE a. Form Fields are: Name, RNO, Mailid, Gender, Branch, Address.

**COURSE OUTCOMES:**

Upon completion of the course, student will able to achieve the following outcomes:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply Object oriented concepts for problem solving	Apply	1	PO1, PO2, PO3
2	Apply inheritance, polymorphism and Abstraction	Apply	1	PO1, PO2, PO3
3	Develop Interfaces and Packages to design real time applications	Create	2	PO1, PO2, PO3
4	Use Exception handling and Multithreading mechanisms to create efficient software applications	Analyze	2	PO3, PO4, PO5, PO6
5	Design and develop GUI based applications using applets and swings for internet and system-based applications.	Create	2	PO3, PO4, PO5, PO6

**TEXT BOOKS:**

1. Herbert Schildt, "Java the complete reference", 12th Edition, McGraw Hill, Education, 2021.
2. T. Budd, "Understanding Object-Oriented Programming with Java", Updated Edition, Pearson Education, 2000.

**REFERENCE BOOKS:**

1. J. Nino and F.A. Hosch, "An Introduction to programming and OO design using Java", 3rd Edition, John Wiley & sons, 2008.
2. P. Radha Krishna, "Object Oriented Programming through Java", 1st Edition, Universities Press, 2007.
3. R. A. Johnson, "Java Programming and Object-Oriented Application Development", 1st Edition, Cengage Learning, 2006.

## 24MC110-COMPUTER NETWORKS

Hours per week:4

L	T	P	C
2	2	0	3

**PREREQUISITE KNOWLEDGE:** Basic knowledge on computers and programming

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course focuses on imparting knowledge about various protocols involved in LANs and WANs. In addition, it gives good foundation on different protocols such as data link protocols, internet protocols and transport protocols present in the respective layers of computer networks.

### **MODULE – 1**

#### **UNIT – I**

**8L+8T+0P=16 Hours**

#### **INTRODUCTION TO NETWORKS AND PHYSICAL LAYER**

Uses of Computer Networks, Types of Computer Networks, Network Technology, From Local to Global, Examples of Networks, Network Protocols, Reference Models, Guided Transmission Media.

#### **UNIT – II**

**8L+8T+0P=16 Hours**

#### **DATA LINK LAYER AND MAC LAYER**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Bluetooth.

#### **PRACTICES:**

- Bit stuffing and byte stuffing.
- Error detection and correction.
- Performance calculation in MCA protocols.
- Performance evaluation in sliding window protocol.
- Study on physical addressing.

### **MODULE – 2**

#### **UNIT – I**

**8L+8T+0P=16 Hours**

#### **THE NETWORK LAYER**

Network Layer Design Issues, Routing Algorithms in A Single Network, Traffic Management at The Network Layer, Quality of Service and Application QOE, Internetworking, The Network Layer in the Internet.

#### **UNIT – II**

**8L+8T+0P=16 Hours**

#### **TRANSPORT AND APPLICATION LAYER**

Elements of Transport Protocols, Congestion Control, The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, Transport Protocols and Congestion Control, Performance Issues, DNS, Electronic Mail, The World Wide Web.

#### **PRACTICES:**

- Logical addressing division.
- Performance evaluation routing and congestion control algorithms.

- TCP/IP programming.
- UCP/IP programming.
- Configuration of email system.

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the suitable network devices and methodologies to establish required network for given scenario	Apply	1	1, 2, 12
2	Simulate and demonstrate the OSI reference model layer services	Analyse	1	1, 2, 3, 5, 12
3	Analyse the various computer network addressing techniques like physical addressing, logical addressing, port addresses and special addressing	Apply	2	1, 2, 6, 12
4	Design and develop simple network applications using TCP/IP suite in one high level programming language	Analyse	2	1, 2, 12

**TEXT BOOK:**

1. Andrew S. Tanenbaum, “Computer Networks”, 6<sup>th</sup> Edition. Pearson Education, 2021.

**REFERENCE BOOKS:**

1. Behrouz A. Forouzan, “Data communications and Networking”, 4th Edition, TMH, 2017.
2. William Stallings, “Data and Computer Communications”, 10th Edition, Pearson Education, 2017.

## 24MC111-ORGANIZATION BEHAVIOR

Hours per week:4

L	T	P	C
2	2	0	3

**PREREQUISITE KNOWLEDGE:** NIL

**COURSE DESCRIPTION AND OBJECTIVES:** To comprehend the dynamics of Management practices in international context, to evaluate behavioral frameworks that suits for corporate world from Global perspective and various business model that suits for all international context

### MODULE – 1

#### UNIT – 1

**8L+8T+0P=16 Hours**

##### INTRODUCTION TO OB

Nature of OB: Nature and scope of OB - contributing disciplines to OB - Environmental and Organizational context of Organizational Behavior

#### UNIT – 2

**8L+8T+0P=16 Hours**

##### PERCEPTION, PERSONALITY AND ATTITUDE

Perception - Process: Individual and Organizational factors that influence perceptual process. Role of perception in managerial activities and organizational processes.

Personality and Attitudes: Personality as continuum – Meaning of Personality – Johari window and Transactional Analysis Nature and Dimension of Attitudes

##### PRACTICES:

- Survey on resistance to changing policies in The Banking Sector, The IT Sector
- Undertake a study to find out the various non-financial incentives used to motivate employees.
- A study in job enrichment and factors contributing to absenteeism and employee turnover in any industry of your choice.
- Analyze the characteristics and components of attitudes.
- Perform a study on the determinants of personality of a group of individuals.
- **Case study:** Organizational Behavior by Steven L McShane, Mary Ann VonGlinow and Radha R Sharma, TaTa McGraw Hill companies, Fouth Edition, Pg-6.

### MODULE – 2

#### UNIT – 1

**8L+8T+0P=16Hours**

##### GROUP DYNAMICS

Group Dynamics: The Nature of groups. Kinds of groups – Stages of Group Development – Factors Contributing to Groups Cohesiveness - Meaning & types of stress – Effect of Stress – Strategies of cope with stress Principles of Learning & Reinforcement - Observational Learning - Cognitive Learning - Organizational Behavior Modification - Steps in Organizational Behavior Modification process.

#### UNIT – 2

**8L+8T+0P=16Hours**

##### CONFLICT MANAGEMENT

Nature of conflict – Dynamics of Conflict – Conflict resolution modes – approaches to conflict management – sources of conflict in organization.

**PRACTICES:**

- Analyze the organizational culture and climate in the BPO industry.
- Conduct a study on the reasons for attrition in the BPO industry.
- Studying organizational structures of any 10 companies and classifying them into different types of organizations which are those organizations.
- Preparing the leadership profiles of any 5 business leaders and studying their leadership qualities and behaviors with respects to the trait, behavioral and contingency theories studied.
- **Case Study:** “Nuts and Bolts”, Principles of Management, Cengage learning ,William ,Manjunath , Sandhya Page no 531-532.
- Identifying any five job profiles and listing the various types, abilities required for those jobs and also the personality traits/attributes required for the jobs identified.

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to

<b>CO No.</b>	<b>Course Outcomes</b>	<b>Blooms Level</b>	<b>Module No.</b>	<b>Mapping with POs</b>
1	Identifying nature and scope of OB	Apply	1	1, 2, 12
2	Become aware of perceptual process and possible errors and act accordingly	Analyze	1	1, 2, 6, 12
3	Identify differences in personalities and attitudes	Evaluate	1	1, 2, 4, 6, 12
4	Act according to the group dynamics and handle stress	Apply	2	1, 2, 12
5	Resolve certain issues by applying conflict management	Apply	2	1, 2, 4, 6, 8

**TEXT BOOK:**

1. Luthans, Fred, “Organizational Behaviour”, 12th edition, Mcgraw Higher Ed, 2013.

**REFERENCE BOOK:**

1. Debra L. Nelson, James Campbell Quick, “Organization Behavior”, 8th edition, Cengage, 2013.

## 24MC112-SOFT SKILLS LABORATORY

Hours per week:2

L	T	P	C
0	0	2	1

**PREREQUISITE KNOWLEDGE:** Basic sentence formation, Understanding contextual meanings, Basic writing skills and Moderate fluency in English.

### COURSE DESCRIPTION AND OBJECTIVES:

- To impart employability skills like resume preparation and facing interviews.
- To enable trainees to develop interpersonal and leadership skills.
- To train them on work place skills like making presentations, participating in group discussions etc.

## MODULE – 1

### UNIT – 1

**0L+0T+8P=8 Hours**

#### PERSONALITY DEVELOPMENT

a) **Soft Skills:** Need for soft skills, professionalism, employability skills.

b) **Communication:** Need for effective communication - the process of communication, levels of communication, flow of communication, choice of diction and style with reference to setting (formal, semi-formal or informal) -communication networks, barriers to communication, miscommunication, noise and ways to overcome the barriers

**Practice:** Self Introduction

c) **Career Planning:**

- Job vs. career,
- SWOT analysis

**Practice:** Personal and Academic SWOC.

d) **Johari Window**

**Practice:** Giving and taking opinions of Self Vs others and assessing oneself.

e) **Goal setting**

**Practice:** Short-, Mid- and Long-Term goals planning the semester.

f) **Time management: four quadrant system**

**Practice:** Stephen Covey Time Management Matrix planning a semester.

g) **Stress-management**

**Practice:** Questionnaire to assess level of stress.

### UNIT – 2

**0L+0T+8P=8 Hours**

#### VOCABULARY BUILDING

a) **Vocabulary Building:** Word etymology, roots, prefixes & suffixes, synonyms & antonyms, collocations, one-word substitutes, analogies, idioms and phrases, contextual guessing of unfamiliar words, task-oriented learning

**Practice:** (50 words) relating to resume preparation and Interviews, newly coined words

b) **Reflects of language on Personality**

- Gender sensitive language in MNCs
- Mind your language

**Practice:** Gender sensitive words and Words acceptable in Indian context and



objectionable international context

- C) Seven essential skills for a team player; attentive listening, intelligent questioning, gently persuading, respecting other's views, assisting others, sharing, participating actively.

## MODULE – 2

### UNIT – 1

0L+0T+8P=8Hours

#### FUNCTIONAL ENGLISH

**a) Functional English:** Situational dialogues, Role plays (including small talk)

**Practice:** Opening and closing a telephonic conversation, making an appointment, making a query, Offering/Passing on information, communicating with superiors, expressing agreement/objection, opening bank account (combination of prepared and impromptu situations given to each student).

**b) Group Discussion:** Articulation and flow of oral presentation, dynamics of group discussion, intervention, summarizing and conclusion, voice modulation, content generation, Key Word Approach (KWA), Social, Political, Economic, Legal and Technical Approach (SPELT), View Point of Affected Part (VAP), language relevance, fluency and coherence – 11th and 12th weeks.

**Practice:** Group Discussions on various topics.

**c) Resume preparation:** Structure and presentation, defining career objective, projecting one's strengths and skill-sets, summarizing, formats and styles and covering letter-

**d) Statement of Purpose:**

**Practice:** Preparing one's SoP and Resume.

### UNIT – 2

0L+0T+8P=8Hours

#### PRESENTATION SKILLS & INTERVIEWS

**a) Facing Interviews:**

Interview process, understanding employer expectations, pre-interview planning, opening strategies, impressive self-introduction, answering strategies, other critical aspects such as body language, grooming, other types of interviews such as stress-based interviews, tele-interviews, video interviews, frequently asked questions (FAQs) including behavioural and HR questions and the aspect looked at by corporate during interviews.

**Practice: Mock interviews on the FAQs including feedback**

**b) Presentation Skills:** Selection of a topic, preparing an abstract, gathering information, organizing the information, drafting the paper, citing reference sources – writing striking introductions, discussing the methodology used, developing the argument, presentation style, language, presenting the paper and spontaneously answering audience questions.

**Practice:** oral presentation with the help of technology (Preparing PPT and presenting).

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to

CO No	Course Outcomes	Blooms Level	Module No	POs
1	Have the ability to introspect on individual strengths and weaknesses, and emerge as a balanced personality with improved self-awareness and self-worth	Apply	1	12
2	Observe gender sensitive language and workplace etiquette in his professional life	Apply	1	9
3	Be able to prepare a resume and gain the confidence to face an interview	Create	1&2	10
4	Possess the interpersonal skills to conduct himself/herself effectively in everyday professional and social contexts	Apply	2	8
5	Be able to bring professionalism into his/her daily activities	Apply	2	8

**TEXT BOOKS:**

1. Krishna Mohan & NP Singh, "Speaking English effectively" 1<sup>st</sup> edition, Macmillan, 2008.
2. Dr. S.P. Dhanvel, English and Soft skills, Orient Blackswan, 2011
3. Rajiv K. Mishra, Personality Development, Rupa& Co. 2004.

**REFERENCE BOOKS:**

1. Edward Holffman, Ace the corporate personality, McGraw Hill, 2001
2. Adrian Furnham, Personality and intelligence at work, Psychology Press, 2008.
3. John Adair Kegan Page, "Leadership for innovation" 1<sup>st</sup> edition, Kogan, 2007.

**II Year I Semester**

## 24MC201-CRYPTOGRAPHY AND NETWORK SECURITY

Hours per week:5

L	T	P	C
3	0	2	4

**PREREQUISITE KNOWLEDGE:** Computers Networks, Number theory and computational Complexity.

### **COURSE DESCRIPTION AND OBJECTIVES:**

Cryptography refers to secure information and communication techniques derived from mathematical concepts and a set of rule-based calculations called algorithms, to transform messages in ways that are hard to decipher. To understand Cryptography Theories, Algorithms and Systems and understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

### **MODULE – 1**

#### **UNIT – I**

**12L+0T+8P=20 Hours**

**INFORMATION AND NETWORK SECURITY CONCEPTS:** Cybersecurity, Information Security, and Network Security, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Cryptography.

**SYMMETRIC CIPHERS - Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.

#### **UNIT – II**

**12L+0T+8P=20 Hours**

#### **SYMMETRIC CIPHERS**

**BLOCK CIPHERS AND THE DATA ENCRYPTION STANDARD:** Traditional Block Cipher Structure, The Data Encryption Standard, Double DES, Triple DES, The Strength of DES, Block Cipher Design Principles, **Finite Fields:** Groups, Rings, Fields, **Advanced Encryption Standard, Block Cipher Operation:** Multiple Encryption and Triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode, **Random Bit Generation and Stream Ciphers.**

#### **PRACTICES:**

- Perform encryption, decryption using the following substitution techniques (i) Caesar cipher, (ii) Playfair cipher (iii) Hill Cipher (iv) Vigenere cipher.
- Perform encryption and decryption using following transposition techniques i) Rail fence ii) row & Column Transformation.
- Apply DES algorithm for practical applications.
- Apply AES algorithm for practical applications.
- Write the RC4 logic in Cryptography, encrypt the text “Hello world” using Blowfish. Create your own key.

## MODULE – 2

### UNIT – I

12L+0T+8P=20 Hours

#### ASYMMETRIC CIPHERS

**Public-Key Cryptography and RSA:** Principles of Public-Key Cryptosystems, The RSA Algorithm, **Other Public-Key Cryptosystems:** Diffie–Hellman Key Exchange, ElGamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

#### CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS

**Cryptographic Hash Functions:** Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA), SHA-2, SHA-3, **Message Authentication Codes, Digital Signatures:** Digital Signatures, ElGamal Digital Signature Scheme, Schnorr Digital Signature Scheme, Elliptic Curve Digital Signature Algorithm, RSA-PSS Digital Signature Algorithm.

### UNIT – II

12L+0T+8P=20 Hours

#### MUTUAL TRUST

Cryptographic Key Management and Distribution, User Authentication.

#### NETWORK AND INTERNET SECURITY

Transport-Level Security, Wireless Network Security, Electronic Mail Security, IP Security, **Network Endpoint Security:** Firewalls, Intrusion Detection Systems, Malicious Software, Distributed Denial of Service Attacks, **Cloud Security, Internet of Things (IoT) Security.**

#### PRACTICES:

- Write a program to implement the RSA algorithm.
- Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
- Calculate the message digest of a text using the SHA-2 algorithm.
- Calculate the message digest of a text using the MD5 algorithm.
- Implement the SIGNATURE SCHEME – Digital Signature Standard.
- Demonstrate intrusion detection system (IDS) using any tool eg. Snort or any other s/w.
- Defeating Malware i) Building Trojans ii) Rootkit Hunter.

#### COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	Analyze	1	1, 2, 12
2	Apply the different cryptographic operations of symmetric cryptographic algorithms	Apply	1	1, 2, 6, 12
3	Apply the different cryptographic operations of public key cryptography	Apply	1	1, 2, 4, 6, 12
4	Apply the various Authentication schemes to simulate different applications.	Apply	2	1, 2, 12

**TEXT BOOK:**

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 8<sup>th</sup> Edition, 2023.

**REFERENCE BOOKS:**

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd, 2017.
2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill, 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: Communication in a PUBLIC World, Prentice Hall, 2008.

## 24MC202-FULL STACK TECHNOLOGIES

Hours Per Week:5

**PREREQUISITE KNOWLEDGE:** DBMS, Web Technologies, Java Programming

L	T	P	C
3	0	2	4

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course provides an in-depth understanding of full stack development, equipping students with the skills needed to build, deploy, and maintain dynamic web applications. Covering both front-end and back-end technologies, this course will take you through the entire process of web development, from initial design and user interface creation to server-side programming, database management, and deployment. By the end of the course, students will have hands-on experience with building and deploying a full-stack application.

### **MODULE-1**

#### **UNIT-1**

**12L+0T+8P=20 Hours**

**JSP TECHNOLOGY:** The anatomy of a JSP page, JSP processing, JSP Application Development: Generating dynamic content, using scripting elements, Implicit JSP objects, declaring variables and methods, sharing data between JSP pages, Users passing control, JDBC, Driver types, Components, JSP application design with JDBC.

#### **UNIT-2**

**12L+0T+8P=20 Hours**

**ASP.NET:** Architecture, MVC, components, characteristics, life cycle, Server controls: HTML server controls, web server controls, validation server controls, Directives.  
**ADO. NET:** Architecture, Data Providers, Form Data Processing, Data Sources, Data Binding, Database connection.

### **PRACTICES:**

- Create a simple JSP page with HTML content including headers, paragraphs, and lists.
- Experiment with adding JSP script lets, expressions, and declarations to display dynamic content.
- Design a simple CRUD (Create, Read, Update, Delete) application using JSP and JDBC to manage a database.
- Experiment with different types of server controls in ASP.NET, such as HTML server controls, web server controls, and validation controls.
- Create a simple ASP.NET application that connects to a database using ADO.NET and displays data in a grid.
- Practice data binding by displaying database records in various ASP.NET server controls like GridView, Repeater, or DataList.

## MODULE-2

### UNIT-1

**12L+0T+8P=20 Hours**

**ANGULAR JS:** The basics of AngularJS, Introduction to MVC, modules, controllers, Directives, two-way data binding, working with Forms, handling events, filters.

**NODE JS:** Introduction, Using the Terminals, Editors, Building a Webserver with Node, The HTTP Module, Views and Layouts, Middleware, Routing, Node JS and MySQL.

### UNIT-2

**12L+0T+8P=20 Hours**

**MongoDB:** Introduction, Key Characteristics, Understanding MongoDB Ecosystem, Comparison with SQL databases, General Setup Instructions & Installation, JSON and MongoDB, Creating Databases and Collections, Documents, CRUD operations with Mongoose.

### PRACTICES:

- Create an AngularJS application that displays a list of items retrieved from a hardcoded array.
- Implement two-way data binding in AngularJS to update the UI dynamically based on model changes.
- Build a form in AngularJS that allows users to input data and submit it to display on the page.
- Build a simple web server using Node.js that serves static HTML files.
- Implement basic routing in a Node.js application to handle different URL paths.
- Connect Node.js to a MySQL database and perform CRUD operations using raw SQL queries.
- Install MongoDB locally and set up a development environment.
- Insert documents into collections using the MongoDB shell and/or a Node.js application.
- Query documents from collections using various criteria like equality, comparison, and logical operators.
- Update and delete documents in MongoDB collections using CRUD operations.
- Practice using Mongoose, a Node.js library for MongoDB, to perform CRUD operations and schema-based data modeling.

### COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Develop dynamic web applications using JSP with proper structuring, including scripting elements, implicit objects, and JDBC integration for database connectivity.	Create	1	PO1, PO3, PO5



2	Understand ASP.NET architecture and ADO.NET data access mechanisms for developing robust web applications.	Analyze	1	PO1,PO12
3	Apply AngularJS fundamentals and its role in front-end development.	Apply	2	PO10,PO11
4	Design front-end applications with Node.js back end for full-stack development.	Analyze	2	P05,PO11,PO12
5	Develop efficient database solutions using MongoDB collections and documents.	Apply	2	PO6, PO10, PO11

**TEXT BOOKS:**

1. Marty Hall and Larry Brown, Core Servlets and Java Server pages Vol. 1: Core Technologies, 2nd edition, Pearson, 2004
2. Andrew Troelsen, Philip Japikse, “Pro C# 7 with .NET and .NET core, 8<sup>th</sup> Edition, Apress, 2018.
3. Ethan Brown, “Web Development with Node and Express”, 1<sup>st</sup> Edition, Oreilly Publishers, 2014.
4. BradDayley, “Learning Angular JS”, 1<sup>st</sup> Edition, Addison-Wesley Professional, 2014.
5. David Hows, Peter Membrey, Eelco Plugge “MongoDB Basics”, Apress, 2014.

**REFERENCE BOOKS:**

1. Hans Bergsten, “Java Server Pages”, 3rd Edition, O'Reilly Media, 2011.
2. Adam Freeman, “Pro ASP.NET Core MVC”, 6<sup>th</sup> Edition, Apress, 2016.
3. AgusKurniawan, “AngularJS Programming by Example”, 1stEdition, PE Press, 2014.
4. Steve Hoberman, “Data Modeling for MongoDB”, 1stEdition, Technics Publication, 2014

## 24MC203-BIG DATA ANALYTICS

Hours Per Week:5

L	T	P	C
3	0	2	4

**PREREQUISITE KNOWLEDGE:** Basics of database, Data mining

### **COURSE DESCRIPTION AND OBJECTIVES:**

This course gives an overview of Big Data, i.e., storage, retrieval, and processing of big data. In addition, it also focuses on the “technologies”, i.e., the tools/algorithms that are available for storage, and processing of Big Data. It also helps a student to perform a variety of “analytics” on different data sets and to arrive at positive conclusions.

### **MODULE-1**

#### **UNIT-1**

**12L+0T+8P=20 Hours**

#### **INTRODUCTION TO BIG DATA ANALYTICS**

**INTRODUCTION:** Data, Characteristics of data and types of digital data, Sources of data, working with unstructured data, Evolution, and definition of big data, Characteristics and need of big data, and Challenges of big data

**BIG DATA ANALYTICS:** Overview of business intelligence, Data Science, and analytics, Meaning and characteristics of big data analytics, Need for big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in the big data environment.

#### **UNIT-2**

**12L+0T+8P=20 Hours**

**HADOOP, HDFS:** Introducing Hadoop, Need of Hadoop, Limitations of RDBMS, RDBMS versus Hadoop, Distributed computing challenges, History of Hadoop, Hadoop overview, the use cases of Hadoop, Hadoop distributors, HDFS, Processing data with Hadoop, managing resources and applications with Hadoop YARN, Hadoop ecosystem.

#### **PRACTICES:**

- Setting up Hadoop on a standalone machine.
- Wordcount Map Reduce program using standalone Hadoop.
- Adding the combiner step to the Wordcount Map Reduce program.
- Using HDFS monitoring UI.
- HDFS basic command-line file operations.
- Setting Hadoop in a distributed cluster environment.
- Running the Word Count program in a distributed cluster environment.
- Practice on Map Reduce monitoring User Interface
- Sort operation using MapReduce

### **MODULE-2**

#### **UNIT-1**

**12L+0T+8P=20 Hours**

**MAPREDUCE and HIVE:** Introduction to mapper, reducer, combiner, partitioner, searching, sorting, compression, real-time applications using MapReduce, combiner, partitioner, Programming using Map Reduce, Matrix multiplication using MapReduce, and page rank algorithm using Map Reduce.

Introduction to Hive, Hive architecture, Hive data types, Hive file format, Hive query language (HQL), Partitions and bucketing, RC File Implementation, working with XML files, User-defined Function (UDF) in Hive.

## UNIT-2

**12L+0T+8P=20 Hours**

**PIG and SPARK:** The anatomy of pig, Pig versus Hive, Pig on Hadoop, Pig philosophy, Use case for pig, ETL processing, Pig Latin overview, Data types in pig, Relational operators, Piggy bank, running pig, Execution modes of pig, HDFS commands, Word count example using pig.

**INTRODUCTION TO SPARK:** features of spark, components of spark, programming with Resilient Distributed Datasets (RDD).

### PRACTICES:

- Creation of Database using hive.
- The practice of Hive Query Language operations.
- Basic operations in the pig.
- Implementation of Word count using Pig.
- Simple programs using Spark.
- Implementation of Word count using Spark

### COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No	Mapping with POs
1	Classify fundamentals of various big data analytics techniques	Analyze	1	1, 2, 3, 4, 9, 10 12
2	Analyze the Big Data frameworks like Hadoop to efficiently store and process Big Data to generate Analytics.	Analyze	1	1, 2, 3, 9, 10 12
3	Analyze the HADOOP and Map Reduce technologies associated with big data analytics	Analyze	2	1, 2, 3, 9, 10, 12
4	Apply data analytics on real time datasets using Hive and Pig	Apply	2	1, 2, 3, 4, 9, 10 12
5	Evaluate functions of Hive, Pig and Spark using real time datasets	Evaluate	2	1, 2, 3, 4, 5, 9, 10, 12

### TEXT BOOKS:

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", 1st Edition, Wiley Publishers, 2015.
2. Holden Karau, Andy Konwinski, Patrick Wendell and Matei Zaharia, "Learning Spark", 1st Edition, Oreilly, 2015.

### REFERENCE BOOKS:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge, University Press, 2012.

2. Boris lublinsky, Kevin t. Smith and AlexeyYakubovich, “Professional Hadoop Solutions”, 1st Edition, Wiley, 2015.
3. Chris Eaton and Dirkderoosetal, “Understanding Big data”, 1st Edition, McGraw Hill, 2012.
4. Tom White, “HADOOP: The definitive Guide”, 1st Edition, O Reilly 2012.