

SENGUNTHAR ARTS AND SCIENCE COLLEGE

(Autonomous)

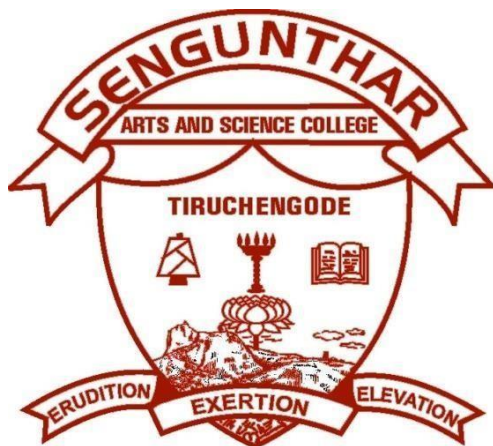
NAAC Accreditation A⁺ (2nd Cycle)

Affiliated to Periyar University, Salem and Approved by AICTE, New Delhi

An ISO 9001:2015 Certified Institution Recognized under section 2(f) and 12(B) of the UGC Act 1956

Tiruchengode – 637 205, Namakkal DT., Tamil Nadu

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SYLLABUS

B.C.A

BACHELOR OF COMPUTER APPLICATIONS

(CBCS – LOCF)

(With effect from the Academic Year 2024-25 onwards)

CHAIRMAN

CDC

PRINCIPAL

CORRESPONDENT

INTRODUCTION

BCA (Bachelor of Computer Applications) is an undergraduate degree program that focuses on computer applications and software development, with a strong emphasis on practical skills and industry-ready training. It aims to provide students with a comprehensive understanding of computer science principles, programming languages, software engineering, and computer applications, as well as expertise in emerging technologies like artificial intelligence, data science, and cloud computing.

The course structure is designed with Foundation courses in computer science, mathematics, and programming in the First Year, Intermediate courses in computer applications, including data structures, algorithms, and computer systems in the Second Year- Advanced courses in computer applications, including software engineering, web development, database management, and specializations like AI, Data Science, and Cloud Computing in the Third Year. The course with its special features such as Hands-on training in programming languages like Java, Python, and C++ ,Exposure to emerging technologies like AI, Data Science, and Cloud Computing, Project-based learning and industry internships, strong focus on software development and testing methodologies provides opportunities for specialization in areas like AI, Data Science, and Cloud Computing , industry-ready skills in computer applications, provides a strong foundation for further studies like M.C.A or careers as Software Developer, Web Developer, Database Administrator, IT Consultant Computer Systems Analyst, Network Administrator, Cyber Security Specialist, Data Analyst, AI/ML Engineer, Cloud Computing Professional.

AIM

The syllabus of this program is aimed at preparing the students with the latest developments and put them on the right track to fulfill the present requirements.

ELIGIBILITY FOR ADMISSION:

A candidate who has passed in Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Computer Applications or Computer Technology or Information technology or Statistics (Academic stream or Vocational stream) as one of the courses and have not studied mathematics should undergo a bridge course on mathematics for a minimum duration of 15 days.

PROGRAM OUTCOMES

REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAME WORK (CBCS) FOR UNDERGRADUATE	
Programme	B.C. A
Programme Code	24UCA
Duration	UG-Three Years
Programme Outcomes (POs)	PO1: Scientific aptitude will be developed in Students. PO2: Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream. PO3: Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship. PO4: Students will possess basic subject knowledge required for higher studies, professional and applied courses. PO5: Students will be aware of and able to develop solution-oriented approach towards various Social and Environmental issues. PO6: Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications. PO7: These skills and knowledge gained lead to proficiency in analytical reasoning, which can be utilized in modelling and solving real life problems. PO8: Utilize computer programming skills to solve theoretical and applied problems by critical understanding, analysis and synthesis. PO9: To recognize patterns and to identify essential and relevant aspects of problems. PO10: Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others

Programme Specific Outcomes (PSO)

Programme Specific Outcomes (PSOs)	PSO1: Think in a critical and logical based manner. PSO2: Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences. PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand. PSO4: Understand, formulate, develop programming model with logical approaches to an Address issues arising in social science, business and other contexts. PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.
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	POs										PSOs				
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	PS01	PS02	PS03	PS04	PS05
CLO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CLO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CLO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CLO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CLO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Level of Correlation between POs and PSOs (*Suggested by UGC as per Six Sigma Tool–Cause and Effect Matrix*);

1–Low, 2–Medium, 3–High, 0–No Correlation

BACHELOR OF COMPUTER APPLICATIONS

FIRST SEMESTER

S.No	Course Category	Course Code	Title of the Course	Hrs / Week			Credit Points	Max Marks		
				L	T	P		CIA	ESE	Total
1	Part-I Language-I	24S1UFTA01	பொதுத்தமிழ் - I	6	-	-	3	25	75	100
2	Part-II English Language I	24S1UFEN01	General English-I	6	-	-	3	25	75	100
3	Part-III Core-I	24S1UCA01	Python Programming	5	-	-	5	25	75	100
4	Part-III Core Practical -I	24S1UCAP01	Practical: Python Programming Lab	-	-	3	3	25	75	100
5	Part-III Generic Elective-I		Choose from Annexure - I	4	-	-	3	25	75	100
6	Part-III Generic Elective-II		Choose from Annexure - I	-	-	2	2	40	60	100
7	Part-IV Foundation Course-I	24S1UCAF01	Fundamentals of C Programming	2	-	-	2	25	75	100
8	Part-IV NME-I	24S1UCAN01	Fundamentals of Information Technology.	2	-	-	2	25	75	100
		24S1UCAN02	PC Hardware and Trouble Shooting							
Total				25		05	23			800

BACHELOR OF COMPUTER APPLICATIONS

SECOND SEMESTER

S.No	Course Category	Course Code	Title of the Course	Hrs / Week			Credit Points	Max Marks		
				L	T	P		CIA	ESE	Total
1	Part-I Language – II	24S2UFTA02	பொதுத்தமிழ் - II	6	-	-	3	25	75	100
2	Part-II English Language II	24S2UFEN02	General English–II	6	-	-	3	25	75	100
3	Part-III Core–II	24S2UCA02	Object Oriented Programming using C++	5	-	-	5	25	75	100
4	Part-III Core Practical-II	24S2UCAP02	Practical: C++ Programming Lab	-	-	3	3	25	75	100
5	Part-III Generic Elective-I		Choose from Annexure – I	4	-	-	3	25	75	100
6	Part-III Generic Elective-II		Choose from Annexure – I	-	-	2	2	40	60	100
7	Part–IV NME-II	24S2UCAN03	MS-Office packages							
		24S2UCAN04	Fundamentals of E-Commerce	2	-	-	2	25	75	100
8	Part-IV Skill Based Elective–I		Chosen from Annexure – II	2	-	-	2	25	75	100
Total				25		05	23			800

BACHELOR OF COMPUTER APPLICATIONS

THIRD SEMESTER

S.No	Course Category	Course Code	Title of the Course	Hrs / Week			Credit Points	Max Marks		
				L	T	P		CIA	ESE	Total
1	Part-I Language -III	24S3UFTA03	பொதுத்தமிழ் - III	6	-	-	3	25	75	100
2	Part-II English Language –III	24S3UFEN03	General English–III	6	-	-	3	25	75	100
3	Part-III Core–III	24S3UCA03	Data Structures and Algorithms	5	-	-	5	25	75	100
4	Part-III Core Practical–III	24S3UCAP03	Practical: Data Structures and Algorithms using C++ Lab	-	-	3	3	25	75	100
5	Part - III Generic Elective-III		Chosen from Annexure I (Generic Specific)	6	-	-	5	25	75	100
6	Part-IV SEC- II		Chosen from Annexure II	2	-	-	2	25	75	100
7	Part-IV SEC-III		Chosen from Annexure II	-	-	1	1	25	75	100
8	Part-IV EVS		Environmental Studies	1	-	-	-	-	-	-
Total				26		04	22			700

BACHELOR OF COMPUTER APPLICATIONS

FOURTH SEMESTER

S.No	Course Category	Course Code	Title of the Course	Hrs / Week			Credit Points	Max Marks		
				L	T	P		CIA	ESE	Total
1	Part-I Language-IV	24S4UFTA04	பொதுத்தமிழ் - IV	6	-	-	3	25	75	100
2	Part-II English Language-IV	24S4UFEN04	General English-IV	6	-	-	3	25	75	100
3	Part-III Core-IV	24S4UCA04	Programming in Java	4	-	-	4	25	75	100
4	Part-III Core Practical-IV	24S4UCAP04	Practical: Programming in Java Lab	-	-	3	3	25	75	100
5	Part - III Generic Elective-IV		Chosen from Annexure I (Generic Specific)	4	-	-	4	25	75	100
6	Part-III Generic Elective Lab - III		Chosen from Annexure I (Generic Specific)	-	-	2	2	25	75	100
7	Part-IV SEC- IV		Chosen from Annexure II	2	-	-	2	25	75	100
8	Part-IV SEC-V		Chosen from Annexure II	-	-	2	2	25	75	100
9	Part-IV EVS	24S4UES01	Environmental Studies	1	-	-	2	25	75	100
Total				23		07	25			900

BACHELOR OF COMPUTER APPLICATIONS

FIFTH SEMESTER

S.No	Course Category	Course Code	Title of the Course	Hrs / Week			Credit Points	Max Marks		
				L	T	P		CIA	ESE	Total
1	Part – III Core V	24S5UCA05	Operating System	5	-	-	4	25	75	100
2	Part – III Core VI	24S5UCA06	ASP.Net Programming	5	-	-	4	25	75	100
3	Part – III Core Practical VI	24S5UCAP06	ASP.Net Programming	-	-	5	4	25	75	100
4	Part - III Discipline Elective V		Elective Course– EC5 (Discipline Specific)– Choose from Annexure-I	4	-	-	3	25	75	100
5	Part - III Discipline Elective VI		Elective Course–EC6 (Discipline Specific)– Choose from Annexure-I	4	-	-	3	25	75	100
6	Part – III	24S5UCAPR1	Project with Viva voce	-	-	5	4	25	75	100
7	Part – IV	24S5UVE01	Value Education	2	-	-	2	25	75	100
8	Part – IV	24S5UIT1	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	-	-	-	2	-	-	-
Total				20		10	26			700

BACHELOR OF COMPUTER APPLICATIONS

SIXTH SEMESTER

S.No	Course Category	Course Code	Title of the Course	Hrs / Week			Credit Points	Max Marks		
				L	T	P		CIA	ESE	Total
1	Part - III Core VII	24S6UCA07	Computer Networks	6	-	-	4	25	75	100
2	Part - III Core VIII	24S6UCA08	Data Analytics using R Programming	6	-	-	4	25	75	100
3	Part - III Core Practical VI	24S6UCAP08	Practical: R Programming Lab	-	-	6	4	25	75	100
4	Part - III Discipline Elective VII		Elective Course –EC7 (Discipline Specific) Choose from Annexure – I	5	-	-	3	25	75	100
5	Part - III Discipline Elective VIII		Elective Course –EC8 (Discipline Specific) Choose from Annexure - I	5	-	-	3	25	75	100
6	Part – IV SEC VI		Skill Enhancement Course – SEC8 Choose from Annexure II	2	-	-	2	25	75	100
7	Part – V	24S6UEX01	Extension Activity	-	-	-	1		-	
Total				24		06	21			600
Cumulative Total (From Semester - I to Semester – VI)							140			4500

Annexure - I**Elective Course (EC1- EC8) (Generic / Discipline Specific) Generic Specific****SEMESTER - I**

S.No	Paper code	Paper Title
1	24S1UPHA01	Physics-I
2	24S1UPHAP01	Physics Practical-I
3		Mathematics-I
4		Numerical Methods-I
5		Digital Logic Fundamentals

SEMESTER - II

S.No	Paper code	Paper Title
1	24S2UPHA02	Physics-II
2	24S2UPHAP02	Physics Practical-II
3		Mathematics-II
4		Numerical Methods-II
5		Mathematics Practical
6		Resource Management Techniques

SEMESTER - III

S.No	Paper code	Paper Title
1	24S3UMAEG01	Introduction to Linear Algebra
2		Graph Theory and its Application
3		Discrete Mathematics-I
4		Statistical Methods and its Application-I
5		Financial Accounting
6		Nano Technology

SEMESTER - IV

S.No	Paper code	Paper Title
1	24S4UMAEG04	Optimization Techniques
2	24S4UMAEGP01	Optimization Techniques lab
3		Statistical Methods and its Application-II
4		Discrete Mathematics-II
5		Statistical Practical
6		Cost and Management Accounting

Discipline Specific Elective Course (EC5-EC8)

SEMESTER – V – EC5

S.No	Paper Code	Paper Name
1	24S5UCAE01	Agile Project Management
2	24S5UCAE02	Analytics Service Industry
3	24S5UCAE03	Artificial Intelligence
4	24S5UCAE04	Artificial Neural Network
5	24S5UCAE05	Image Processing

SEMESTER – V – EC6

S.No	Paper Code	Paper Name
1	24S5UCAE06	Big Data Analytics
2	24S5UCAE07	Mobile Adhoc Network
3	24S5UCAE08	Computational Intelligence
4	24S5UCAE09	Cryptography
5	24S5UCAE10	Software Project Management

SEMESTER – VI – EC7

S.No	Paper Code	Paper Name
1	24S6UCAE11	Fuzzy Logic
2	24S6UCAE12	Grid Computing
3	24S6UCAE13	Human Computer Interaction
4	24S6UCAE14	Information Security
5	24S6UCAE15	Database Management System

SEMESTER – VI – EC8

S.No	Paper Code	Paper Name
1	24S6UCAE16	IOT and its Applications
2	24S6UCAE17	Natural Language Processing
3	24S6UCAE18	Cloud Computing
4	24S6UCAE19	Software Metrics

Annexure-II
Skill Enhancement Course

Semester – II

S.No	Paper Code	Paper Title
1	24S2UCASE01	Fundamentals of Information Technology
2	24S2UCASE02	Introduction to HTML
3	24S2UCASE03	Web Designing
4	24S2UCASE04	Multimedia Systems

Semester – III

S.No	Paper Code	Paper Title
1	24S3UCASE05	Data Analytics using R
2	24S3UCASEP01	Data Analytics using R Lab
3	24S3UCASE06	Data Analytics using Advanced Excel
4	24S3UCASEP02	Data Analytics Using Advanced Excel Lab

Semester – IV

S.No	Paper Code	Paper Title
1	24S4UCASE07	Understanding Internet
2	24S4UCASEP03	Internet Basics Laboratory
3	24S4UCASE08	PHP Programming
4	24S4UCASEP04	PHP Programming Lab

Semester – VI

S.No	Paper Code	Paper Title
1	24S6UCASE09	Software Testing
2	24S6UCASE10	Quantitative Aptitude
3	24S6UCASE11	Pattern Recognition
4	24S6UCASE12	Enterprise Resource Planning

FIRST YEAR - SEMESTER - I
CORE – I – PYTHON PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCA01	Core-I	Theory	Y	Y	-	5	5

Learning Objectives

- ❖ To make students understand the concepts of Python programming.
- ❖ To apply the OOPS concept in Python programming.
- ❖ To impart knowledge on demand and supply concepts.
- ❖ To make the students learn best practices in Python programming.
- ❖ To know the costs and profit maximization Course Outcomes.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Learn the basics of python, do simple programs on python, learn how to use an array.	PO1-PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, do programs on Loops and jump statements.	PO1-PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1-PO6
CO4	Work with List, tuples and dictionary, write program using list, tuples and dictionary.	PO1-PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, do programs using files.	PO1-PO6

CORE - I-PYTHON PROGRAMMING

Unit	Details	No. of Hours
I	Basics of Python Programming: History of Python- Attributes of Python Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements –Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays–Array Methods-Array Operations.	15
II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-else if- else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements-Dynamic and meta programming-control flow.	15
III	Functions: Function Definition – Function Call – Variable Scope and its Lifetime- Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module –dir () function – Modules and Namespace–Defining our own modules-Function decorators. Practical Implementation on Develop a simple arithmetic calculator using functions.	15
IV	Lists: Creating list-Access values in List-Updating values in Lists-Nested lists-Basic list operations-List Methods. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary–Dictionary Functions and Methods-Difference between Lists and Dictionaries. Merging and Updating, Python File Handling: Types of files in Python - Opening and Closing files-Reading and Writing files: write () and write lines () methods- append () method – read () and read lines () methods–with keyword–Splitting words.	15
V	Python and MySQL: Introduction to MySQL – Python and SQL Connectivity – CRUD operations – Working with complex queries – Data handling and analyze –Project development. Practical Implementation on Create a login page using Database connectivity.	15
	Total	75
# Practical Implementation related to the above topics to be discussed (Internal Exam Only)		

Textbooks

- ❖ Reema Thareja, - Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.
- ❖ Dr.R.Nageswara Rao-Core Python Programming, First Edition, 2017, Dream tech Publishers.

Reference books

- ❖ Vamsi Kurama - Python Programming: A Modern Approach, Pearson Education 2018.
- ❖ Mark Lutz's, Learning Python, O'reilly 5th edition 2013.
- ❖ Adam Stewarts - Python Programming, Online.2016.
- ❖ Fabio Nelli - Python Data Analytics I, A Press.2nd edition 2018.
- ❖ Kenneth A. Lambert, - Fundamentals of Python - First Programs, CENGAGE Publication.2011.

Web Resources

- ❖ <https://www.programiz.com/python-programming>
- ❖ <https://www.guru99.com/python-tutorials.html>
- ❖ https://www.w3schools.com/python/python_intro.asp

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weightage	15	14	15	15	13
Weighted percentage of Course Contribution to PO's	3.0	2.8	3.0	3.0	2.6

CORE - I – PRACTICAL – I - PYTHON PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCAP01	Core Practical-I	Practical	-	-	Y	3	3

Learning Objectives

- ❖ Be able to design and program Python applications.
- ❖ Be able to create loops and decision statements in Python
- ❖ Be able to work with functions and pass arguments in Python.
- ❖ Be able to build and package Python modules for reusability.
- ❖ Be able to read and write files in Python.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Demonstrate the understanding of syntax and semantics	PO1
CO2	Identify the problem and solve using PYTHON programming techniques	PO1, PO2
CO3	Identify suitable programming constructs for problem solving.	PO4, PO6
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way	PO4, PO5, PO6
CO5	Develop a PYTHON program for a given problem and test for its correctness	PO3, PO6

CORE - I – PRACTICAL – I - PYTHON PROGRAMMING LAB

S. No	List of Programs	No. of Hours
1.	Program using variables, constants, I/O statements in Python.	45
2	Program using Operators in Python.	
3	Program using Conditional Statements.	
4	Program using Loops, Jump Statements	
5	Program using Functions.	
6	Program using Recursion.	
7	Program using Arrays, Strings.	
8	Program using Modules, Lists	
9	Program using Lists, Tuples	
10	Program using Dictionaries, File Handling	

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	3	3	2	1	1	2	2
CO2	3	3	2	3	1	3	1	2	1	2
CO3	2	1	3	2	2	3	2	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weightage	15	15	13	15	13
Weighted percentage of Course Contribution to POs	3.0	3.0	2.6	3.0	2.6

Course Coordinator

BOS Chairman

FOUNDATION COURSE – FUNDAMENTALS OF C PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCAF01	Foundation Course	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To familiarize the students with the Programming basics and the fundamentals of C, Data types in C, Mathematical and logical operations.
- ❖ To understand the concept using if statements and loops
- ❖ This unit covers the concept of Arrays
- ❖ This unit covers the concept of Functions
- ❖ To understand the concept of implementing pointers

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Remember the program structure of C with its syntax and semantics.	PO1,PO3,PO5
CO2	Understand the programming principles in C (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6, PO7
CO3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO7
CO4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
CO5	Code, debug and test the programs with real world applications	PO7,PO8

FOUNDATION COURSE – FUNDAMENTALS OF C PROGRAMMING

Unit	Details	No. of Hours
I	Framework of C: Introduction to C – Basic Structure of C program, executing C program. Constants, Variables, and Data Types, Character set, C tokens, keywords and identifiers, declaration of variables, Operators, Evaluation of Expressions.	6
II	Branching Statements: Decision making with Simple if statement, if- else statement, nested if statement, else-if ladder, Switch statement, Go to statement. Looping Statements: While loop, Do-While loop, For loop, Nested for loop. PPT Presentation on Looping.	6
III	Arrays: Declaration, initialization and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays, Dynamic arrays.	6
IV	Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions.	6
V	Real world Applications of C: Operating systems, GUI, Embedded systems, Google, Design of a Compiler, Mozilla Firefox, Gaming and Animation, MYSQL, MATLAB and Mathematical. Model Preparation on Application of arrays in Robotics.	6
	Total	30
# PPT Presentation, Model Preparation related to the above topics to be considered for Internal Exam Only		

Text Books

- ❖ E.Balagurusamy, Programming in ANSI C, Fifth Edition, Tata Mc Graw-Hill, 2016.

Reference books

- ❖ Byron Gottfried, Schism's Outline Programming with C, Fourth Edition, Tata McGraw w-Hill, 2018.
- ❖ Kernighan and Ritchie, the C Programming Language, Second Edition, Prentice Hall, 1998.
- ❖ Yashavant Kanetkar, Let Us C, 18th Edition, Bpb Publications, 2021.

Web Resources

- ❖ <https://codeforwin.org/>
- ❖ <https://www.geeksforgeeks.org/c-programming-language/>
- ❖ <http://en.cppreference.com/w/c>
- ❖ <http://learn-c.org/>
- ❖ <https://www.cprogramming.com/>
- ❖ Learntube.ai/blog/programming/c-programming/8-real-world-applications-of-c-language/

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	2	3	1	2	1	2	2
CO2	2	3	3	2	2	3	3	2	1	2
CO3	2	2	3	3	2	2	3	2	2	2
CO4	2	2	2	3	3	3	2	2	1	2
CO5	2	2	2	1	2	2	3	3	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	2	2
CO2	2	2	2	2	-
CO3	3	2	2	1	1
CO4	3	2	2	1	-
CO5	1	2	2	2	2
Weightage	10	10	10	8	5
Weighted percentage of Course Contribution to POs	2.0	2.0	2.0	1.6	10

Course Coordinator

BOS Chairman

NMEC – FUNDAMENTALS OF INFORMATION TECHNOLOGY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCAN01	NMEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand basic concepts and terminology of information technology.
- ❖ To have a basic understanding of personal computers and their operation.
- ❖ To be able to identify data storage and its usage.
- ❖ To get great knowledge of software and its functionalities.
- ❖ To understand about operating system and their uses.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1- PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1- PO6
CO3	Concept of storing data in computer using two headers namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1- PO6
CO4	Concept of data communication and computer networks.	PO1-PO6
CO5	Usage of Operating system in information technology which really acts as an interpreter between software and hardware.	PO1-PO6

NMEC – FUNDAMENTALS OF INFORMATION TECHNOLOGY

Unit	Details	No. of Hours
I	Introduction to Computers: Introduction, Definition, Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Types of Computers, Processor and Memory.	6
II	Basic Computer Organization: Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, and Output Units: Monitors and its types. Printers: Impact Printers and its types. Non-Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	6
III	Storage Fundamentals: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives. Model Presentation on Storage Devices.	6
IV	Data Communication and Computer Networks: Basic Elements of a Communication System – Data Transmission Modes – Data Transmission Speed – Data Transmission Media – Digital and Analog Data Transmission.	6
V	Operating System: Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi-Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux. Practical implementation on Installation of Operating System.	6
	Total	30
# Model Preparation, Practical Implementation related to the above topics to be considered for Internal Exam Only		

Text Books

- ❖ Anoop Mathew, S.Kavitha Murugesan (2009), Fundamental of Information Technology, Majestic Books.
- ❖ Alexis Leon, Mathews Leon, Fundamental of Information Technology, 2nd Edition, 2009.
- ❖ S.K.Bansal-Fundamental of Information Technology, 2004.

Reference books

- ❖ Bhardwaj Sushil Puneet Kumar- Fundamental of Information Technology, 2021.
- ❖ GG WILKINSON - Fundamentals of Information Technology, Wiley-Blackwell-1987.
- ❖ A.Ravichandran, - Fundamentals of Information Technology, Khanna Book Publishing, 2014.

Web Resources

- ❖ <https://testbook.com/learn/computer-fundamentals>
- ❖ <https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html>
- ❖ <https://www.javatpoint.com/computer-fundamentals-tutorial>
- ❖ https://www.tutorialspoint.com/computer_fundamentals/index.htm
- ❖ <https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	2
CO5	3	3	2	3	3
Weightage	15	15	14	15	14
Weighted percentage of Course Contribution to POs	3.0	3.0	2.8	3.0	2.8

Course Coordinator

BOS Chairman

NMEC – I - PC HARDWARE AND TROUBLE SHOOTING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCAN02	NMEC – I	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand the components on the motherboard
- ❖ To perform system administration tasks
- ❖ To understand different storage media
- ❖ To understand system related problems and methods of troubleshooting

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the concept of CPU and its working procedures	PO1,PO6
CO2	Able to understand the Memory concepts and its organization.	PO2
CO3	Able to do Assembling and Disassembling a CPU	PO2,PO4
CO4	Able to understand the Power supplies.	PO6,PO8
CO5	Able to understand the Storage devices.	PO7

NMEC – I - PC HARDWARE AND TROUBLE SHOOTING

Unit	Details	No. of Hours
I	BASIC HARDWARE CPU Essentials: The Buses -Processor Modes - Modern CPU concepts: CISC vs. RISC CPUs - Circuit Size and Die Size - Processor Speed - Processor Cooling - System Clocks - Processor Packages - Architectural Performance Features.	6
II	Memory: Essential memory concepts: Memory Organizational - Logical memory organization: Memory package - modules: Memory considerations -speed and wait – states – memory types - memory techniques - selection and installation of memory - getting the right amount - filling banks –Troubleshooting. Model Preparation on Storage Devices	6
III	Motherboard: Components of Motherboards: Sockets and slots, Expansion Slots-Memory slots - Chipsets - North bridge -South bridge - Form factor - Motherboard up-gradation - Considerations-Performing the Upgrade - Troubleshooting: Steps to identify whether repair or replace the motherboard. Practical Implementation on Assembling and Disassembling a CPU	6
IV	Power supplies and power management: Switching regulation - Potential power problems: Recognizing the problems - Dealing with the power problems –Up gradation; Power management in windows O.S - Troubleshooting: switching power supplies - power management.	6
V	Storage devices: The hard drive: Construction - IDE drive standard and features - Troubleshooting: The CD-ROM drive - Basics of CD-ROM drive - Construction- Trouble shooting; The DVD drive: DVD media - The DVD drive and decoder -Troubleshooting; Blue-Ray disc drive: Physical Media - Software standards - Troubleshooting; Flash Memory drive: Essential components of flash drive - Size and style of packaging – Troubleshooting.	6
	Total	30
# Model Preparation and Practical Implementation related to the above topics to be considered for Internal Exam Only.		

Text Books

- ❖ Computers Fundamentals and Architecture by B.Ram aust-2018.
- ❖ William Stallings, Operating System, Pearson Education-2018.
- ❖ Norton, Introduction to Computers, McGrawHill-2017.

Reference books

- ❖ Craig Zacker & John Rourke, —The complete reference: PC hardware, Tata McGraw Hill, New Delhi, 2001.
- ❖ Mike Meyers, —Introduction to PC Hardware and Troubleshooting, Tata McGraw-Hill, New Delhi, 2003.
- ❖ B.Govindarajulu, —IBM PC and Clones hardware trouble shooting and maintenancel, Tata McGraw-Hill, New Delhi, 2012.

Web resources

- ❖ <https://www.pluralsight.com/blog/tutorials/trouble-shooting-hardware>
- ❖ <https://www.dummies.com/article/technology/computers/pcs/trouble-shooting-maintaining-your-pc-all-in-one-for-dummies-cheat-sheet-8602/>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	2	1	3	1	1	2	1
CO2	2	3	1	1	2	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	1	2	3	1	3	2	1
CO5	2	1	2	1	2	2	3	2	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	3	2	2	2	2
CO3	3	3	3	3	3
CO4	3	2	2	2	2
CO5	3	3	2	2	2
Weightage	15	12	11	11	11
Weighted percentage of Course Contribution to POs	3.0	2.4	2.1	2.1	2.1

Course Coordinator

BOS Chairman

CORE - II – OBJECT ORIENTED PROGRAMMING USING C++

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCA02	Core– II	Theory	Y	Y	-	5	5

Learning Objectives

- ❖ Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.
- ❖ Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
- ❖ Describe the concept of function over loading, operator overloading, virtual functions and polymorphism.
- ❖ Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
- ❖ Demonstrate the use of various OOPs concepts with the help of programs.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Remember the program structure of C with its syntax and semantics	PO1,PO6
CO2	Understand the programming principles in C++ (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
CO3	Apply the programming principles learnt in real-time problems	PO4,PO7
CO4	Analyse the various methods of solving a problem and choose the best method	PO6
CO5	Code, debug and test the programs with appropriate test cases	PO7,PO8

CORE - II – OBJECT ORIENTED PROGRAMMING USING C++

Unit	Details	No. of Hours
I	Overview of C++: Principles of Object-Oriented Programming – Benefits of OOPS-Data types- C++ Declarations. Control Structures: Decision making and Statements: If...else, jump, go to, break, continue, Switch case statements - Loops in C++: for, while, do - functions in C++ - inline functions – Function Overloading-Function parameters.	15
II	Classes and Objects: Create a Class-Creating and Declaring Objects – Defining Member Functions – Static Member variables and functions–array of objects–friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	15
III	Operator Overloading: Overloading unary, binary operators-Operator precedence–Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multipath inheritance– Virtual base Classes–Abstract Classes. Seminar on Inheritance.	15
IV	Pointers–Declaration–Pointer to Class, Object–this pointer–Pointers- to derived classes and Base classes –Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions. Practical Implementation on Array.	15
V	Files –File stream classes –file modes–Sequential Read /Write operations– Binary and ASCII Files–Random Access Operation–Templates –Exception Handling- String –Declaring and Initializing string object String Attributes– Miscellaneous functions. Practical Implementation on Create a file and perform read and write operations.	15
	Total	75
# Seminar, Practical Implementation related to the above topics to be considered for Internal Exam Only		

Text Books

- ❖ E.Balagurusamy, —Object-Oriented Programming with C++, TMH 2016, 7th Edition.

Reference books

- ❖ Ashok N Kamthane, —Object-Oriented Programming with ANSI and Turbo C++, Pearson Education 2003.
- ❖ Maria Litvin & Gray Litvin, —C++ for you, Vikas publication 2002.

Web Resources

- ❖ <https://alison.com/course/introduction-to-c-plus-plus-programming>
- ❖ <https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition>
- ❖ https://onlinecourses.swayam2.ac.in/cec20_bt14/preview

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	3	2	1	2	2
CO2	2	3	2	2	2	2	2	2	1	2
CO3	2	2	2	3	2	2	3	2	2	2
CO4	2	2	2	2	2	3	1	2	1	2
CO5	2	2	2	2	2	2	3	3	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	-	-
CO2	2	2	2	1	-
CO3	3	1	1	-	1
CO4	1	2	1	2	2
CO5	3	2	1	2	3
Weightage	12	9	6	5	6
Weighted percentage of Course Contribution to POs	2.4	1.8	1.2	1.0	1.2

Course Coordinator

BOS Chairman

CORE - PRACTICAL-II C++ PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCAP02	Core Practical-II	Practical	-	-	Y	3	3

Learning Objectives

- ❖ Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects be able to create loops and decision statements in Python.
- ❖ Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
- ❖ Describe the concept of function over loading, operator overloading, virtual functions and polymorphism.
- ❖ Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- ❖ Demonstrate the use of various OOPs concepts with the help of programs.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Remember the program structure of C++ with its syntax and semantics	PO1, PO4, PO5
CO2	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO1, PO4, PO6
CO3	Apply the programming principles learnt in real-time problems	PO1, PO3, PO6
CO4	Analyze the various methods of solving a problem and choose the best method	PO3, PO4
CO5	Code, debug and test the programs with appropriate test cases	PO1, PO5, PO6

CORE - PRACTICAL-II C++ PROGRAMMING LAB

S. No	LAB EXERCISES	No. of Hours
1	Program to demonstrate function overloading, Default Arguments and Inline function.	45
2	Program to demonstrate Class and Objects.	
3	Program to demonstrate the concept of Passing Objects to Functions.	
4	Program to demonstrate the Friend Functions.	
5	Program to demonstrate the concept of Passing Objects to Functions.	
6	Program to demonstrate Constructor and Destructor.	
7	Program to demonstrate Unary Operator Overloading.	
8	Program to demonstrate Binary Operator Overloading.	
9	Program to demonstrate: • Single Inheritance • Multiple Inheritance	
10	Program to demonstrate Exception Handling.	

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	3	1	1	2	1
CO2	2	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	2	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	1
CO2	2	3	3	3	1
CO3	2	3	3	3	1
CO4	2	3	3	3	1
CO5	2	3	3	3	1
Weightage	11	15	15	15	5
Weighted percentage of Course Contribution to POs	2.2	3.0	3.0	3.0	1.0

Course Coordinator

BOS Chairman

NME - II – MS-OFFICE PACKAGES

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCAN03	NME- II	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Understand and apply the basic concepts of a word processing package.
- ❖ Understand and apply the basic concepts of electronic spread sheet software.
- ❖ Understand and apply the basic concepts of database management system.
- ❖ Understand and create a presentation using Power Point tool.
- ❖ Understand and practically implement the MS-Office Applications.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Possess the knowledge on the word processing and document preparation.	PO1,PO2,PO3, PO6
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3, PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO3,PO5
CO4	Demonstrate the understanding of Power Point Presentation.	PO3,PO4,PO5
CO5	Utilize the MS-Office Package for documentation, Calculation and presentation purpose.	PO4,PO6

NME - II – MS-OFFICE PACKAGE

Unit	Details	No. of Hours
I	Word Processing: Open, Save and close word document; Editing text–tools, formatting, bullets; Spell Checker–Document formatting–Paragraph alignment, indentation, headers and footers, numbering; printing–Preview, options, merge.	6
II	Spreadsheets: Excel–opening, entering text and data, formatting, navigating; Formulas– entering, handling an copying; Charts–creating ,formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	6
III	MS-Access: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language(MS–Access). Practical implementation on Creation of student database.	6
IV	Power point: Introduction to Power point - Features –Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition–Animation effects, audio inclusion, timers. Power Point presentation using animation effects.	6
V	To create and manage professional documents using word-Insertion of tables and other media into documents-Payroll preparation using Excel-Chart creation Functions and formulas using excel-Power point presentation- Advertisement in TV channels.	6
	Total	30
# Power Point Presentation, Practical Implementation related to the above topics to be considered for Internal Exam Only		

Text Books

- ❖ Peter Norton, Introduction to Computers II–Tata McGraw-Hill, 7th Edition 2017.

Reference books

- ❖ Jennifer Ackerman Kettell, Guy Hat-Davis, Curt Simmons, —Microsoft 2003, Tata McGraw Hill.

Web Resources

- ❖ <https://www.udemy.com/course/office-automation-certificate-course/>
- ❖ <https://www.javatpoint.com/automation-tools>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	1	2	3	1	3	1	2
CO2	3	3	3	1	1	3	2	1	1	1
CO3	2	2	3	1	3	2	3	1	2	1
CO4	2	1	3	3	3	2	3	2	1	2
CO5	2	2	1	3	2	3	3	3	1	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	14	14	15	15
Weighted percentage of Course Contribution to PO's	3.0	2.8	2.8	3.0	3.0

Course Coordinator

BOS Chairman

NME – II FUNDAMENTALS OF E-COMMERCE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCAN04	NME-II	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ The strategic uses of social media.
- ❖ The steps involved in creating a social media strategy.
- ❖ To design documents and protocols you should have in place for social media success.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Possess the knowledge on the basics of commerce in different platforms.	PO1, PO2, PO3, PO6
CO2	Gain knowledge regarding Electronic Data Interchange.	PO1, PO2, PO3, PO6
CO3	Learn the different security tools like Firewall.	PO3, PO5
CO4	Demonstrate the understanding of different consumer-oriented applications.	PO3, PO4, PO5
CO5	Utilize the different payment modes on different platforms.	PO4, PO6

NME – II FUNDAMENTALS OF E-COMMERCE

Unit	Details	No .of Hours
I	E-Commerce – meaning - Evolution in India – Traditional commerce Vs E-Commerce – Factors driving the growth of E-Commerce – benefits and limitations – business models for E-Commerce – E-Commerce opportunities in India and challenges.	6
II	Electronic Data Interchange – Benefits – EDI Legal, Security and Privacy issues – EDI software implementation – Value Added Network – Internal Information Systems – Work flow atomization and Coordination – Customization and internal commerce. Model Preparation on EDI.	6
III	Network security and firewalls – Client Server Network Security – Emerging client server security threats – Firewalls and network security – Data and message security – Encrypted documents and electronic mail – Hypertext publishing – Technology behind the web – Security and the web. Power Point Presentation on Network Security on E-Commerce.	6
IV	Consumer Oriented Electronic Commerce: Consumer Oriented Applications – Mercantile Process Models – Mercantile Models from the Consumers Perspective – Mercantile Models from the Merchants Perspective. Web advertisement: Online advertising methods – advertising strategies and promotions.	6
V	Electronic Payment Systems – Types – Digital Token Based Electronic Payment System – Smart Card & Credit Card Electronic Payment Systems – Risk – Designing Electronic Payment System. Mobile Commerce – benefits – products and service of M-Commerce. Power Point Presentation on E-Payment System.	6
	Total	30
# Model Presentation, Power Point Presentation related to the above topics to be considered for Internal Exam Only		

Text Books

- ❖ P.T.Joseph, S.J., —E-Commerce - An Indian Perspective, PHI 2012, 4th Edition.

Reference books

- ❖ David Whitely, —E-Commerce Strategy, Technologies and Applications, Tata McGraw Hill, 2001.
- ❖ Ravi Kalakota, Andrew B Whinston, —Frontiers of Electronic Commerce, Pearson 2006, 12th Impression.

Web Resources

- ❖ <https://www.docsity.com/en/e-commerce-notes-pdf-lecture-notes-universitylevel/2484734/>
- ❖ <https://magnetoitsolutions.com/blog/advantages-and-disadvantages-of-ecommerce>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	2	3	1	3	1	2
CO2	3	3	3	2	1	3	2	1	1	2
CO3	2	2	3	1	3	2	3	1	2	2
CO4	2	1	3	3	3	2	3	2	1	2
CO5	2	2	1	3	2	3	3	3	1	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	14	14	15	15
Weighted percentage of Course Contribution to PO's	3.0	2.8	2.8	3.0	3.0

Course Coordinator

BOS Chairman

II YEAR – III SEMESTER

CORE – III – DATA STRUCTURES AND ALGORITHMS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCA03	CORE	Theory	Y	Y	-	5	5

Learning Objectives

- ❖ To understand the concepts of ADTs
- ❖ To learn linear data structures-lists, stacks, queues
- ❖ To learn Tree structures and application of trees
- ❖ To learn graph structures and application of graphs
- ❖ To understand various sorting and searching

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.	PO1, PO6
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues.	PO2
CO3	Describe the hash function and concepts of collision and Its resolution methods	PO2, PO4
CO4	Solve problem involving graphs trees and heaps	PO6, PO8
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO7

CORE - III- DATA STRUCTURES AND ALGORITHMS

Units	Details	No. of Hours
I	Abstract Data Types (ADTs)- List ADT-Array based implementation-Linked list implementation -Singly linked lists-Circular linked lists-Doubly linked lists-Applications of lists-Polynomial Manipulation-All Operations-Insertion-Deletion-Merge-Traversal.	15
II	Stack ADT-Operations-Applications-Evaluating arithmetic expressions–Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue-Priority Queue-D Queue-Applications of queues.	15
III	Tree ADT-Tree Traversals-Binary Tree ADT-Expression Trees-Applications of trees-Binary search tree ADT- Threaded Binary Trees-AVL Trees-B-Tree- B+ Tree –Heap-Applications of heap.	15
IV	Definition-Representation of Graph-Types of graph-Breadth first traversal – Depth first traversal-Topological Sort- Bi-connectivity – Cut vertex-Euler Circuits-Applications of graphs.	15
V	Searching- Linear Search-Binary Search-Sorting-Bubble Sort-Selection Sort-Insertion Sort-Shell Sort-Radix Sort- Ordered Set and Unordered Set.	15
	Total	75
# Practical Implementation related to the above topics to be discussed (Internal Exam Only)		

Text Books:

1. Mark Allen Weiss "Data Structures and Algorithm Analysis in C++" Pearson Education 2014, 4th Edition.
2. Reema Thareja "Data Structures using C" Oxford Universities Press 2014, 2nd Edition.

Reference Books:

1. Thomas H Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein —Introduction to Algorithms, McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman "Data Structures and Algorithms", Pearson Education 2013.

Web Resources:

- 1.NPTEL & MOOC Courses titled data structures.
2. <https://nptel.ac.in/courses/106106127/>

Mapping with Programme Outcomes: 3 - Strong,2–Medium,1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weightage	15	14	15	15	13
Weighted percentage of Course Contribution to PO's	3.0	2.8	3.0	3.0	2.6

Course Coordinator

BOS Chairman

CORE - PRACTICAL-III

DATA STRUCTURES AND ALGORITHMS LAB USING C++

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCAP03	CORE	Practical	-	-	Y	3	3

Learning Objectives

- ❖ To understand the concepts of ADTs.
- ❖ To learn Tree structures and application of trees.
- ❖ To learn linear data structures - lists, stacks, queues.
- ❖ To learn graph structures and applications of graphs.
- ❖ To understand various sorting and searching.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.	PO1,PO4,PO5
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues.	PO1,PO4,PO8
CO3	Describe the hash function and concepts of collision and Its resolution methods.	PO1,PO3,PO6
CO4	Solve problem involving graphs trees and heaps.	PO3,PO4
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.	PO1,PO5,PO6

DATA STRUCTURES AND ALGORITHMS LAB USING C++

S.No	Details	No.Of Hours
1	Write a program to implement the List ADT using arrays and linked lists.	45
2	Write a programs to implement the following using a singly linked list - Stack ADT - Queue ADT	
3	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT)	
4	Write a program to implement priority queue ADT.	
5	Write a program to perform the following operations - Insert an element in to a binary search tree. - Delete an element from a binary search tree. - Search for a key element in a binary search tree.	
6	Write a program to perform the following operations - Insertion into an AVL-tree - Deletion from an AVL-tree	
7	Write a program for the implementation of BFS and DFS for a given graph.	
8	Write programs for implementing the following searching methods: - Linear search - Binary search	
9	Write programs for implementing the following sorting methods: - Bubble sort - Selection sort	
10	Write programs for implementing the following sorting methods: - Insertion sort - Radix sort	

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	3	3	2	1	1	2	2
CO2	3	3	2	3	1	3	1	2	1	2
CO3	2	1	3	2	2	3	2	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weightage	15	14	13	15	13
Weighted percentage of Course Contribution to PO's	3.0	2.8	2.6	3.0	2.6

Course Coordinator

BOS Chairman

SEMESTER IV
CORE - IV–PROGRAMMING IN JAVA

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCA04	CORE	Theory	Y	Y	-	4	4

Learning Objectives

- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.
- To enable the students to use AWT controls, Event Handling and Swing for GUI.
- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.

Course Outcomes		
Course Outcomes	On completion of this course, students will be able to	Programme Outcomes
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1,PO2,PO6
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2,PO3,PO8
CO3	Implement multi-threading and I/O Streams of Core Java.	PO1,PO3,PO7
CO4	Implement AWT and Event handling.	PO2,PO6
CO5	Use Swing to create GUI.	PO1,PO3,PO8

PROGRAMMING IN JAVA

Units	Details	No. of Hours
I	Introduction: Review of Object-Oriented concepts. History of Java-Java buzz words-JVM architecture-Data Types-Variables-Scope and life time of variables - Arrays-Operators-Control Statements-Type conversion and casting-Simple java program-Constructors-Methods-Static Block-Static Data-Static Method -String and String Buffer Class.	12
II	Inheritance: Basic concepts - Types of inheritance - Member access rules- Usage of this and Super keyword-Method Overloading-Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition-Access Protection – Importing Packages. Interfaces: Definition–Implementation–Extending Interfaces. Exception Handling: try–catch- throw - throws–finally– Built-in exceptions- Creating own Exception classes.	12
III	Multithreaded Programming: Thread Class- Runnable interface– Synchronization– Using synchronized methods– Using synchronized statement- Inter thread Communication–Deadlock. I/O Streams: Concepts of streams-Stream Classes-Byte and Character stream-Reading console Input and Writing Console output-File Handling.	12
IV	AWT Controls: The AWT class hierarchy user interface components- Labels- Button Text Components - Check Box - Check Box Group - Choice -List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers. Event Handling: Events-Event sources-Event Listeners - Event Delegation Model (EDM) – Handling Mouse and Keyboard Events – Adapter classes – Inner classes.	12
V	Swing: Introduction to Swing-Hierarchy of swing components. Containers-Top level containers-J Frame-J Window – J Dialog – J Panel – J Button – J Toggle Button –J Check Box-J Radio Button-J Label-J Text Field-J Text Area-J List-J Combo Box-J Scroll Pane.	12
	Total	60

Text Books:

1. Herbert Schildt, —The Complete Referencell, Tata McGraw Hill, New Delhi, 7th Edition, 2020.
2. Gary Cornell, —Core Java2 Volume I–Fundamentalsll, Addison Wesley 1999.

Reference Books:

1. Head First Java, O_Rielly Publications
2. Y.Daniel Liang —Introduction to Java Programmingll, 7th Edition, Pearson Education India,2010

Web Resources:

1. <http://javabeginnerstutorial.com-java-tutorial>
2. <http://docs.oracle.com/javase/>
3. <http://www.coursera.org/>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weightage	15	14	15	15	13

Course Coordinator**BOS Chairman**

CORE - IV–PROGRAMMING IN JAVA LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCAP04	CORE	Practical	-	-	Y	3	3

Learning Objectives

- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.
- To enable the students to know about Event Handling.
- To enable the students to use String Concepts.
- To equip the student with programming knowledge in to create GUI using AWT controls.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the basic Object oriented concepts. Implement the basic constructs of Core Java.	PO1
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1,PO2
CO3	Implement multi-threading and I/O Streams of ore Java.	PO4,PO6
CO4	Implement AWT and Event handling.	PO4,PO5,PO6
CO5	Use Swing to create GUI.	PO3,PO8

PROGRAMMING IN JAVA LAB

S.No	Details	No. of Hours
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that integer.	45
2	Write a Java program to multiply two given matrices.	
3	Write a Java program that displays the number of characters, lines and words in a text	
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.	
5	Write a program to do String Manipulation using Character Array and perform the following string operations: a. String length b. Finding a character at a particular position c. Concatenating two strings	
6	Write a program to perform the following string operations using String class: a. String Concatenation b. Search a substring c. To extract substring from given string	
7	Write a program to perform string operations using String Buffer class: a. Length of a string b. Reverse a string c. Delete a substring from the given string	
8	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	
9	Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread1 and to print 0 to 100 using Thread2.	
10	Write a program to demonstrate the use of following exceptions. a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception	

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	3	3	2	1	1	2	2
CO2	3	3	2	3	1	3	1	2	1	2
CO3	2	1	3	2	2	3	2	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weightage	15	15	13	15	13
Weighted percentage of Course Contribution to PO's	3.0	3.0	2.6	3.0	2.6

Course Coordinator

BOS Chairman

SEMESTER – V
CORE - V– OPERATING SYSTEMS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCA05	CORE	Theory	Y	Y	-	5	4

Learning Objectives

- ❖ Understanding the design of the Operating System
- ❖ Imparting knowledge on CPU scheduling, Process and Memory Management.
- ❖ To code specialized programs form an aging over all resources and operations of the computer.
- ❖ To study about the concept of Job and processor scheduling
- ❖ To learn about the concept of memory organization and multiprogramming

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	On completion of this course, students will Define the fundamentals of OS and identify the concepts relevant to process, process life cycle, Scheduling Algorithms, Deadlock and Memory management.	PO1
CO2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.	PO4, PO6
CO4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
CO5	Understand memory organization and management	PO3, PO8

CORE - V - OPERATING SYSTEMS

Units	Details	No. of Hours
I	Introduction: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. Process concepts: definition of process, process states – Life cycle of a process, process management – process state transitions, process control block (PCB), process operations, suspend and resume, context switching, Interrupts –Interrupt processing, interrupt classes, Inter process communication - signals, message passing.	15
II	A synchronous concurrent process: mutual exclusion-critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm, software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion - Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. Concurrent programming: monitors, Message passing.	15
III	Deadlock and in definite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.	15
IV	Job and processor scheduling: scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms - FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling.	15
V	Real Memory organization and Management: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multi programming, Memory swapping Virtual Memory organization: virtual memory basic concepts, multi-level storage organization, Block mapping, paging basic concepts, segmentation, and paging / segmentation systems. Virtual Memory Management: Demand Paging, Page replacement strategies.	15
	Total	75
# Practical Implementation related to the above topics to be discussed (Internal Exam Only)		

Text Books:

1. H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011.

Reference Books:

1. William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice – Hall of India, 2012.
2. Silbers chatz, and P.B.Galvin., Operating Systems Concepts, Ninth Edition, John Wiley & Sons (ASIA) Pvt Ltd., 2012

Mapping with Programme Outcomes: 3 - Strong, 2–Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage	12	8	4	11	5	6
Weighted percentage of Course Contribution to PO's	2.0	2.0	1.0	2.0	1.0	1.0

Course Coordinator**BOS Chairman**

CORE - VI–ASP.NET PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCA06	CORE	Theory	Y	Y	-	5	4

Learning Objectives

- ❖ To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
- ❖ To develop ASP.NET Web application using standard controls.
- ❖ To implement file handling operations.
- ❖ To handles SQL Server Data base using ADO.NET.
- ❖ Understand the Grid view control and XML classes.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	On completion of this course, students will Develop working knowledge of C# programming constructs and the .NET Framework.	PO1, PO2, PO6
CO2	To develop a software to solve real- world problems using ASP.NET	PO2, PO3, PO8
CO3	To Work on Various Controls Files.	PO1, PO3, PO7
CO4	To create a web application using Microsoft ADO.NET.	PO2, PO6
CO5	To develop web applications using XML	PO1, PO3, PO8

CORE - VI–ASP.NET PROGRAMMING

Units	Details	No. of Hours
I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library - C# Fundamentals: Primitive types and Variables – Operators – Conditional statements - Looping statements – Creating and Using Objects – Arrays – String operations.	15
II	Introduction to ASP.NET – IDE – Languages supported Components –Working with Web Forms –Web form standard controls: Properties and its events – HTML Controls – List Controls: Properties and its events.	15
III	Rich Controls: Properties and its events–validation controls: Properties and its events– File Stream classes -File Modes –File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.	15
IV	ADO.NET Overview – Database Connections –Commands – Data Reader – Data Adapter – Data Sets –Data Controls Its Properties– Data Binding.	15
V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files Website Security – Authentication – Authorization – Creating a Web application.	15
	Total	75
# Practical Implementation related to the above topics to be discussed (Internal Exam Only)		

Text Books:

1. Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.
2. Mathew, MacDonald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

Reference Books:

1. Herbert Schildt, The Complete Reference C#.NET, Tata Mc Graw - Hill, 2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET4.5 Black Book, Dream tech press, 2013.
3. AnneBoehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc.2016.

Web Resources:

1. <https://www.geeksforgeeks.org/introduction-to-net-framework/>
2. <https://www.javatpoint.com/net-framework>

Mapping with Programme Outcomes: 3 - Strong,2–Medium,1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	1	3
CO2	3	2	2	2	2	3
CO3	3	3	2	2	3	3
CO4	3	1	2	2	1	3
CO5	3	1	2	2	1	2
Weightage	15	8	10	10	8	14
Weighted percentage of Course, Contribution to PO's	3.0	1.0	2.0	2.0	1.0	2.0

Course Coordinator

BOS Chairman

CORE - VI-ASP.NET PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAP06	CORE	Practical	-	-	Y	5	4

Learning Objectives

- ❖ To develop ASP.NET Web application using standard controls.
- ❖ To create rich database applications using ADO.NET.
- ❖ To implement file handling operations.
- ❖ To implement XML classes.
- ❖ To utilize ASP.NET security features for authenticating the website

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	On completion of this course, students will To create web applications and implement various controls	PO1,PO2,PO6
CO2	Create web pages in Rich control.	PO3,PO8
CO3	Develop knowledge about file handling operations	PO1,PO4,PO8
CO4	An ability to design XML classes	PO2,PO6,PO7
CO5	To develop a software to solve real- world problems using ASP.NET	PO1,PO3,PO5,PO8

S.No	Details	No. of Hours
1	Create an exposure of Web applications and tools	75
2	Implement the Html Controls	
3	Implement the Server Controls	
4	Web application using Web controls..	
5	Web application using List controls.	
6	Web Page design using Rich control. Validate user input using Validation controls. Working with File concepts.	
7	Web application using Data Controls.	
8	Data binding with Web controls	
9	Data binding with Data Controls.	
10	Database application to perform insert, update and delete operations.	

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	1	3
CO2	3	2	2	2	2	3
CO3	3	3	2	2	3	3
CO4	3	1	2	2	1	3
CO5	3	1	2	2	1	2
Weightage	15	8	10	10	8	14
Weighted percentage of Course Contribution to PO's	3.0	1.0	2.0	2.0	1.0	2.0

Course Coordinator

BOS Chairman

SEMESTER - VI

CORE – COMPUTER NETWORKS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCA07	CORE	Theory	Y	Y	-	5	4

Learning Objectives

- To understand the concept of Data communication and Computer network.
- To get a knowledge on routing algorithms.
- To impart knowledge about networking and internetworking devices
- To study about Network communication.
- To learn the concept of Transport layer

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	On completion of this course, students will To Understand the basics of Computer Network architecture, OSI and TCP / IP reference model	PO1,PO2
CO2	To gain knowledge on Telephone systems using Wireless network	PO4,PO6
CO3	To understand the concept of MAC	PO4,PO5, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO3,PO8
CO5	To understand network security and define various Protocols such as FTP, HTTP, Telnet, DNS.	PO1,PO2

CORE – COMPUTER NETWORKS

Units	Details	No. of Hours
I	Introduction–Network Hardware–Software–Reference Models–OSI and TCP / IP Models –Example Networks: Internet, ATM, Ethernet and Wireless LANs – Physical Layer– Theoretical Basis for Data Communication – Guided Transmission Media	15
II	Wireless Transmission – Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	15
III	Elementary Data Link Protocols – Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	15
IV	Network Layer – Design Issues – Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	15
V	Transport Layer – Services – Connection Management - Addressing, Establishing and Releasing a Connection –Simple Transport Protocol – Internet Transport Protocols (ITP) – Network Security: Cryptography.	15
	Total	75

Text Books:

1. A.S.Tanenbaum, —Computer Networks, 4th Edition, Prentice – Hall of India, 2008.

Reference Books:

1. B.A. Forouzan, Data Communications and Networking, Tata Mc Graw Hill, 4th Edition, 2017
2. Halsall, —Data Communications, Computer Networks and Open Systems, Pearson Education, 2008
3. Bertsimas and Gallager, —Data Networks, 2nd Edition, PHI, 2008.

Web Resources:

- 1 https://en.wikipedia.org/wiki/Computer_network
- 2 <https://citationsy.com/styles/computer-networks>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	2	1	-
CO2	3	2	1	2	2	-
CO3	3	-	-	2	-	2
CO4	3	1	-	2	1	-
CO5	3	3	-	2	1	-
Weightage	15	8	1	10	5	2
Weighted percentage of Course Contribution to POs	2.5	1.5	1.0	2.0	1.0	1.0

Course Coordinator

BOS Chairman

CORE – DATA ANALYTICS USING R PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCA08	CORE	Theory	Y	Y	-	6	4

Learning Objectives

- ❖ To understand the problem-solving approaches
- ❖ To learn the basic programming constructs in R Programming.
- ❖ To learn the basic programming constructs in R Programming
- ❖ To use R Programming data structures - lists, tuples, and dictionaries.
- ❖ To do input / output with files in R Programming.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	On completion of this course, students will Work with big data tools and its analysis techniques.	PO1,PO2
CO2	Analyze data by utilizing clustering and classification algorithms.	PO4,PO6
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4,PO5, PO6
CO4	Perform analytics on data streams.	PO3,PO8
CO5	Learn No SQL data bases and management.	PO1,PO2

CORE – DATA ANALYTICS USING R PROGRAMMING

Units	Details	No. of Hours
I	Evolution of Big data — Best Practices for Big data Analytics— Big data characteristics—Validating —The Promotion of the Value of Big Data — Big Data Use Cases – Characteristics of Big Data Applications—Perception and Quantification of Value - Understanding Big Data Storage—A General Overview of High – Performance Architecture — HDFS — Map Reduce and YARN— Map Reduce Programming Model	18
II	CONTROL STRUCTURES AND VECTORS - Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations.	18
III	LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix – Like Operations	18
IV	FACTORS AND TABLES-Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix / Array- Like Operations on Tables, extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R PROGRAMMING.	18
V	OBJECT – ORIENTED PROGRAMMING SClasses, S Generic Functions, Writing SClasses, Using Inheritance, S Classes, Writing SClasses, Implementing a Generic Function on an SClass, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation	18
	Total	90

Text Books:

1. Roger D.Peng, R Programming for Data Science —, 2012
2. Norman Matloff, The Art of R Programming – A Tour of Statistical Software Design , 2011

Reference Books:

1. Garrett Golemund, Hadley Wickham, Hands – On Programming with R: Write Your Own Functions and Simulations ,1st Edition, 2014
 2. Venables, W.N., and Ripley, S programming, Springer, 2000
- Web Resources:

Web Resources:

- ❖ [https://en.wikipedia.org/wiki/Big data Analytics](https://en.wikipedia.org/wiki/Big_data_Analytics)
- ❖ <https://www.simplilearn.com>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	3	1	-
CO2	3	3	2	2	-	2
CO3	1	2	3	1	2	1
CO4	2	2	1	-	2	1
CO5	2	2	2	1	3	1
Weightage	11	11	8	7	8	5
Weighted percentage of Course Contribution to POs	2.0	2.0	1.0	1.0	1.0	1.0

Course Coordinator**BOS Chairman**

CORE - VIII– R PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAP08	CORE	Practical	-	-	Y	5	4

Learning Objectives

- ❖ To understand the problem-solving approaches
- ❖ To learn the basic programming constructs in R Programming
- ❖ To practice various computing strategies for R Programming – based solutions to real world
- ❖ To use R Programming data structures - lists, tuples, and dictionaries.
- ❖ To do input / output with files in R Programming.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	On completion of this course, students will Acquire programming skills in core R Programming.	PO1,PO4,PO5
CO2	Acquire Object – oriented programming skills In R Programming.	PO1,PO4,PO8
CO3	Develop the skill of designing graphical-user Interfaces (GUI) in R Programming	PO1,PO3,PO6
CO4	Acquire R Programming skills to move in to Specific branches	PO3,PO4
CO5	To develop a software to solve real- world problems using R	PO1,PO5,PO6

CORE - VIII– R PROGRAMMING LAB

S.No	Details	No. of Hours
1	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending Upon user's choice.	75
2	Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.	
3	Write a program to find list of even numbers from 1 to n using R - Loops.	
4	Create a function to print squares of numbers in sequence.	
5	Write a program to join columns and rows in a data frame using cbind() and rbind() in R.	
6	Implement different String Manipulation functions in R.	
7	Implement different data structures in R (Vectors, Lists, Data Frames)	
8	Write a program to read a csv file and analyze the data in the file in R..	
9	Create pie chart and bar chart using R.	
10	Create a data set and do statistical analysis on the data using R.	

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	3	1	-
CO2	3	3	2	2	-	2
CO3	1	2	3	1	2	1
CO4	2	2	1	-	2	1
CO5	2	2	2	1	3	1
Weightage	11	11	8	7	8	5
Weighted percentage Of Course, Contribution to PO's	2.0	2.0	1.0	1.0	1.0	1.0

Course Coordinator

BOS Chairman

FIRST YEAR - SEMESTER I
ALLIED I – ALLIED PHYSICS-I

(For B.Sc., Mathematics, Computer Science, Artificial Intelligence & Data Science
and B.C.A)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UPHA01	Allied-I	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.
- ❖ To enable the students to understand waves and oscillations.
- ❖ To inculcate the concepts of various properties of matter.
- ❖ Understand the concept of nanomaterials, including their, properties, synthesis and applications.
- ❖ To impart knowledge on the basic concepts of Electricity and Digital Electronics.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in various field.	PO1,PO3
CO2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life.	PO1,PO2,PO3
CO3	Understanding the fundamental properties and behaviors of nanomaterials. Ability to apply various techniques for synthesizing nanomaterials. Awareness of how nanomaterials are used in real-world applications across different industries.	PO4,PO6
CO4	Comprehension of fundamental concepts such as current, voltage, resistance, and power in electrical circuits. Ability to analyze using techniques such as Ohm's law and Kirchhoff's laws. Knowledge of the principles and operation of potentiometers and their role in electrical circuits.	PO4,PO5,PO6
CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits. Use the number system, binary arithmetic conversion.	PO3,PO8

Unit	Details	No. of Hours
I	WAVES, OSCILLATIONS AND ACOUSTICS: Simple Harmonic Motion (SHM) - Composition of two SHMs at Right Angles (Periods in the Ratio 1:1) - Lissajous Figures -Uses-Laws of Transverse Vibrations of Strings - Determination of AC Frequency using Sonometer (Steel and Brass Wires) – Ultrasound-Production - Piezoelectric Method – Magnetostriction method -Application of Ultrasonics. Power point presentation on: Medical Imaging	12
II	PROPERTIES OF MATTER: Elasticity: Young’s modulus-Rigidity modulus- Bulk modulus - Bending of Beam - Determination of Young’s Modulus by Uniform and Non-Uniform Bending – Torsional oscillations of a body - Determination of Rigidity Modulus by Torsional Pendulum. Viscosity: Streamline and Turbulent Motion - Critical Velocity - Coefficient of Viscosity - Poiseuille’s Formula - Comparison of Viscosities - Burette Method. Surface Tension: Definition - Drop Weight Method –Experiment to determine the Interfacial Surface Tension.	12
III	NANOMATERIALS: Need and origin of nano-Synthesis and classification of synthesis methods-techniques used in synthesis of nano materials- Chemical Vapour Deposition,Sol-gel-Electro Deposition-Ball Milling method-Properties and applications of nano materials. Laboratory Experiment on Synthesis of Silver Nanoparticles. (Report on observations during the experiment)	12
IV	CURRENT ELECTRICITY: Ohm’s Law-Verification of Ohm’s Law-Kirchhoff’s laws-Application’s of Kirchhoff’s law: Wheat stone’s bridge-Metre bridge-Carey Foster’s bridge- Potentiometer-Calibration of low range voltmeter - Calibration of low range ammeter- Types of Switches- Types of Fuses - Circuit Breakers. Model preparation : Solar mobile phone charger / power supply	12
V	DIGITAL ELECTRONICS Logic Gates OR, AND, NOT, NAND, NOR, EXOR - Logic gates using Diodes and Transistor (AND, OR, NOT)- NAND & NOR as Universal Building Blocks - Boolean Algebra - De Morgan’s Theorem – Verification-Number system-Binary system-Addition-Subtraction-Multiplication-Division-Binary to decimal and decimal to Binary conversion.	12
TOTAL		60
• PPT, Laboratory Experiments & Model preparation-related to the above topics are to be considered for Internal Exam Only		

Text Books

- ❖ R.Murugesan, Allied Physics, S.Chand & Co, New Delhi, Revised edition 2010.
- ❖ Charles P.Poole Jr, Frank J.Owens, Introduction to Nanotechnology, Wiley, India, Revised edition 2014.

Reference Books

- ❖ Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt.Ltd.,Singapore.
- ❖ V.K.Metha(2004). Principles of electronics 6thEdn. S.Chand and company.
- ❖ T.Pradeep, NANO: The Essentials, McGraw-Hill Education. 1st Edition 2007.

Web Resources

- ❖ https://youtu.be/M_5KYncYNyc
- ❖ <https://youtu.be/liJLJgIvaHY>
- ❖ https://youtu.be/7mGqd9HQ_AU
- ❖ <https://youtu.be/h5jOAw57OXM>
- ❖ <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	2	3	3	3	3	2
CO3	2	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	2	3	3	3	3	3	3	3	3	3

Mapping With Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Coordinator

BOS Chairman

FIRST YEAR- SEMESTER – I

ALLIED- PHYSICS PRACTICAL-I

(For B.Sc., Mathematics, Computer Science, Artificial Intelligence & Data Science and B.C.A)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UPHAP01	Allied Practical -I	Practical	-	-	Y	2	2

Learning Objectives

- ❖ It is aimed at exposing the undergraduate allied students to the technique of handling simple measuring instrument and also make them measure certain properties of materials.
- ❖ Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate result.
- ❖ To determine the modulus of elasticity and rigidity modulus by various methods.
- ❖ To know the working principle of logic gates.
- ❖ To understand the basic role of various components in an electronic circuit, to build the circuits such as digital circuits.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Analyze the relation between theory and experimental results.	PO1, PO2
CO2	Understand the theoretical concepts through real experiments	PO4, PO6
CO3	Plan the experimental procedure, record and interpret the results	PO3, PO8
CO4	The hands-on exercises to apply physics principles to evaluate physical parameters.	PO1, PO3, PO8
CO5	Compute the experimental investigations of mechanical, heat and optical Physics.	PO4, PO5

LIST OF EXPERIMENT (ANY SEVEN ONLY)

1	Young's modulus by uniform bending using pin and microscope
2	Young's modulus by non-uniform bending using optic lever, scale and telescope
3	Rigidity modulus by static torsion method
4	Rigidity modulus by torsional oscillations without mass
5	Surface tension and interfacial Surface tension - drop weight method
6	Comparison of viscosities of two liquids - burette method
7	Verification of laws of transverse vibrations using sonometer
8	Calibration of low range voltmeter using potentiometer
9	Calibration of low range ammeter using potentiometer
10	Verification of truth tables of basic logic gates using ICs
11	Verification of De Morgan's theorems using logic gate ICs
12	Use of NAND as universal building block.

Text Books

- ❖ M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan chand and sons educational publishers, New Delhi. Edition 2017.
- ❖ M.K. Subramanian, S.Padmanathan, S.Somasundram, B.Sc Practical Physics, Apsara Publications, Trichy, Revised edition 2020.

Reference Books

- ❖ C.C.Ourseph, C.Rangarajan, R.Balakrishnan - A Text Book of Practical Physics - S. Viswanathan Publisher - Part II (1996)
- ❖ S.L. Gupta and V.Kumar - Practical Physics - Pragti Prakashan - 25th Edition (2002)

Web Resources

- ❖ <https://www.sultanchandandsons.com/book/331/a-textbook-of-practical-physics>

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	2	3	3	3	3	2
CO3	2	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	2	3	3	3	3	3	3	3	3	3

Mapping With Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Coordinator

BOS Chairman

FIRST YEAR - SEMESTER II

ALLIED II - ALLIED PHYSICS-II

(For B.Sc., Mathematics, Computer Science, Artificial Intelligence & Data Science and B.C.A)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UPHA02	Allied-II	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To understand the basic concepts of optics.
- ❖ To provide a coherent and concise coverage of the important atomic and nuclear concept of physics.
- ❖ To provide students with a comprehensive understanding of the fundamental principles governing celestial phenomena.
- ❖ To expose the students to the applications of Quantum Mechanics and Relativity.
- ❖ Providing an overview of the principles, operation and applications of special devices.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns.	PO1
CO2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Summarize the properties of nuclei, nuclear forces, structure of atomic nucleus and nuclear models. Interpret nuclear processes like fission and fusion	PO1,PO2
CO3	Understand the basics of how the universe works, including stars, galaxies, and cosmic events.	PO4,PO6
CO4	Understand how light can release electrons from a material and explain the basic principles behind it. To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation.	PO4,PO5,PO6
CO5	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices like EV charging stations.	PO3,PO8

Unit	Details	No. Of hours
I	PHYSICAL OPTICS: Interference - Interference in Thin Films -Colors of Thin Films - Air Wedge – experiment to find the thickness of a wire – Newton’s rings – theory and experimental –Michelson’s Interferometer and its applications-Determination of Wavelength using Diffraction - Polarization - Polarization by Reflection - Brewster’s Law - Optical Activity - Laurent’s Half Shade Polarimeter. Hands on Training: Optical instruments like Spectrometer and Microscopes.	12
II	ATOMIC AND NUCLEAR PHYSICS: Atom Models - Bohr Atom Model - Mass Number - Atomic Number - Vector Atom Model - Quantum Numbers associated with the vector atom model - Pauli’s Exclusion Principle - Electronic Configuration – coupling schemes- L.S and JJ coupling. Nuclear Models - Liquid Drop Model –Semi empirical mass formula- Magic Numbers - Shell Model - Nuclear Energy - Mass Defect - Binding Energy - Nuclear Fission - Bohr and Wheeler’s theory of nuclear fission-Atom Bomb - Nuclear Fusion-Thermonuclear reactions.	12
III	ASTROPHYSICS: Planets-internal structure- crust, mantle and core of the earth-different region of earth’s atmosphere-rotation of the earth magnetosphere- Planets and their satellites-Comets-Meteors-Asteroids- Phases and their Features of moon-Types of variable stars-Types of galaxies-origin of universe: Big bang theory-Pulsating theory-Steady state theory. Power point presentation on: Regular nights dedicated to observing celestial events.	12
IV	MODERN PHYSICS: Photo electric effect-Laws of Photo electric effect-Einstein’s photo electric equation-Verification of Einstein’s photo electric equation by Millikan’s experiment-photo electric cells and its applications-Frame of Reference - Postulates of Special Theory of Relativity - Galilean Transformation Equations - Lorentz Transformation Equations - Derivation - Length Contraction - Time Dilation.	12
V	ANALOG ELECTRONICS: Energy bands in Conductor, Semiconductor and Insulator-Types of Semiconductor-PN Junction Diode - Forward and Reverse Biasing - Characteristics of Junction Diode - Zener Diode - Characteristics of Zener Diode -LED –theory-construction and working -Introduction to E-Vehicles and EV Charging Stations. Field Visit to Electric Vehicles charging station and Report Submission.	12
TOTAL		60
Hands on training, PPT & Field visit-related to the above topics are to be considered for Internal Exam Only		

Text Books

- ❖ R.Murugesan, Allied Physics, S.Chand & Co, New Delhi. Revised edition 2010.
- ❖ BaidynathBasu, Sudhindra Nath Biswas and Tanuka Chattopadhyay, An Introduction to Astrophysics, Prentice Hall of India, New Delhi (2010).

Reference Books

- ❖ Resnick Halliday and Walker (2018), Fundamentals of Physics, 11thEdn., JohnWiley and Sons, Asia Pvt. Ltd., Singapore.
- ❖ Thomas L. Floyd (2017), Digital Fundamentals, 11thEdn., Universal Book Stall, NewDelhi
- ❖ R.Murugesan, Modern Physics, S.Chand & Co, New Delhi. Revised edition 2018.

Web Resources

- ❖ <https://www.youtube.com/watch?v=JrRrp5F-Qu4>
- ❖ <https://www.validyne.com/blog/leak-test-using-pressure-transducers/>
- ❖ <https://www.atoptics.co.uk/atoptics/blsky.htm> -
- ❖ <https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	2	3	3	3	3	2
CO3	2	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	2	3	3	3	3	3	3	3	3	3

Mapping With Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Coordinator

BOS Chairman

FIRST YEAR- SEMESTER – II

ALLIED- PHYSICS PRACTICAL-II

(For B.Sc., Mathematics, Computer Science, Artificial Intelligence & Data Science
and B.C.A)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UPHAP02	Allied Practical -II	Practical	-	-	Y	2	2

Learning Objectives:

- ❖ To determine the radius of curvature of the thin lens.
- ❖ To determine the wavelength of most prominent colours of mercury spectrum.
- ❖ To find the thickness of thin wire.
- ❖ To know the working principle of logic gates.
- ❖ To construct regulated power supplies.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Analyse the relation between the theory and experimental results.	PO1, PO2
CO2	Understand the theoretical concept to the real experiments.	PO4, PO6
CO3	Plan the experimental procedure record interrupt the results.	PO3, PO8
CO4	The hands on exercise to apply physics principles to evaluate physical parameters.	PO1, PO3, PO8
CO5	Compute the experimental investigation of mechanical physics.	PO4, PO5

LIST OF EXPERIMENT (ANY SEVEN ONLY)

1	Radius of curvature of lens by forming Newton's rings
2	Thickness of a wire using air wedge
3	Wavelength of mercury lines using spectrometer and grating
4	Determination of AC frequency using sonometer
5	Sonometer -frequency of a tuning fork
6	Determination of Coefficient of viscosity using a graduated burette
7	Determination of figure of merit table galvanometer
8	Determination of Earth's magnetic field using field along the axis of a coil
9	Characterisation of Zener diode
10	Construction of Zener/IC regulated power supply
11	Construction of AND, OR, NOT gates using diodes and transistor
12	NOR gate as a universal building block

Text Books

- ❖ M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan chand and sons educational publishers, New Delhi. Edition 2017.
- ❖ M.K.Subramanian, S.Padmanathan, S.Somasundram, B.Sc Practical physics, Apsara Publications, Trichy, Revised edition 2020.

Reference Books

- ❖ C.C.Ourseph, C. Rangarajan, R. Balakrishnan - A Text Book of Practical Physics - S. Viswanathan Publisher - Part II (1996)
- ❖ S.L. Gupta and V.Kumar - Practical Physics - Pragti Prakashan - 25th Edition (2002)

Web Resources

- ❖ <https://www.sultanchandandsons.com/book/331/a-textbook-of-practical-physics>

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	2	3	3	3	3	2
CO3	2	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	2	3	3	3	3	3	3	3	3	3

Mapping With Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Coordinator

BOS Chairman

THIRD YEAR –FIFTH SEMESTER
ELECTIVE COURSE –EC5
ELECTIVE: AGILE PROJECT MANAGEMENT

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE01	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ Learning of software design, software technologies and APIs.
- ❖ Detailed demonstration about Agile development and testing techniques.
- ❖ Learning about Agile Planning and Execution.
- ❖ Understanding of Agile Management Design and Quality Check.
- ❖ Detailed examination of Agile development and testing techniques.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understanding of software design, software technologies and APIs using Agile Management.	PO1
CO2	Understanding of Agile development and testing techniques.	PO1, PO2
CO3	Understanding about Agile Planning and Execution using Sprint.	PO4, PO5
CO4	Understanding of Agile Management Design, scope, Procurement, managing Time and Cost and Quality Check.	PO4, PO5, PO6
CO5	Analyzing of Agile development and testing techniques.	PO2, PO4

ELECTIVE: AGILE PROJECT MANAGEMENT

Unit	Details	No. of Hours
I	Introduction: Modernizing Project Management: Project Management Needed a Makeover – Introducing Agile Project Management. Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 15 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test. Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.	12
II	Being Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming - Summary Agile Environments in Action: Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools. Agile Behaviors in Action: Establishing Agile roles – Establishing new values – Changing team philosophy.	12
III	Agile Planning and Execution Defining the Product Vision and Roadmap: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog. Planning Releases and Sprints: Refining requirements and estimates – Release planning – Sprint planning. Working Throughout the Day: Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective. Preparing for Release: Preparing the product for deployment (the release sprint) – Preparing the operational support – Preparing the organization for product deployment - Preparing the marketplace for product deployment .	12
IV	Agile Management Managing Scope and Procurement: What_s different about Agile scope management – Managing Agile scope – What_s different about Agile procurement – Managing Agile procurement. Managing Time and Cost: What_s different about Agile time management – Managing Agile schedules – What_s different about Agile cost management – Managing Agile budgets. Managing Team Dynamics and Communication: What_s different about Agile team dynamics – Managing Agile team dynamics – What_s different about Agile communication – Managing Agile communication. Managing Quality and Risk: What_s different about Agile quality – Managing Agile quality – What_s different about Agile risk management – Managing Agile risk.	12

V	Implementing Agile Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members – Creating and environment that enables Agility – Support Agility initially and over time. Being a Change Agent: Becoming Agile requires change – why change doesn't happen on its own – Platinum Edge's Change Roadmap – Avoiding pitfalls – Signs your changes are slipping. Benefits, Factors for Success and Metrics: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.	12
	Total	60

Text Books

- ❖ Mark C. Layton, Steven J. Ostermiller, *Agile Project Management for Dummies*, 2nd Edition, Wiley India Pvt. Ltd., 2018.
- ❖ Jeff Sutherland, *Scrum – The Art of Doing Twice the Work in Half the Time*, Penguin, 2014.

Reference Books

- ❖ Mark C. Layton, David Morrow, *Scrum for Dummies*, 2nd Edition, Wiley India Pvt. Ltd., 2018.
- ❖ Mike Cohn, *Succeeding with Agile – Software Development using Scrum*, Addison-Wesley Signature Series, 2010.
- ❖ Alex Moore, *Agile Project Management*, 2020.
- ❖ Andrew Stellman and Jennifer Greene, *Learning Agile: Understanding Scrum, XP, Lean, and Kanban*, Shroff/O'Reilly, First Edition, 2014.

Web Resources

- ❖ www.agilealliance.org/resources

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	2	3	2
CO4	3	3	3	3	3
CO5	3	2	2	3	2
Weightage	15	14	11	15	11
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	2.2

Course Coordinator

BOS Chairman

ELECTIVE: ANALYTICS SERVICE INDUSTRY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE02	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ Recognize challenges in dealing with data sets in service industry.
- ❖ Identify and apply appropriate algorithms for analyzing the healthcare, Human resource, hospitality and tourism data.
- ❖ Make choices for a model for new machine learning tasks.
- ❖ To identify employees with high attrition risk.
- ❖ To Prioritizing various talent management initiatives for your organization.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand and critically apply the concepts and methods of business analytics	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Identify, model and solve decision problems in different settings.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Create viable solutions to decision making problems.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Instill a sense of ethical decision-making and a commitment to the long-run welfare of both organizations and the communities they serve.	PO1, PO2, PO3, PO4, PO5, PO6

ELECTIVE: ANALYTICS SERVICE INDUSTRY

Unit	Details	No. of Hours
I	Healthcare Analytics: Introduction to Healthcare Data Analytics- Electronic Health Records- Components of EHR- Coding Systems- Benefits of EHR- Barrier to Adopting HER Challenges-Pheno typing Algorithms. Biomedical Image Analysis and Signal Analysis- Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models.	12
II	Healthcare Analytics Applications: Applications and Practical Systems for Healthcare- Data Analytics for Pervasive Health- Fraud Detection in Healthcare- Data Analytics for Pharmaceutical Discoveries-Clinical Decision Support Systems- Computer- Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data.	12
III	HR Analytics: Evolution of HR Analytics, HR information systems and data sources, HR Metric and HR Analytics, Evolution of HR Analytics; HR Metrics and HR Analytics; Intuition versus analytical thinking; HRMS/HRIS and data sources; Analytics frameworks like LAMP, HCM:21(r) Model.	12
IV	Performance Analysis: Predicting employee performance, Training requirements, evaluating training and development, Optimizing selection and promotion decisions.	12
V	Tourism and Hospitality Analytics: Guest Analytics – Loyalty Analytics – Customer Satisfaction – Dynamic Pricing – optimized disruption management – Fraud detection in payments.	12
	Total	60

Text Books

- ❖ Chandan K. Reddy and Charu C Aggarwal, —Healthcare data analytics, Taylor & Francis, 2015.
- ❖ Edwards Martin R, Edwards Kirsten (2016),—Predictive HR Analytics: Mastering the HR Metric, Kogan Page Publishers, ISBN-0749473924
- ❖ Fitz-enzJac (2010), —The new HR analytics: predicting the economic value of your company_s human capital investments, AMACOM, ISBN-13: 978-0-8144-1643-3
- ❖ RajendraSahu, Manoj Dash and Anil Kumar. Applying Predictive Analytics Within the Service Sector.

Reference Books

- ❖ Hui Yang and Eva K. Lee, —Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016
- ❖ Fitz-enzJac, Mattox II John (2014), —Predictive Analytics for Human Resources, Wiley, ISBN- 1118940709.

Web Resources

- ❖ <https://www.ukessays.com/essays/marketing/contemporary-issues-in-marketing-marketing-essay.php>
- ❖ <https://yourbusiness.azcentral.com/examples-contemporary-issues-marketing-field-26524.html>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3
Weightage	14	15	14	15	15
Weighted percentage of Course Contribution to POs	2.8	3.0	2.8	3.0	3.0

Course Coordinator

BOS Chairman

ELECTIVE: ARTIFICIAL INTELLIGENCE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE03	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To learn various concepts of AI Techniques.
- ❖ To learn various Search Algorithm in AI.
- ❖ To learn probabilistic reasoning and models in AI.
- ❖ To learn about Markov Decision Process.
- ❖ To learn various type of Reinforcement learning.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the various concepts of AI Techniques.	PO1
CO2	Understand various Search Algorithm in AI.	PO1, PO2
CO3	Understand probabilistic reasoning and models in AI.	PO4, PO6
CO4	Understand Markov Decision Process.	PO4, PO5, PO6
CO5	Understand various type of Reinforcement learning Techniques.	PO3, PO4

ELECTIVE: ARTIFICIAL INTELLIGENCE

Unit	Details	No. of Hours
I	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	12
II	Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, best first search, A* algorithm, Game Search	12
III	Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	12
IV	Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	12
V	Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.	12
	Total	60

Text Books

- ❖ Stuart Russell and Peter Norvig, —Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall.
- ❖ Elaine Rich and Kevin Knight, —Artificial Intelligence, Tata McGraw Hill

Reference Books

- ❖ Trivedi, M.C., —A Classical Approach to Artificial Intelligence, Khanna Publishing House, Delhi.
- ❖ Saroj Kaushik, —Artificial Intelligence, Cengage Learning India, 2011
- ❖ David Poole and Alan Mackworth, —Artificial Intelligence: Foundations for Computational Agents, Cambridge University Press 2010

Web Resources

- ❖ <https://github.com/dair-ai/ML-Course-Notes>
- ❖ <https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html>
- ❖ https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXIRFbcghLMZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1	2
CO2	3	2	2	3	3
CO3	3	2	2	2	2
CO4	3	3	2	3	3
CO5	3	2	2	3	3
Weightage	15	12	10	12	13
Weighted percentage of Course Contribution to POs	3.0	2.4	2.0	2.4	2.6

Course Coordinator

BOS Chairman

ELECTIVE: ARTIFICIAL NEURAL NETWORK

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE04	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ Understand the basics of artificial neural networks, learning process, single layer and multi-layer perceptron networks.
- ❖ Understand the Error Correction and various learning algorithms and tasks.
- ❖ Identify the various Single Layer Perception Learning Algorithm.
- ❖ Identify the various Multi-Layer Perception Network.
- ❖ Analyze the Deep Learning of various Neural network and its applications.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Students will learn the basics of artificial neural networks with single layer and multi-layer perception networks.	PO1
CO2	Learn about the Error Correction and various learning algorithms and tasks.	PO1, PO2
CO3	Learn the various Perception Learning Algorithm.	PO4, PO5
CO4	Learn about the various Multi-Layer Perception Network.	PO4, PO5, PO6
CO5	Understand the Deep Learning of various Neural network and its applications.	PO3, PO5

ELECTIVE: ARTIFICIAL NEURAL NETWORK

Unit	Details	No. of Hours
I	Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.	12
II	Introduction, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, learning with and without teacher, learning tasks, Memory and Adaptation.	12
III	Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.	12
IV	Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm.	12
V	Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzman Machines, Training of DNN and Applications.	12
	Total	60

Text Books

- ❖ Neural Networks A Classroom Approach- Satish Kumar, McGraw Hill- Second Edition.
- ❖ Neural Network- A Comprehensive Foundation- Simon Haykins, Pearson Prentice Hall, 2nd Edition, 1999.

Reference Books

- ❖ Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

Web Resources

- ❖ https://www.w3schools.com/ai/ai_neural_networks.asp
- ❖ https://en.wikipedia.org/wiki/Artificial_neural_network
- ❖ https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	3	3	2
CO4	3	3	2	3	2
CO5	2	2	2	3	2
Weightage	14	14	11	15	10
Weighted percentage of Course Contribution to POs	2.8	2.8	2.2	3.0	2.0

Course Coordinator

BOS Chairman

ELECTIVE: IMAGE PROCESSING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE05	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To learn fundamentals of digital image processing.
- ❖ To learn about various 2D Image transformations.
- ❖ To learn about various image enhancement processing methods and filters.
- ❖ To learn about various classification of Image segmentation techniques.
- ❖ To learn about various image compression techniques.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the fundamental concepts of digital image processing.	PO1
CO2	Understand various 2D Image transformations.	PO1, PO2
CO3	Understand image enhancement processing techniques and filters.	PO4, PO6
CO4	Understand the classification of Image segmentation techniques.	PO4, PO5, PO6
CO5	Understand various image compression techniques.	PO3, PO5

ELECTIVE: IMAGE PROCESSING

Unit	Details	No. of Hours
I	Digital Image Fundamentals: Image representation - Basic relationship between pixels, Elements of DIP system -Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems - Mathematical Morphology- Structuring Elements- Morphological Image Processing - 2D Convolution - 2D Convolution Through Graphical Method -2D Convolution Through Matrix Analysis	12
II	2D Image transforms: Properties of 2D-DFT - Walsh transform - Hadamard transform- Haar transform- Discrete Cosine Transform Karhunen-Lo eve Transform -Singular Value Decomposition	12
III	Image Enhancement: Spatial domain methods- Point processing Intensity transformations - Histogram processing- Spatial filtering smoothing filter- Sharpening filters - Frequency domain methods: low pass filtering, high pass Filtering- Homomorphic filter.	12
IV	Image segmentation: Classification of Image segmentation techniques - Region approach – Clustering techniques - Segmentation based on thresholding - Edge based segmentation - Classification of edges- Edge detection - Hough transform- Active contour	12
V	Image Compression: Need for compression -Redundancy- Classification of image- Compression schemes- Huffman Coding- Arithmetic coding Dictionary based compression -Transform based compression.	12
	Total	60

Text Books

- ❖ S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing, Tata McGraw Hill, 2015.
- ❖ Gonzalez Rafel C, Digital Image Processing, Pearson Education, 2009

Reference Books

- ❖ Jain Anil K, Fundamentals of digital image processing: PHI,1988.
- ❖ Kenneth R Castleman, Digital image processing: Pearson Education,2/e,2003.
- ❖ Pratt William K, Digital Image Processing: John Wiley,4/e,2007

Web Resources

- ❖ [https://kanchiuniv.ac.in/coursematerials/Digital image processing-VijayaRaghavan.pdf](https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing-VijayaRaghavan.pdf)
- ❖ [http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital Image Processing](http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing)

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2
CO2	3	3	2	3	2
CO3	3	3	3	3	2
CO4	3	3	2	3	2
CO5	3	3	2	3	2
Weightage	15	14	11	15	10
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	2.0

Course Coordinator

BOS Chairman

ELECTIVE COURSE – EC6**ELECTIVE: BIG DATA ANALYTICS**

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE06	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ Understand the Big Data Platform and its Use cases, Map Reduce Jobs.
- ❖ To identify and understand the basics of cluster and decision tree
- ❖ To study about the Association Rules, Recommendation System
- ❖ To learn about the concept of stream
- ❖ Understand the concepts of No SQL Databases

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO5
CO4	Perform analytics on data streams.	PO3, PO5, PO6
CO5	Learn NoSQL databases and management.	PO3, PO4

ELECTIVE: BIG DATA ANALYTICS

Unit	Details	No. of Hours
I	Evolution of Big data - Best Practices for Big data Analytics -Big data characteristics - Validating- The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications-Perception and Quantification of Value - Understanding Big Data Storage -A General Overview of High-Performance Architecture - HDFS -Map Reduce and YARN-Map Reduce Programming Model.	12
II	Advanced Analytical Theory and Methods: Overview of Clustering - K-means -Use Cases - Overview of the Method -Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions - Classification: Decision Trees — Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree -Decision Trees in R - Naïve Bayes- Bayes Theorem - Naïve Bayes Classifier.	12
III	Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules — Finding Association& finding similarity-Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.	12
IV	Introduction to Streams Concepts - Stream Data Model and Architecture -Stream Computing, Sampling Data in a Stream - Filtering Streams - Counting Distinct Elements in a Stream - Estimating moments - Counting oneness in a Window - Decaying Window - Real time Analytics Platform (RTAP) applications – Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics.	12
V	NoSQL Databases: Schema-less Models: Increasing Flexibility for Data Manipulation-Key Value Stores - Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding - Hbase - Analyzing big data with twitter - big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.	12
	Total	60

Text Book

- ❖ Anand Rajaraman and Jeffrey David Ullman, —Mining of Massive Datasets, Cambridge University Press, 2012.

Reference Books

- ❖ David Loshin, —Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph, Morgan Kaufmann/El sevier Publishers, 2013.

- ❖ EMC Education Services, —Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley publishers, 2015.

Web Resources

- ❖ <https://www.simplilearn.com>
- ❖ https://www.sas.com/en_us/insights/analytics/big-data-analytics.html

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	2
CO4	3	3	2	3	3
CO5	3	3	2	3	2
Weightage	15	14	11	15	13
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	2.6

Course Coordinator

BOS Chairman

ELECTIVE: MOBILE AD HOC NETWORK

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE07	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To learn about basics concepts of Ad-hoc network models.
- ❖ To learn about Medium Access Protocols (MAC)
- ❖ To learn about Network Routing Protocols and Algorithms.
- ❖ To learn about Delivery and Security in Transport Layer.
- ❖ To learn about Cross layer design and optimization techniques, Integration of ad-hoc with Mobile IP Networks

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the basics concepts of Ad-hoc network models.	PO1
CO2	Understand the Medium Access Protocols (MAC).	PO1, PO2
CO3	Understand Network Routing Protocols, design issues and various types of Routing Algorithms.	PO4, PO6
CO4	Understand the concepts of Delivery and Security in Transport Layer.	PO4, PO5, PO6
CO5	Understand cross layer techniques and Integration of ad-hoc with Mobile IP networks.	PO3, PO8

ELECTIVE: MOBILE AD HOC NETWORK

Unit	Details	No. of Hours
I	Introduction: Introduction to ad-hoc networks– definition, characteristics, features, applications. Characteristics of wireless channel, ad-hoc mobility models indoor and outdoor models.	12
II	Medium Access Protocol: MAC Protocols: Design issues, goals and classification. Contention-based protocols - With reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.	12
III	Network Protocols: Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, Hybrid routing algorithm, energy aware routing Algorithm, hierarchical routing, Seaware routing.	12
IV	End–end delivery and security: Transport Layer: Issues in designing Transport layer classification, ad-hoc transport protocols. Security issues in ad-hoc networks: issues and challenges, network security attacks, secure routing protocols.	12
V	Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of ad-hoc with Mobile IP networks.	12
Total		60

Text Books

- ❖ C.Siva Ram Murthy and B.S.Manoj, Ad-hoc Wireless Networks Architecture and Protocols II edition, Pearson Edition, 2007.
- ❖ Charles E.Perkins, Ad-hoc Networking, Addison –Wesley, 2000

Reference Books

- ❖ Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Tomjanovich, Mobile ad-hoc networking, Wiley-IEEE press, 2004.
- ❖ Mohammad Ilyas, The hand book of ad-hoc wireless networks, CRC press, 2002.
- ❖ T.Camp, J.Boleng, and Davies — A Survey of Mobility Models for Ad-hoc Network
- ❖ Research, - Wireless Common. And Mobile Comp-Special Issue on Mobile Ad-hoc networking Research, Trends and Applications, Vol.2, no.5, 2002, pp.483 – 502.
- ❖ A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri M. Abduljalil and Shrikant K.Bodhe, IEEE communication Survey and tutorials, no:12007.

Web Resources

- ❖ https://en.wikipedia.org/wiki/Wireless_ad_hoc_network
- ❖ <https://www.ijert.org/mobile-ad-hoc-network> 150
- ❖ https://books.google.com/books/about/Mobile_Ad_Hoc_Networking.html?id=GnkcHEsxAigC

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	-	3	3	1
CO2	2	1	2	3	3	-
CO3	3	2	1	2	3	3
CO4	3	3	2	3	2	-
CO5	2	2	-	3	3	3
Weightage	12	10	5	14	14	7
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	3.0	2.0

Course Coordinator

BOS Chairman

ELECTIVE: COMPUTATIONAL INTELLIGENCE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE08	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To identify and understand the basics of AI and its search.
- ❖ To study about the Fuzzy logic systems.
- ❖ Understand and apply the concepts of Neural Network and its functions.
- ❖ Understand the concepts of Artificial Neural Network
- ❖ To study about the Genetic Algorithm.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Describe the fundamentals of artificial intelligence concepts and searching techniques.	PO1
CO2	Develop the fuzzy logic sets and membership function and Defuzzification techniques.	PO1, PO2
CO3	Understand the concepts of Neural Network and analyze and apply the learning techniques	PO4, PO6
CO4	Understand the artificial neural networks and its applications.	PO4, PO5, PO6
CO5	Understand the concept of Genetic Algorithm and Analyze the optimization problems using GAs.	PO3, PO5

ELECTIVE: COMPUTATIONAL INTELLIGENCE

Unit	Details	No. of Hours
I	Introduction to AI: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.	12
II	Fuzzy Logic Systems: Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.	12
III	Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Back propagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications	12
IV	Artificial Neural Networks: Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.	12
V	Genetic Algorithm: Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm	12
	Total	60

Text Books

- ❖ S.N. Sivanandam and S.N. Deepa, —Principles of Soft Computing, 2nd Edition, Wiley India Pvt. Ltd.
- ❖ Stuart Russell and Peter Norvig, —Artificial Intelligence - A Modern Approach, 2nd Edition, Pearson Education in Asia.
- ❖ S. Rajasekaran, G. A. Vijayalakshmi, —Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, PHI.

Reference Books

- ❖ F. Martin, Mcneill, and Ellen Thro, —Fuzzy Logic: A Practical approach, AP Professional, 2000.
- Chin Teng Lin, C. S. George Lee, Neuro-Fuzzy Systems, PHI
- ❖ Chin Teng Lin, C. S. George Lee, Neuro-Fuzzy Systems, PHI.

Web Resources

- ❖ <https://www.javatpoint.com/artificial-intelligence-tutorial>
- ❖ <https://www.w3schools.com/ai/>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2
CO2	3	3	2	3	3
CO3	3	3	2	2	2
CO4	3	2	2	2	3
CO5	3	2	2	2	3
Weightage	15	12	10	12	13
Weighted percentage of Course Contribution to POs	3.0	2.4	2.0	2.4	2.6

Course Coordinator

BOS Chairman

ELECTIVE: CRYPTOGRAPHY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE09	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To understand the fundamentals of Cryptography
- ❖ To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- ❖ To understand the various key distribution and management schemes.
- ❖ To understand how to deploy encryption techniques to secure data in transit across data networks.
- ❖ To design security applications in the field of Information technology

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply the different cryptographic operations of public key cryptography.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Apply the various Authentication schemes to simulate different applications.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand various Security practices and System security standards	PO1, PO2, PO3, PO4, PO5, PO6

ELECTIVE: CRYPTOGRAPHY

Unit	Details	No. of Hours
I	Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.	12
II	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Mono alphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography.	12
III	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.	12
IV	Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.	12
V	Intruders – Malicious software – Firewalls.	12
	Total	60

Text Books

- ❖ William Stallings, —Cryptography and Network Security Principles and Practices.

Reference Books

- ❖ Behrouz A. Foruzan, —Cryptography and Network Security, Tata McGraw-Hill, 2007.
- ❖ Atul Kahate, —Cryptography and Network Security, Second Edition, 2003, TMH.
- ❖ M.V. Arun Kumar, —Network Security, 2011, First Edition, USP.

Web Resources

- ❖ <https://www.tutorialspoint.com/cryptography/>
- ❖ <https://pgptools.tenderapp.com/kb/how-to/introduction-to-cryptography>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	2	3	3	2	3
CO5	3	2	3	2	3
Weightage	14	13	15	12	14
Weighted percentage of Course Contribution to POs	2.8	2.6	3.0	2.4	2.8

Course Coordinator

BOS Chairman

ELECTIVE: SOFTWARE PROJECT MANAGEMENT

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCAE10	ELECTIVE	Theory	Y	Y	-	4	3

Learning Objectives

- ❖ To define and highlight importance of software project management.
- ❖ To formulate and define the software management metrics & strategy in managing projects
- ❖ To familiarize in Software Project planning
- ❖ Understand to apply software testing techniques in commercial environment

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the principles and concepts of project management	PO1
CO2	Knowledge gained to train software project managers	PO1, PO2,
CO3	Apply software project management methodologies.	PO3, PO4, PO5,
CO4	Able to create comprehensive project plans	PO4, PO5, PO6
CO5	Evaluate and mitigate risks associated with software development process.	PO2, PO3, PO4, PO5, PO6

ELECTIVE: SOFTWARE PROJECT MANAGEMENT

Unit	Details	No. of Hours
I	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.	12
II	Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.	12
III	Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.	12
IV	Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.	12
V	Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study	12
	Total	60

Text Book

- ❖ Robert T. Futrell, Donald F. Shafer, Linda I. Safer, —Quality Software Project Management Pearson Education Asia 2002.

Reference Books

- ❖ PankajJalote, —Software Project Management in Practicel, Addison Wesley 2002.
- ❖ Hughes, —Software Project Managementll, Tata McGraw Hill 2004, 3rd Edition.

Web Resources

- ❖ Software Project Management e-resources from Digital libraries
- ❖ www.smartworld.com/notes/software-project-management

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	3	1	2	2	2
CO3	3	2	2	3	3
CO4	2	2	2	3	2
CO5	2	2	2	3	3
Weightage	13	11	10	13	12
Weighted percentage of Course Contribution to POs	2.6	2.2	2.0	2.6	2.4

Course Coordinator

BOS Chairman

THIRD YEAR –SIXTH SEMESTER**ELECTIVE COURSE – EC7****ELECTIVE: FUZZY LOGIC**

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE11	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ To understand the basic concept of Fuzzy logic.
- ❖ To learn the various operations on relation properties
- ❖ To study about the membership functions
- ❖ To learn about the Defuzzification and Fuzzy Rule-Based System
- ❖ To learn the concepts of Applications of Fuzzy Logic

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the basics of Fuzzy sets, operation and properties.	PO1
CO2	Apply Cartesian product and composition on Fuzzy relations and use the tolerance and Equivalence relations.	PO1, PO2
CO3	Analyze various fuzzification methods and features of membership Functions.	PO4, PO6
CO4	Evaluate defuzzification methods for real time applications.	PO3, PO4, PO6
CO5	Design an application using Fuzzy logic and its Relations.	PO3, PO6

ELECTIVE: FUZZY LOGIC

Unit	Details	No. of Hours
I	Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations: Introduction-Cartesian Product of Relation-Classical Relations - Cardinality of Crisp Relation.	15
II	Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations, Crisp Relation.	15
III	Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.	15
IV	Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.	15
V	Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.	15
	Total	75

Text Books

- ❖ S. N. Sivanandam, S. Sumathi and S. N. Deepa-Introduction to Fuzzy Logic using MATLAB, Springer-Verlag Berlin Heidelberg 2007.

Reference Books

- ❖ Guanrong Chen and Trung Tat Pham- Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems
- ❖ Timothy J Ross , Fuzzy Logic with Engineering Applications

Web Resources

- ❖ <https://www.javatpoint.com/fuzzy-logic>
- ❖ <https://www.guru99.com/what-is-fuzzy-logic.html>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	3	3	2
CO3	3	3	2	3	2
CO4	3	2	2	3	2
CO5	3	3	2	2	3
Weightage	15	14	11	14	11
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	2.8	2.2

Course Coordinator

BOS Chairman

ELECTIVE: GRID COMPUTING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE12	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ To learn the basic construction and application of Grid computing.
- ❖ To learn grid computing organization and their Role.
- ❖ To learn Grid Computing Anatomy.
- ❖ To learn Grid Computing road map.
- ❖ To learn various type of Grid Architecture.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	To understand the basic elements and concepts of Grid computing.	PO1
CO2	To understand the Grid computing toolkits and Framework.	PO1, PO2
CO3	To understand the concepts of Anatomy of Grid Computing.	PO4, PO6
CO4	To understand the concept of service-oriented architecture.	PO4, PO5
CO5	To Gain knowledge on grid and web service architecture.	PO3, PO5

ELECTIVE: GRID COMPUTING

Unit	Details	No. of Hours
I	Introduction: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.	15
II	Grid Computing organization and their Roles: Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), Organization Developing Grid Computing Toolkits and Framework, Organization and building and using grid-based solutions to solve computing, commercial organization building and Grid Based solutions.	15
III	Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, Grid Architecture and relationship to other distributed technology.	15
IV	The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, Semantic Grids.	15
V	Merging the Grid services Architecture with the Web Services Architecture: Service-Oriented Architecture, Web Service Architecture, XML messages and Enveloping, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.	15
	Total	75

Text Book

- ❖ Joshy Joseph and Craig Fellenstein, Grid computing, Pearson / IBM Press, PTR, 2004.

Reference Books

- ❖ Ahmer Abbas and Graig computing, A Practical Guide to technology and applications, Charles River Media, 2003.

Web Resources

- ❖ https://en.wikipedia.org/wiki/Grid_computing
- ❖ https://link.springer.com/chapter/10.1007/978-1-84882-409-6_4
- ❖ <https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	3	3	2
CO4	3	2	2	3	2
CO5	3	3	2	3	2
Weightage	15	14	11	15	10
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	2.0

Course Coordinator

BOS Chairman

ELECTIVE: HUMAN COMPUTER INTERACTION

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE13	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ To learn about the foundations of Human Computer Interaction.
- ❖ To learn the design and software process technologies.
- ❖ To learn HCI models and theories.
- ❖ To learn Mobile Ecosystem.
- ❖ To learn the various types of Web Interface Design.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the fundamentals of HCI.	PO1
CO2	Understand the design and software process technologies.	PO1, PO2
CO3	Understand HCI models and theories.	PO3, PO5
CO4	Understand Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	PO4, PO5
CO5	Understand the various types of Web Interface Design.	PO3, PO4

ELECTIVE: HUMAN COMPUTER INTERACTION

Unit	Details	No. of Hours
I	FOUNDATIONS OF HCI: • The Human: I/O channels – Memory • Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; • Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case Studies	15
II	DESIGN & SOFTWARE PROCESS: • Interactive Design: • Basics – process – scenarios • Navigation: screen design Iteration and prototyping. • HCI in software process: • Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design	15
III	MODELS AND THEORIES: • HCI Models : Cognitive models:- Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW.	15
IV	Mobile HCI: • Mobile Ecosystem: Platforms, Application frameworks • Types of Mobile Applications: Widgets, Applications, Games • Mobile Information Architecture, Mobile 2.0, • Mobile Design: Elements of Mobile Design, Tools. - Case Studies	15
V	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies.	15
	Total	75

Text Books

- ❖ Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Human -Computer Interaction, III Edition, Pearson Education, 2004 (UNIT I, II & III)
- ❖ Brian Fling, —Mobile Design and Development, I Edition, O'Reilly Media Inc., 2009(UNIT-IV)
- ❖ Bill Scott and Theresa Neil, —Designing Web Interfaces, First Edition, O'Reilly, 2009. (UNIT-V)

Reference Books

- ❖ Shneiderman, —Designing the User Interface: Strategies for Effective Human-Computer Interaction, V Edition, Pearson Education.

Web Resources

- ❖ <https://www.interaction-design.org/literature/topics/human-computer-interaction>
- ❖ https://link.springer.com/10.1007/978-0-387-39940-9_192
- ❖ https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	3	3	3
CO4	3	2	2	3	2
CO5	3	3	2	3	2
Weightage	15	14	11	15	11
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	2.2

Course Coordinator

BOS Chairman

ELECTIVE: INFORMATION SECURITY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE14	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ To know the objectives of information security
- ❖ Understand the importance and application of each of confidentiality, integrity, authentication and availability
- ❖ Understand various cryptographic algorithms
- ❖ Understand the basic categories of threats to computers and networks
- ❖ To study about the concepts of security in networks, web security

Course Outcomes		
Course Outcomes	On completion of this course, students will;	Programme Outcomes
CO1	Understand network security threats, security services, and counter measures	PO1
CO2	Understand vulnerability analysis of network security	PO1, PO2
CO3	Acquire background on hash functions; authentication; firewalls; intrusion detection techniques	PO4, PO6
CO4	Gain hands-on experience with programming and simulation techniques for security protocols.	PO4,PO5,PO6
CO5	Apply methods for authentication, access control, Intrusion detection and prevention	PO3,PO8

ELECTIVE: INFORMATION SECURITY

Unit	Details	No. of Hours
I	Introduction to Information Security: Security mindset, Computer Security Concepts (CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms	15
II	The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense. Cryptography: Concepts and Techniques: Introduction, plain text and decipher text, substitution techniques, transposition techniques, encryption and decryption.	15
III	Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms Authentication and Digital Signatures: Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos	15
IV	Program Security: Non-malicious Program errors –Buffer overflow, Incomplete mediation, Time-of-check to Time-of-use Errors, Viruses, Trapdoors, Salami attack, Man-in-the-middle attacks, Covert channels. File protection Mechanisms, User Authentication Designing Trusted O.S: Security policies, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples	15
V	Security in Networks: Threats in networks, Network Security Controls–Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honey pots, Traffic flow security. Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction	15
	Total	75

Text Books

- ❖ Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education
- ❖ Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson

Reference Books

- ❖ Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition
- ❖ Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 2nd Edition
- ❖ Information Security, Principles and Practice: Mark Stamp, Wiley India
- ❖ Principles of Computer Security: W M. Arthur Conklin, Greg White, TMH

Web Resources

- ❖ <https://www.geeksforgeeks.org/what-is-information-security/>

- ❖ <https://www.tutorialspoint.com/what-is-information-security#:~:text=Information security is designed and, destruction alteration and disruption.>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	3	2
CO2	2	-	1	-	3	2
CO3	-	3	1	3	-	-
CO4	2	3	1	3	3	-
CO5	2	3	1	3	3	2
Weightage: Weighted percentage of Course Contribution to POs	8	12	5	11	12	6

Course Coordinator

BOS Chairman

ELECTIVE: DATABASE MANAGEMENT SYSTEM

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE15	Elective	Theory	Y	Y	-	5	4

Learning Objectives

- ❖ To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- ❖ To understand the concepts of data base management system, design simple Database models.
- ❖ To learn and understand to write queries using SQL, PL/SQL.
- ❖ To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- ❖ To understand the concepts of data base management system, design simple Database models.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO3, PO4
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO5

ELECTIVE: DATABASE MANAGEMENT SYSTEM

Unit	Details	No. of Hours
I	Database Concepts: Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction	15
II	Design Concepts: Relational database model - logical view of data-keys -Integrity 15 rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram Relational Model: Structure of Relational Databases -Database Schema - Keys – Schema Diagrams - Relational Query Languages - Relational Operations Fundamental Relational- Algebra Operations Additional Relational-Algebra Operations- Extended Relational-Algebra Operations - Null Values - Modification of the Database.	15
III	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.	15
IV	Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function.	15
V	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation –Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	15
	Total	75

Text Books

- ❖ Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
- ❖ Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016

Reference Books

- ❖ Abraham Silberschatz, Henry F.Korth and Sudarshan,—Database System Concepts, McGraw Hill International Publication, VI Edition
- ❖ Shio Kumar Singh, Database Systems, Pearson publications, II Edition

Web Resources

- ❖ Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	3	2	1	1	2	1
CO2	3	2	2	3	1	3	1	2	1	1
CO3	3	1	3	2	2	3	1	1	2	2
CO4	2	1	3	3	2	1	1	2	2	1
CO5	3	2	2	1	3	3	2	1	1	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	1
CO2	3	3	2	2	3
CO3	3	3	2	3	2
CO4	3	2	3	2	2
CO5	3	2	2	2	3
Weightage	15	12	10	11	11
Weighted percentage of Course Contribution to POs	3.0	2.4	2.0	2.2	2.2

Course Coordinator

BOS Chairman

ELECTIVE COURSE – EC8**ELECTIVE: IOT AND ITS APPLICATION**

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE16	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ Use of Devices, Gateways and Data Management in IoT.
- ❖ Design IoT applications in different domain and be able to analyze their performance.
- ❖ Implement basic IoT applications on embedded platform
- ❖ To gain knowledge on Industry Internet of Things
- ❖ To Learn about the privacy and Security issues in IoT

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO5
CO4	Perform analytics on data streams.	PO3, PO4, PO5
CO5	Learn NoSQL databases and management.	PO3, PO5

ELECTIVE: IOT AND ITS APPLICATION

Unit	Details	No. of Hours
I	IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.	15
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural. Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	15
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	15
IV	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management.	15
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.	15
	Total	75

Text Books

- ❖ Vijay Madiseti and Arshdeep Bhaga, —Internet of Things: (A Hands-on Approach), Universities Press (INDIA) Private Limited 2014, 1st Edition.

Reference Books

- ❖ Michael Miller, —The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, kindle version.
- ❖ Francis DaCosta, —Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications 2013, 1st Edition,.
- ❖ Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice 4..CunoPfister, —Getting Started with the Internet of Things, O'Reilly Media 2011

Web Resources

- ❖ <https://www.simplilearn.com>
- ❖ <https://www.javatpoint.com>
- ❖ <https://www.w3schools.com>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3
CO2	3	3	3	3	3
CO3	3	2	2	3	3
CO4	3	2	2	3	3
CO5	3	2	2	3	2
Weightage	15	12	11	15	14
Weighted percentage of Course Contribution to POs	3.0	2.4	2.2	3.0	2.8

Course Coordinator

BOS Chairman

ELECTIVE: NATURAL LANGUAGE PROCESSING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE17	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ To understand approaches to syntax and semantics in NLP.
- ❖ To learn natural language processing and to learn how to apply basic algorithms in this field.
- ❖ To understand approaches to discourse, generation, dialogue and summarization within NLP.
- ❖ To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc.
- ❖ To understand current methods for statistical approaches to machine translation.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Describe the fundamental concepts and techniques of natural language processing. Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each. Use NLP technologies to explore and gain a broad understanding of text data.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Use NLP methods to analyse sentiment of a text document.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Analyze large volume text data generated from a range of real-world applications. Use NLP methods to perform topic modeling.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness. Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments.	PO1, PO2, PO3, PO4, PO5, PO6

ELECTIVE: NATURAL LANGUAGE PROCESSING

Unit	Details	No. of Hours
I	Introduction: Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.	15
II	Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging, Syntactic Analysis: Context-free Grammar-Constituency- Parsing- Probabilistic Parsing.	15
III	Semantic analysis and Discourse Processing: Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure.	15
IV	Natural Language Generation: Architecture of NLG Systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.	15
V	Information retrieval and lexical resources: Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: WorldNet-Frame Net Stemmers- POS Tagger- Research Corpora SSAS.	15
	Total	75

Text Books

- ❖ Daniel Jurafsky, James H. Martin, —Speech & language processing, Pearson publications.
- ❖ Allen, James. Natural language understanding. Pearson, 1995.

Reference Book

- ❖ Pierre M. Nugues, —An Introduction to Language Processing with Perl and Prolog, Springer

Web Resources

- ❖ https://en.wikipedia.org/wiki/Natural_language_processing
- ❖ <https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	2
CO3	3	3	3	3	3
CO4	3	3	3	3	2
CO5	3	3	3	3	2
Weightage	14	14	15	15	13
Weighted percentage of Course Contribution to POs	2.8	2.8	3.0	3.0	2.6

Course Coordinator

BOS Chairman

ELECTIVE: CLOUD COMPUTING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE18	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ Learning fundamental concepts and Technologies of Cloud Computing.
- ❖ Learning various cloud service types and their uses and pitfalls.
- ❖ To learn about Cloud Architecture and Application design.
- ❖ To know the various aspects of application design, benchmarking and security on the Cloud.
- ❖ To learn the various Case Studies in Cloud Computing.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the fundamental concepts and Technologies in Cloud Computing.	PO1
CO2	Able to understand various cloud service types and their uses and pitfalls.	PO1, PO2
CO3	Able to understand Cloud Architecture and Application design.	PO4, PO5
CO4	Understand the various aspects of application design, benchmarking and security in the Cloud.	PO4, PO5
CO5	Understand various Case Studies in Cloud Computing.	PO3,PO4

ELECTIVE: CLOUD COMPUTING

Unit	Details	No. of Hours
I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service Level Agreements – Billing.	15
II	Cloud Services Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage. Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services Content Delivery Services: Amazon Cloud Front - Windows Azure Content Delivery Network Analytics Services: Amazon Elastic Map Reduce - Google Map Reduce Service - Google Big Query - Windows Azure HD Insight Deployment and Management Services: Amazon Elastic Bean stack - Amazon Cloud Formation Identity and Access Management Services: Amazon Identity and Access Management - Windows Azure Active Directory. Open Source Private Cloud Software: Cloud Stack – Eucalyptus – Open Stack	15
III	Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Up gradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).	15
IV	Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.	15
V	Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.	15
	Total	75

Text Books

- ❖ Arshdeep Bahga, Vijay Madisetti, Cloud Computing – A Hands On Approach, Universities Press (India) Pvt. Ltd., 2018

Reference Books

- ❖ Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw-Hill, 2013.
- ❖ Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.
- ❖ David Crookes, Cloud Computing in Easy Steps, Tata McGraw Hill, 2015.
- ❖ Dr. Kumar Saurabh, Cloud Computing, Wiley India, Second Edition 2012.

Web Resources

- ❖ https://en.wikipedia.org/wiki/Cloud_computing
- ❖ https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7
- ❖ <https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3
CO2	3	2	3	3	3
CO3	3	3	2	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3
Weightage	15	14	11	15	15
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	3.0

Course Coordinator

BOS Chairman

ELECTIVE: SOFTWARE METRICS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCAE19	ELECTIVE	Theory	Y	Y	-	5	3

Learning Objectives

- ❖ Gain a solid understanding of what software metrics are and their significance
- ❖ Learn how to identify and select appropriate software metrics based on project goals
- ❖ Acquire knowledge and skills in collecting and measuring software metrics
- ❖ Learn how to analyze and interpret software metrics data to extract valuable insights
- ❖ Gain the ability to evaluate software quality using appropriate metrics

Course Outcomes		
Course Outcomes		Programme Outcomes
CO1	Understand various fundamentals of measurement and software metrics	PO1
CO2	Identify framework and analysis techniques for software measurement	PO1, PO2
CO3	Apply internal and external attributes of software product for effort estimation	PO4, PO6
CO4	Use appropriate analytical techniques to interpret software metrics data and derive Meaningful insights	PO4, PO5, PO6
CO5	Recommend reliability models for predicting software quality	PO3, PO8

ELECTIVE: SOFTWARE METRICS

Unit	Details	No. of Hours
I	Fundamentals of Measurement: Need for Measurement: Measurement in Software Engineering, Scope of Software Metrics, The Basics of measurement: There presentation all theory of measurement, Measurement and models, Measurement scales and Scale types, meaningfulness in measurement	15
II	A Goal-Based Framework For Software Measurement: Classifying software measures, Determining what to Measure, Applying the framework, Software measurement validation, Performing Software Measurement Validation Empirical investigation: Principles of Empirical Studies, Planning Experiments, Planning case studies as quasi-experiments, Relevant and Meaningful Studies	15
III	Software Metrics Data Collection: Defining good data, Data collection for incident reports, How to collect data, Reliability of data collection Procedures Analyzing software measurement data: Statistical distributions and hypothesis testing, Classical data analysis techniques, Examples of simple analysis techniques	15
IV	Measuring internal product attributes: Size Properties of Software Size, Code size, Design size, Requirements analysis and Specification size, Functional size measures and estimators, Applications of size measures Measuring internal product attributes: Structure: Aspects of Structural Measures, Control flow structure of program units, Design-level Attributes, Object-oriented Structural attributes and measures	15
V	Measuring External Product Attributes: Modelling software quality, Measuring aspects of quality, Usability Measures, Maintainability measures, Security Measures Software Reliability: Measurement and Prediction: Basics of reliability theory, The software reliability problem, Parametric reliability growth models, Predictive accuracy	15
	Total	75

Textbooks

- ❖ Software Metrics a Rigorous and Practical Approach, Norman Fenton, James Bieman, Third Edition, 2014

Reference Books

- ❖ Software metrics, Norman E, Fenton and Shari Lawrence P fleeger, International Thomson Computer Press, 1997
- ❖ Metric and models in software quality engineering, Stephen H.K and, Second edition, 2002, Addison Wesley Professional
- ❖ Practical Software Metrics for Project Management and Process Improvement, Robert B.Grady, 1992, Prentice Hall.

Web Resources

- ❖ <https://lansa.com/blog/general/what-are-software-metrics-how-can-i-measure-these-metrics/>
- ❖ <https://stackify.com/track-software-metrics/>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	-	3	3	2
CO2	3	1	2	3	3	3
CO3	3	1	1	2	3	3
CO4	2	3	2	3	2	3
CO5	2	2	-	3	3	3
Weighted percentage of Course Contribution to POs	12	9	5	14	14	14

Course Coordinator

BOS Chairman

SEC - FUNDAMENTALS OF INFORMATION TECHNOLOGY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCASE01	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand basic concepts and terminology of information technology.
- ❖ To have a basic understanding of personal computers and their operation.
- ❖ To be able to identify data storage and its usage.
- ❖ To get great knowledge of software and its functionalities.
- ❖ To understand about operating system and their uses.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1-PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1-PO6
CO3	Concept of storing data in computer using two headers namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1-PO6
CO4	Work with different software, Write program in the software and applications of software.	PO1-PO6
CO5	Usage of Operating system in information technology which really acts as an interpreter between software and hardware.	PO1-PO6

SEC-FUNDAMENTALS OF INFORMATION TECHNOLOGY

Unit	Details	No. of Hours
I	Introduction to Computers-Generations of Computer-Data and Information- Components of Computer – Software – Hardware – Input Devices Output Devices-Types of Operating System.	6
II	MSWord: Introduction-Elements of Window-Files, Folders and Directories –Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment-Bullets and Numbering-Header and footer watermark-inserting objects (images, other application document) – Table creation – Mail merge.	6
III	MS Excel: Introduction-Inserting rows and columns-Sizing rows and columns-Implementing formulas-Generating Series-Functions in excel-Creation of Chart-Inserting objects-Filter-Sorting-Inserting worksheet.	6
IV	MS PowerPoint: Introduction-Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) –Slide show- Types of Views – Types of Animations-Inserting Objects-Implementing multimedia (Video and Audio)-Templates (Built-in and User-Defined).	6
V	Internet: Introduction to Internet and Intranet-Services of Internet-Domain Name – URL – Browser – Types of Browsers – Search Engine -E-Mail – Basic Components of E-Mail – How to send group mail. Ecommerce: Digital Signature-Digital Currency-Online shopping and transaction.	6
	Total	30

Text books

- ❖ Reema Thareja, - FUNDAMENTALS OF INFORMATION TECHNOLOGY II, First Edition, 2017, Oxford University Press.
- ❖ Dr. R. Nageswara Rao, - FUNDAMENTALS OF INFORMATION TECHNOLOGY II, First Edition, 2017, Dream tech Publishers.

Reference Books

- ❖ Vamsi Kurama, - FUNDAMENTALS OF INFORMATION TECHNOLOGY II, Pearson Education.
- ❖ Mark Lutz, FUNDAMENTALS OF INFORMATION TECHNOLOGY, Orielly.
- ❖ Adam Stewarts, - FUNDAMENTALS OF INFORMATION TECHNOLOGY, online.
- ❖ Fabio Nelli, - FUNDAMENTALS OF INFORMATION TECHNOLOGY, A Press.
- Kenneth A. Lambert
- ❖ Fundamentals of Information Technology – First Programs, CENGAGE Publication.

Mapping with Programme Outcomes: S-Strong-3, M-Medium-2, -Low-1

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	2	1
CO2	3	2	3	2	3
CO3	3	2	2	2	2
CO4	2	3	3	3	3
CO5	3	3	3	3	3
Weightage	13	13	13	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Course Coordinator

BOS Chairman

SEC-INTRODUCTION TO HTML

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCASE02	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Insert a graphic within a web page.
- ❖ Create a link within a web page.
- ❖ Create a table with in a webpage.
- ❖ Insert heading levels within a web page.
- ❖ Insert ordered and unordered lists within a web page. Create a webpage.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1-PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of saves the files.	PO1-PO6
CO3	Understand the page formatting. Concept of list	PO1- PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1- PO6
CO5	Concept of adding images Understand the table creation.	PO1- PO6

SEC-INTRODUCTION TO HTML

Unit	Details	No. of Hours
I	Introduction: Web Basics: What is Internet – Web browsers – What is Webpage –HTML Basics: Understanding tags.	6
II	Tags for Document structure (HTML, Head, and Body Tag). Block level text elements: Headings paragraph (<p> tag) –Font style elements: (bold, italic, font, small, strong, strike, big tags).	6
III	Lists: Types of lists: Ordered, Unordered – Nesting Lists –Other tags: Marquee, HR, and BR – Using Images – Creating Hyperlinks.	6
IV	Tables: Creating basic Table, Table elements, Caption – Table and cell alignment –Rowspan, Colspan – Cell padding.	6
V	Frames: Frameset – Targeted Links – Noframe – Forms: Input, Text area, Select, Option.	6
	Total	30

Text Books

- ❖ Mastering HTML5and CSS3 Made Easy®, Teach UComp Inc., 2014.
- ❖ Thomas Michaud, -Foundations of Web Design: Introduction to HTML&CSS

Web Resources

- ❖ <https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf>
- ❖ <https://www.w3schools.com/html/default.asp>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	2	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	2	3
Weightage	14	15	14	14	15
Weighted percentage of Course Contribution to POs	2.8	3.0	2.8	2.8	3.0

Course Coordinator

BOS Chairman

SEC-WEB DESIGNING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCASE03	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Understand the basics of HTML and its components.
- ❖ To study about the Graphics in HTML.
- ❖ Understand and apply the concepts of XML and DHTML.
- ❖ Understand the concept of JavaScript.
- ❖ To identify and understand the goals and objectives of the Ajax.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Develop working knowledge of HTML	PO1,PO3, PO6,PO8
CO2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3, PO6
CO3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3,PO5
CO4	Ability to develop a java script	PO1,PO2, PO3,PO7
CO5	An ability to develop web application using Ajax.	P02,PO6, PO7

SEC-WEB DESIGNING

Unit	Details	No. of Hours
I	HTML: HTML-Introduction-tag basics- page Structure - adding comments working with texts, paragraphs and line break. Emphasizing test - heading and horizontal rules – list - font size, face and color - alignment links – tables - frames.	6
II	Forms & Images Using Html: Graphics: Introduction - How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.	6
III	XML & DHTML: Cascading style sheet (CSS)-what is CSS - Why we use CSS -adding CSS to your web pages - Grouping styles - extensible markup language (XML).	6
IV	Dynamic HTML: Document object model (DCOM) - Accessing HTML & CSS through DCOM Dynamic content styles & positioning - Event bubbling - data binding. JavaScript: Client-side scripting, what is JavaScript, how to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition,	6
V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	6
	Total	30

Text Books

- ❖ Pankaj Sharma, - Web Technology, S K Kataria & Sons Bangalore 2011.
- ❖ Mike Mcgrath, - Java Script, 6th Edition, Dream Tech Press, 2020.
- ❖ Achyut S, Godbole, AtulKahate, Web Technologies, Tata McGraw- Hill, 2008.

Reference Books

- ❖ Laura Lemay, Rafe Colburn, Jennifer Kyrnin, - Mastering HTML, CSS & Java script Web Publishing, Pearson Education, 2015.
- ❖ DT Editorial Services, - HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), 2nd Edition, Wiley India Pvt. Limited, 2011.

Web Resources

- ❖ NPTEL & MOOC courses titled Web Design and Development.
- ❖ <https://www.geeks for geeks.org>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	1	2	3	1	3	1	2
CO2	3	3	3	1	1	3	2	1	1	1
CO3	2	2	3	1	3	2	3	1	2	1
CO4	2	1	3	3	3	2	3	2	1	2
CO5	2	2	1	3	2	3	3	3	1	1

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	14	14	15	15
Weighted percentage of Course Contribution to POs	3.0	2.8	2.8	3.0	3.0

Course Coordinator**BOS Chairman**

SEC-MULTIMEDIA SYSTEMS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCASE04	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Understand the definition of Multimedia
- ❖ To study about the Image File Formats, Sounds Audio File Formats
- ❖ Understand the concepts of Animation and Digital Video Containers.
- ❖ To study about the Stage of Multimedia Project.
- ❖ Understand the concept of Ownership of Content Created for Project

Acquiring Talent

Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the concepts, importance, application and the process of developing multimedia	PO1
CO2	To have basic knowledge and understanding about image related processing's	PO1,PO2
CO3	To understand the framework of frames and bit images to animations	PO4,PO6
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4,PO5,
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3,PO6

SEC-MULTIMEDIA SYSTEMS

Unit	Details	No. of Hours
I	Multimedia Definition - Use of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia -Computers and Text Font Editing and Design Tools - Hypermedia and Hypertext.	6
II	Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound –Digital Audio – Midi Audio – MIDI vs Digital Audio – Multimedia System Sounds Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.	6
III	Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.	6
IV	Making Multimedia: The Stage of Multimedia Project -The Intangible Needs -The Hardware Needs - The Software Needs -An Authoring System's Needs-Multimedia Production Team.	6
V	Planning and Costing: The Process of Making Multimedia – Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing-Content and Talent: Acquiring Content – Ownership of Content Created for Project –Acquiring Talent.	6
	Total	30

Text Books

- ❖ James Lee and Brent Ware - Open Source Web Development with LAMP using LINUX, Apache, MySQL, Perl and PHP, Dorling Kindersley (India) Pvt. Ltd, 2008.

Reference Books

- ❖ Eric Rosebrock, Eric Filson—Setting up LAMP: Getting Linux, Apache, MySQL and PHP and working together, John Wiley and Sons, 2004.
- ❖ Anthony Butcher—Teach Yourself MySQL in 21days, 2nd Edition, Sams Publication.
- ❖ Rich Bower, Daniel Lopez Ridruejo, Alian Liska—Apache Administrator's Handbook, Sams Publication.
- ❖ Tammy Fox—Red Hat Enterprise Linux5 Administration Unleashed, Sams Publication.
- ❖ Naramore Eligabette, GernerJason, Wrox Press, Wiley Dreamtech Press, —Beginning PHP5, Apache, MySQL Web Development, 2005..

Web Resources

- ❖ <http://Introduction to Open-Source and its benefits-Geeks for Geeks>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	3	3	1
CO5	3	3	3	3	1
Weightage	15	11	15	15	8

Course Coordinator

BOS Chairman

SEC - DATA ANALYTICS USING R

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCASE05	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand the problem-solving approaches.
- ❖ To learn the basic programming constructs in R Programming.
- ❖ To practice various computing strategies for R Programming -based solutions to real world problems
- ❖ To use R Programming data structures - lists, tuples, and dictionaries
- ❖ To do input/output with files in R Programming

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcome
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO3
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO2, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Understand the input/output with file concept.	PO5, PO6

SEC - DATA ANALYTICS USING R

Unit	Details	No. of Hours
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value - Understanding Big Data Storage — A General Overview of High Performance Architecture — HDFS — MapReduce and YARN — Map Reduce Programming Model.	6
II	Introduction to R: Variables – Scalars – Vectors - Matrices – List – Data frames – Factors - Using c, Cbind, Rbind, attach and detach functions in R.	6
III	Functions and Loops: Mathematical functions – summary functions – String functions – user defined functions – local and global variables. While loop – for loop – if statement – Operators.	6
IV	Importing Data: Reading tabular data files, CSV files – importing data from excel and SAS – Writing to files. Manipulating Data: Selecting rows/observations – selecting columns/fields – merging data – relabeling the column name – converting variable types – Data sorting and aggregation.	6
V	Charts and plots: Box plot – Histogram – Pareto Chart – Pie graph – Line Chart – Scatter plot – Developing graphs.	6
	Total	30

Text books

- ❖ Roger D. Peng, —R Programming for Data Sciencell, 2012.
- ❖ Norman Matloff, —The Art of R Programming- A Tour of Statistical Software Designll, 2011.

Reference Books

- ❖ Garrett Grolemond, Hadley Wickham, —Hands-On Programming with R: Write Your Own Functions and Simulationsll, 1st Edition, 2014.
- ❖ Venables, W.N. and Ripley, —R Programmingll, Springer, 2010.

Web Resources

- ❖ <https://www.w3schools.com/r/default.asp>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	2
Weightage	14	15	14	15	14
Weighted percentage of Course Contribution to POs	2.8	3.0	2.8	3.0	2.8

Course Coordinator

BOS Chairman

SEC - DATA ANALYTICS USING R LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCASEP01	SEC	Practical	-	-	Y	1	1

Learning Objectives

- ❖ To understand the problem-solving approaches.
- ❖ To learn the basic programming constructs in R Programming.
- ❖ To practice various computing strategies for R Programming -based solutions to real world problems
- ❖ To use R Programming data structures - lists, tuples, and dictionaries
- ❖ To do input/output with files in R Programming

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcome
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO3
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO2, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Understand the input/output with file concept.	PO5, PO6

SEC - DATA ANALYTICS USING R LAB

Program List	No. of Hours
1. To develop a Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice. 2. To develop Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user. 3. To design a program to find list of even numbers from 1 to n using R Loops. 4. To create a function to print squares of numbers in sequence. 5. To Write a program to join columns and rows in a data frame using cbind() and rbind() in R. 6. To implement different data structures in R (Vectors, Lists, Data Frames) 7. To develop a program to read a csv file and analyze the data in the file in R. 8. To develop pie chart and bar chart using R. 9. To create a data set and do statistical analysis on the data using R. 10. To develop a program to count the number of even and odd numbers from array of N numbers.	15
Total	15

Text books

- ❖ Roger D. Peng, —R Programming for Data Science, 2012.
- ❖ Norman Matloff, —The Art of R Programming- A Tour of Statistical Software Design, 2011.

Reference Books

- ❖ Garrett Grolemund, Hadley Wickham, —Hands-On Programming with R: Write Your Own Functions and Simulations, 1st Edition, 2014.
- ❖ Venables W.N. and Ripley, —R Programming, Springer, 2010.

Web Resources

- ❖ <https://www.w3schools.com/r/default.asp>

Mapping with Programme Outcomes: 3-Strong, 2–Medium, 1–Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	2
Weightage	14	15	14	15	14
Weighted percentage of Course Contribution to POs	2.8	3.0	2.8	3.0	2.8

Course Coordinator

BOS Chairman

SEC- DATA ANALYTICS USING ADVANCED EXCEL

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCASE06	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Handle large amount of data and managing worksheets.
- ❖ Aggregate numeric data and summarize into categories and subcategories.
- ❖ Creating chart and advanced conditional formatting, filtering.
- ❖ Create advanced formulas and advanced chart.
- ❖ Create pivot tables to consolidate data from multiple files.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Knows the basic concept of worksheets and managing the worksheets.	PO1-PO6
CO2	Knows, how to aggregate numeric data and summarizing the data.	PO1-PO6
CO3	Knows to create advanced formulas and advanced chart	PO1-PO6
CO4	Know the concept of advanced formulas.	PO1-PO6
CO5	Create pivot table and handling multiple files.	PO1-PO6

DATA ANALYTICS USING ADVANCED EXCEL

Units	Details	No. of. Hours
I	INTRODUCTION TO EXCEL: Cells – name range – references – Creating and editing worksheets-Cell Formatting-Creating and using formulas and functions-Use of Macros –Sorting and querying data- usage of Paste special.	6
II	APPLICATIONS OF EXCEL IN DIFFERENT AREAS: Preparation of a table Using EXCEL e.g. Employees payroll, Sales data, Students marks and perform the functions (Total, Average, Percentage, conditional sum and show the results in chart) - Creating formulas for financial solutions.	6
III	ADVANCED EXCEL: Cell Referencing - Data Validation-Naming a Cell or Range of Cells (Name Manager)-Basic formulas (SUM, COUNTA, AVERAGE, MAX, and MIN). Text Functions (RIGHT, LEFT, MID, SUBSTITUTE, FIND, LEN). Date Functions (TODAY, NOW, DAY, MONTH, YEAR, EDATE, EOMONTH, TEXT).	6
IV	ADVANCED EXCEL II: Lookup Functions (VLOOKUP, HLOOKUP, MATCH, and INDEX). - Logical Functions (IF, AND, OR). -Data Analysis Functions (SUMIF, SUMIFS, COUNTIF, COUNTIFS) - Conditional Formatting, Filtering and Sorting. - Graphs, Charts and Pivot Tables remove duplicates.	6
V	CONDUCTING ONLINE SURVEYS: Usage of Google drive – micro soft online surveys – sharing with the help of social media/	6
	Total	30

Text Books:

- ❖ Beskeen, D, and Microsoft Office 2013: Illustrated introductory, first course. Stamford, CT: Cengage Learning, 2013.
- ❖ Rinkoo Jainn, A to Z of MS EXCEL, A Book for Learners and Trainers, Amazon digital Services LLC-KDP print US. 2021.

Reference Book:

- ❖ Introduction to Computers and Communications, Peter Norton-Sixth Edition- Tata McGraw Hill, 2009.
- ❖ V.Rajaraman, Introduction to Information Technology, Prentice Hall India, 2008.
- ❖ Winston-Microsoft Office Excel Data Analysis and Business Modeling, First Edition, Prentice Hall India. 2007.
- ❖ David Whigham, Business Data Analysis Using Excel, Oxford University Press, first Indian Edition.

Web Resources:

1. <https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf>
2. <https://www.w3schools.com/html/default.asp>

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	2	3	1	1	2	1
CO2	3	2	3	1	3	3	1	2	1	1
CO3	3	3	3	3	2	3	2	1	1	2
CO4	3	2	3	3	3	3	2	2	1	1
CO5	3	3	2	2	3	3	1	1	2	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	2	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	2	3
Weightage	14	15	14	14	15
Weighted percentage of Course Contribution to PO's	2.8	3.0	2.8	2.8	3.0

Course Coordinator

BOS Chairman

SEC- DATA ANALYTICS USING ADVANCED EXCEL LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCASEP02	SEC	Practical	-	-	Y	1	1

Learning Objectives

- ❖ Understand Data Analytics Concepts.
- ❖ Learn about Data Preparation and Cleaning
- ❖ Applying the concept of Advanced Excel Functions
- ❖ Apply and using the Data Analysis Tools
- ❖ Understanding the Data Visualization

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain basic concepts of Excel and create/edit spreadsheet.	PO2
CO2	Apply basic excel formula in various functional areas of management.	PO1, PO2
CO3	Demonstrate knowledge in using advanced excel functions.	PO2,PO4,PO6
CO4	Apply logical functions of Excel	PO2,PO4,PO5
CO5	Use online methods to conduct surveys.	PO2,PO4

DATA ANALYTICS USING ADVANCED EXCEL LAB

S.No	Details	No.of. Hours
1	Write a program to create and editing worksheets by using Excel.	15
2	Write a program to Creating Excel Sheets with Formula and Functions.	
3	Write a program to implement the Simple statistical functions.	
4	Write a program to implement the logical functions.	
5	Write a program to implement Decision making using IF, SUMIF, COUNTIF etc.,	
6	Write a program to perform the Text functions.	
7	Write a program to perform the Look up functions.	
8	Write a program for Creating and Formatting a Sales Table in Excel.	
9	Write programs for implementing the Visualization using charts.	
10	Write programs for implementing Page referencing.	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	
CO1	1	3	2	2	1
CO2	3	1	3	2	
CO3	3	2	2	-	
CO4	2	-	3	3	
CO5	3	3	3	3	
Weightage	12	9	13	10	
Weighted percentage of Course Contribution to PO's	1	3	2	2	1

Course Coordinator

BOS Chairman

SEC-UNDERSTANDING INTERNET

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCASE07	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Knowledge of internet medium.
- ❖ Internet as a mass medium.
- ❖ Features of Internet Technology.
- ❖ Internet as source of infotainment.

Course Outcome	On completion of this course students will able to	Programme Outcomes
CO1	Knows the basic concept in internet concepts of mass medium and world wide web	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows the concept of internet as a technology.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understanding the concept of infotainment and classification based on content and style.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Can be able to know about Demographic description of internet.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand the concept to cybercrime and future possibilities.	PO1, PO2, PO3,

SEC-UNDERSTANDING INTERNET

Unit	Details	No.of Hours
I	The emergence of internet as a mass medium–the world of-world wide web.	6
II	Features of internet as a technology.	6
III	Internet as a source of infotainment–classification based on content and style.	6
IV	Demographic and psycho graphic descriptions of internet = audiences – effect of Internet on the values and life-styles.	6
V	Present issues such as cybercrime and future possibilities.	6
	Total	30

Text Books

- ❖ Barnouw, Eand Krishnaswamy S [1990] Indian Film. New York OUP.
- ❖ Keval J.Kumar [1999] Mass Communication in India. Mumbai, Jaico, 2020.
- ❖ Srivastava, KM [1992] Media Issues. Sterling Publishers Pvt Ltd. 2020.

Reference Books

- ❖ Acharya, R.N. Television in India. Manas Publications, NewDelhi-1987.
- ❖ Barnouw, E Documentary–A History of Nonfiction. Oxford, OUP 1974.
- ❖ Luthra,HR Indian Broadcasting. Ministry of Information & Broadcasting, New Delhi.
- ❖ Aruna, Vasudev, The new Indian Cinema. Macmillan India, NewDelhi.1986.

Mapping with program outcomes: 3-Strong, 2–Medium, 1–Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	2	1	2	2
CO2	3	3	3	2	3	3	2	2	1	1
CO3	3	3	2	3	3	3	2	1	1	2
CO4	3	2	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	1

Mapping with program specific outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	2	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	2	3
Weightage	14	15	14	14	15
Weighted percentage of Course contribution to POs	2.8	3.0	2.8	2.8	3.0

Course Coordinator

BOS Chairman

SEC – INTERNET BASICS LABORATORY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCASEP03	SEC	Practical	-	-	Y	2	2

Learning Objectives

- ❖ To introduce the fundamentals of Internet and the Web functions
- ❖ To impart knowledge and essential skills necessary to use the internet and its various components.
- ❖ To find, evaluate, and use online information resources.
- ❖ To use Google Apps for education effectively.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcome
CO1	Introduce the fundamentals of Internet and the Web functions	PO1, PO2, PO6
CO2	Impart knowledge and essential skills necessary to use the internet and its various components.	PO2,PO4. PO5, PO6
CO3	Find, evaluate, and use online information resources.	PO1, PO2, PO4, PO5, PO6
CO4	Use Google Apps for education effectively.	PO2, PO3, PO4 PO5,

SEC – INTERNET BASICS LABORATORY

EX. NO.	Contents	No. of Hours
1	Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 10 recipients. Use CC and BCC options accordingly.	3
2	Open your inbox in the Gmail account created, check the mail received from your peer from other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends.	3
3	Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit Any job port a land upload your resume.	3
4	Create a label and upload bulk contacts using import option in Google Contacts.	3
5	Create one-pages to try in your mother tongue by using voice recognition facility of Google Docs.	3
6	Create your own Google classroom and invite all your friends through emailed. Post study material in Google class room using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Material	3
7	Create and share a folder in Google Drive using share a link option and set the permission to access That folder by your friends only	3
8	Create a meet using Google Calendar and record the meet using Google Meet.	3
9	Create a registration form for your Department Seminar or Conference using Google Forms	3
10	Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.	3
Total		30

Text books

- ❖ Ian Lamont, —Google Drive & Docs in 30 Minutes, I30 Media Corporation, 2nd Edition, 2015.

Reference books

- ❖ Sherry Kinkoph Gunter, —My Google Apps, Pearson Education, 2015.

Web Resources

- ❖ https://www.tutorialspoint.com/modelling_and_simulation/index.htm
- ❖ <https://www.javatpoint.com/verilog-simulation-basics>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3
Weightage	15	14	11	15	15
Weighted percentage of Course Contribution to POs	3.0	2.8	2.2	3.0	3.0

Course Coordinator

BOS Chairman

SEC-PHP PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCASE08	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To provide the necessary knowledge on basics of PHP.
- ❖ To design and develop dynamic, database-driven web applications using PHP version.
- ❖ To get an experience on various web application development techniques.
- ❖ To learn the necessary concepts for working with the files using PHP.
- ❖ To get a knowledge on OOPS with PHP

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Write PHP scripts to handle HTML forms.	PO1,PO4,PO6
CO2	Write regular expressions including modifiers, operators and meta characters.	PO2,PO5, PO7
CO3	Create PHP Program using the concept of array.	PO3,PO4,PO5
CO4	Create PHP programs that use various PHP library functions.	PO2,PO3, PO5
CO5	Manipulate files and directories.	PO3, PO5,PO6

SEC-PHP PROGRAMMING

Units	Details	No.of Hours
I	Introduction to PHP - Basic Knowledge of websites - Introduction of Dynamic Website - Introduction to PHP - Scope of PHP - XAMPP and WAMP Installation.	6
II	PHP Programming Basics - Syntax of PHP - Embedding PHP in HTML - Embedding HTML in PHP. Introduction to PHP Variable -Understanding Data Types - Using Operators - Using Conditional Statements - If(), else if() and else if Condition Statement.	6
III	Switch () Statements - Using the while () Loop - Using for () Loop - PHP Functions –Creating an Array - Modifying Array Elements –Processing. Arrays with Loops - Grouping Form Selections with Arrays -Using Array Functions.	6
IV	PHP Advanced Concepts - Reading and Writing Files - Reading Data from a File.	6
V	Managing Sessions and Using Session Variables -Destroying a Session - Storing Data in Cookies -Setting Cookies.	6
	Total	30

Text Books:

1. Head First PHP & MySQL: A Brain-Friendly Guide-2009-Lynnmighley and Michael Morrison.
2. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL-Alan Forbes.

Reference Books:

1. PHP: The Complete Reference- Steven Holzner.
2. DT Editorial Services (Author),—HTML 5Black Book (CoversCSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) ll, Paperback2016, 2ndEdition.

Web Resources:

1. Open source digital libraries: PHP Programming
2. <https://www.w3schools.com/php/default.asp>.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	1	0
CO2	2	0	1	1	2
CO3	3	3	1	1	0
CO4	1	3	2	1	0
CO5	3	2	1	1	0
Weightage	12	11	6	5	2
Weighted percentage of Course Contribution to PO's	2.4	2.2	1.2	1.0	0.4

Course Coordinator**BOS Chairman**

SEC-PHP PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCASEP04	SEC	Practical	-	-	Y	2	2

Learning Objectives

- ❖ To provide the necessary knowledge on basics of PHP.
- ❖ To design and develop dynamic, database-driven web applications using PHP version.
- ❖ To get an experience on various web application development techniques.
- ❖ To learn the necessary concepts for working with the files using PHP.
- ❖ To get a knowledge on OOPS with PHP

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Write PHP scripts to handle HTML forms.	PO1,PO4,PO6
CO2	Write regular expressions including modifiers, operators and meta characters.	PO2,PO5, PO7
CO3	Create PHP Program using the concept of array.	PO3,PO4,PO5
CO4	Create PHP programs that use various PHP library functions.	PO2,PO3, PO5
CO5	Manipulate files and directories.	PO3, PO5,PO6

SEC-PHP PROGRAMMING LAB

Details	No.of. Hours
1. Write a php program to get name of the user from a form and show greeting text. 2. Write a php program to check whether given number is Armstrong or not. 3. Write a Mathematical calculator program. 4. Write a Age calculator program. 5. Write a php program to check whether given number is String palindrome or not. 6. Write a php program to Array manipulation. 7. Create a PHP page for login page with sql connection. 8. Write a php program to perform file operations. 9. Write a php program hit counter using cookies. 10. Create a PHP page for login system using session.	30
Total hours	30

Text Books:

1. Head First PHP & MySQL: A Brain-Friendly Guide-2009-Lynnmighley and Michael Morrison.
2. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL-Alan Forbes.

Reference Books:

1. PHP: The Complete Reference- Steven Holzner.
2. DT Editorial Services (Author),—HTML 5Black Book (CoversCSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) ll, Paperback2016, 2ndEdition.

Web Resources:

Open source digital libraries: PHP Programming

1. <https://www.w3schools.com/php/default.asp>.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	1
CO2	3	3	3	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	2

Mapping with Program Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	1	0
CO2	2	0	1	1	2
CO3	3	3	1	1	0
CO4	1	3	2	1	0
CO5	3	2	1	1	0
Weightage	12	11	6	5	2
Weighted percentage of Course Contribution to PO's	2.4	2.2	1.2	1.0	0.4

Course Coordinator**BOS Chairman**

Skill Enhancement Course
SOFTWARE TESTING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCASE09	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To study fundamental concepts in software testing.
- ❖ To discuss various software testing issues and solutions in software unit test, integration and system testing.
- ❖ To study the basic concept of Data flow testing and Domain testing.
- ❖ To acquire knowledge on path products and path expressions.
- ❖ To learn about Logic based testing and decision tables.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Students learn to apply software testing knowledge and engineering methods	PO1
CO2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	PO1, PO2.
CO3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.	PO4,PO6
CO4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	PO4,PO5,PO6
CO5	Have an ability to uses of software testing methods and modern software testing tools for their testing projects.	PO3, PO8.

SEC - SOFTWARE TESTING

Unit	Details	No.of Hours
I	Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.	6
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.	6
III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.	6
IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases	6
V	Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, State Testing.	6
	Total	30

Text Books

- ❖ B.Beizer, Software Testing Techniques, II Edn., Dream Tech India, New Delhi, 2003.
- ❖ K.V.K.Prasad,—SoftwareTestingTools‖,DreamTech.India,NewDelhi,2005

Reference Books

- ❖ I. Burnstein, —Practical Software Testing‖, Springer International Edition, 2003.
- ❖ E. Kit, —Software Testing in the Real World: Improving the Process‖, Pearson Education, Delhi, 2005.
- ❖ R. Rajani, and P.P.Oak, —Software Testing‖, Tata Mcgraw Hill, New Delhi, 2004.

Web Resources

- ❖ <https://www.javatpoint.com/software-testing-tutorial>
- ❖ <https://www.guru99.com/software-testing.html>

Mapping with Programme Outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	1	2	2
CO2	3	3	2	3	3	3	1	2	1	1
CO3	3	3	3	3	3	3	2	1	2	2
CO4	2	3	3	3	3	3	2	2	1	1
CO5	3	3	3	3	2	3	1	1	2	2

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	1	2	2	2
CO5	2	2	3	2	2
Weightage	11	11	12	11	11
Weighted percentage of Course Contribution to POs	2.2	2.2	2.4	2.2	2.2

Course Coordinator

BOS Chairman

SEC-10 QUANTITATIVE APTITUDE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCASE10	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand the basic concepts of numbers
- ❖ Understand and apply the concept of percentage, profit & loss
- ❖ To study the basic concepts of time and work, interests
- ❖ To learn the concepts of permutation, probability, discounts
- ❖ To study about the concepts of data representation, graphs

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the concepts, application and the problems of numbers	PO1
CO2	To have basic knowledge and understanding about percentage, profit & loss related processing	PO1, PO2
CO3	To understand the concepts of time and work	PO4, PO5
CO4	Speaks about the concepts of probability, discount	PO4, PO5
CO5	Understanding the concept of problem solving involved in stocks & shares, graphs	PO2, PO3

SEC-10 QUANTITATIVE APTITUDE

Unit	Details	No. of Hours
I	Numbers-HCF and LCM of numbers-Decimal fractions Simplification-Square root and cube roots – Average problems on Numbers.	6
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership-Chain rule.	6
III	Time and work - pipes and cisterns - Time and Distance - problems on trains -Boats and streams - simple interest - compound interest - Logarithms - Area-Volume and surface area -races and Games of skill.	6
IV	Permutation and combination-probability-True Discount-Bankers Discount – Height and Distances-Odd man out & Series.	6
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs- Pie charts Line graphs.	6
Total		30

Text Book

- ❖ Quantitative Aptitude, R.S. AGGARWAL, S.Chand & Company Ltd.,

Web Resources

- ❖ <https://www.javatpoint.com/aptitude/quantitative>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	3	2
CO2	2	3	1	2	2
CO3	1	2	1	1	3
CO4	1	3	1	1	3
CO5	1	2	1	1	3
Weightage	8	12	5	8	13
Weighted percentage of Course Contribution to POs	1.6	2.4	1.0	1.6	2.6

Course Coordinator

BOS Chairman

SEC - PATTERN RECOGNITION

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCASE11	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To learn the fundamentals of Pattern Recognition techniques.
- ❖ To learn the various Statistical Pattern recognition techniques
- ❖ To learn the linear discriminant functions and unsupervised learning and clustering
- ❖ To learn the various Syntactical Pattern recognition techniques
- ❖ To learn the Neural Pattern recognition techniques

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the concepts, importance, application and the process of developing Pattern recognition over view	PO1
CO2	To have basic knowledge and understanding about parametric and non-parametric related concepts.	PO1, PO2
CO3	To understand the framework of frames and bit images to animations	PO4, PO5
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO2, PO3
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3, PO4

SEC - PATTERN RECOGNITION

Unit	Details	No. of Hours
I	PATTERN RECOGNITION OVERVIEW: Pattern recognition, Classification and Description-Patterns and feature Extraction with Examples-Training and Learning in PR systems-Pattern recognition Approaches	6
II	STATISTICAL PATTERN RECOGNITION: Introduction to statistical Pattern Recognition-supervised Learning using Parametric and Non-Parametric Approaches	6
III	LINEAR DISCRIMINANT FUNCTIONS AND UNSUPERVISED LEARNING AND CLUSTERING: Introduction-Discrete and binary Classification Problems Techniques to directly Obtain linear Classifiers - Formulation of Unsupervised Learning Problems-Clustering for unsupervised learning and classification	6
IV	SYNTACTIC PATTERN RECOGNITION: Overview of Syntactic Pattern Recognition-Syntactic recognition via parsing and other grammars-Graphical Approaches to syntactic pattern recognition- Learning via grammatical inference.	6
V	NEURAL PATTERN RECOGNITION: Introduction to Neural Networks-Feed-forward Networks and training by Back Propagation-Content Addressable Memory Approaches and Unsupervised Learning in Neural PR	6
	Total	30

Text Books

- ❖ Robert Schalkoff, —Pattern Recognition: Statistical Structural and Neural Approaches, John Wiley & Sons.
- ❖ Duda R.O., P.E.Hart & D.G Stork, — Pattern Classification, 2nd Edition, J.Wiley.
- ❖ Duda R.O. & Hart P.E., —Pattern Classification and Scene Analysis, J.Wiley.
- ❖ Bishop C.M., —Neural Networks for Pattern Recognition, Oxford University Press.

Reference Books

- ❖ Earl Gose, Richard Johnsonbaugh, Steve Jost, —Pattern Recognition and Image Analysis, Prentice Hall of India, Pvt Ltd, New Delhi.

Web Resources

- ❖ <https://www.geeksforgeeks.org/pattern-recognition-introduction/>
- ❖ <https://www.mygreatlearning.com/blog/pattern-recognition-machine-learning/>

Mapping with Programme Outcomes: 3 - Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	1	2	3	1	2	1	1
CO2	1	3	2	1	1	2	1	2	1	2
CO3	2	3	2	3	1	1	2	1	2	1
CO4	1	2	2	3	1	3	2	1	2	1
CO5	2	1	2	1	3	3	1	2	2	1

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	3	3	2	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	2
CO5	3	3	2	2	3
Weightage	15	15	12	12	13
Weighted percentage of Course Contribution to POs	3.0	3.0	2.4	2.4	2.6

Course Coordinator**BOS Chairman**

SEC - ENTERPRISE RESOURCE PLANNING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCASE12	SEC	Theory	Y	Y	-	2	2

Learning Objective

- ❖ To understand the basic concepts Evolution and Benefits of ERP.
- ❖ To know the need and Role of ERP in logical and Physical Integration.
- ❖ Identify the important business functions provided by typical business software.
- ❖ To train the students to develop the basic understanding of how ERP enriches.
- ❖ To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.

Course Outcome	On completion of this course students will able to	Programme Outcomes
CO1	Understand the basic concepts of ERP.	PO1,PO2, PO6
CO2	Identify different technologies used in ERP.	PO2,PO3, PO4
CO3	Understand and apply the concepts of ERP manufacturing Perspective and ERP Modules.	PO1,PO3,PO6
CO4	Discuss the benefits of ERP.	PO2,PO6
CO5	Apply different tools used in ERP.	PO1,PO3, PO5

SEC - ENTERPRISE RESOURCE PLANNING

Unit	Details	No. of Hours
I	ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP, Components and needs of ERP, ERP Vendors; Benefits & Limitations of ERP packages.	6
II	Need to focus on Enterprise Integration/ERP; Information mapping; Role of common shared Enterprise database; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration, ERP's Role in Logical and Physical Integration. Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Management (PLM), LAP, Supply chain Management.	6
III	ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications. Cloud and Open Source, Quality Management, Material Management, Financial Module, CRM and Case Study.	6
IV	ERP Implementation Basics, ERP implementation Strategy, ERP Implementation Life Cycle, Pre- Implementation task, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.	6
V	ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study.	6
	Total	30

Text Books

- ❖ Alexis Leon, —Enterprise Resource Planning, Tata McGraw Hill, 2019.

Reference Books

- ❖ Alexis Leon, —Enterprise Resource Planning – Diversified, TMH, 2019.
- ❖ Ravi Shankar & S. Jaiswal, Enterprise Resource Planning, Galgotia, 2021.

Web Resources

- ❖ https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm
- ❖ <https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource-planning/>

Mapping with program outcomes: 3-Strong, 2-Medium, 1-Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	2	1	2	2
CO2	3	3	3	2	3	3	2	2	1	1
CO3	3	3	2	3	3	3	2	1	1	2
CO4	3	2	3	3	3	3	2	2	1	1
CO5	3	3	3	3	3	3	1	1	2	1

Mapping with program specific outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	1	3
CO2	3	2	-	1	2
CO3	2	3	2	2	3
CO4	1	-	2	1	-
CO5	3	3	-	1	3
Weightage	10	11	6	7	11
Weighted percentage of Course contribution to PO's	2.0	2.2	1.2	1.3	2.2

Course Coordinator

BOS Chairman