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SENGUNTHAR ARTS AND SCIENCE COLLEGE

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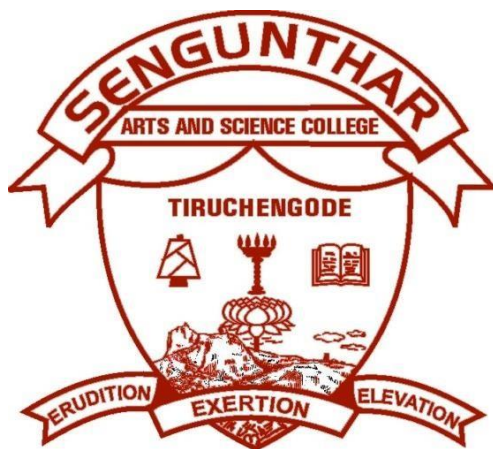
(Affiliated to Periyar University, Salem and Approved by AICTE, New Delhi)

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

TIRUCHENGODE – 637 205, NAMAKKAL DT, TAMILNADU



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SYLLABUS

B.Sc., COMPUTER SCIENCE (CBCS – LOCF)

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

Chairman

CDC

Principal

Correspondent

INTRODUCTION

B.Sc (Computer Science) is an undergraduate degree program that focuses on the study of computer science and its applications. It aims to provide students with a strong foundation in computer science principles, programming languages, software development, and computer systems. The course structure is designed with Foundation courses in computer science, Mathematics, and Programming in the First Year, Intermediate courses in computer science, including data structures, algorithms, and computer systems in the Second Year, advanced courses in computer science, including software engineering, artificial intelligence, project learning, industry internships and computer networks in the Third Year. The course focuses on industry-ready skills in computer science thereby providing a strong foundation for further studies in Computer Science M.Sc CS or MCA. Graduates can pursue careers in

- Software Developer,
- Data Scientist,
- Artificial Intelligence/Machine Learning Engineer,
- Cyber Security Specialist, Network Administrator,
- Database Administrator
- IT Consultant,
- Computer Systems Analyst,

The syllabus of this program is aimed at preparing the students with the latest developments and put the month right track of fill the present requirements.

ELIGIBILITY FOR ADMISSION TO THE COURSE:

Higher Secondary pass with Mathematics as one of the Subject. Or Higher Secondary pass with Computer Science / Computer Applications / Information Technology / Computer Technology / Business Mathematics/ Statistics as one of the courses and have not studied Mathematics should undergo a bridge course on Mathematics for a minimum duration of 15 days.

PROGRAMME OUTCOMES

REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (CBCS) FOR UNDERGRADUATE	
Programme	B.Sc (Computer Science)
Programme Code	24UCS
Duration	UG - Three Years
Programme Outcomes (POs)	PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge, analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources PO5: Scientific Reasoning: Ability to analyze, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

	PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including “learning how to learn”, through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives. PO7: Reflective Thing: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society PO8: Reading & Projects: Document their reading and interpretive practices in assignments, translation works, and independent projects. PO9: Confidence & Effectiveness: Confidently and effectively articulate their literary and textual experiences. PO10: Social Skills & Empathetic Approach: Reorganize a professional and reflective approach to leadership, responsibility, personal integrity, empathy, care and respect for others, accountability and self-regulation.
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Programme Specific Outcomes (PSO)

Programme Specific Outcomes (PSOs)	PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of English Language and Literature. PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields. PSO3: To prepare the students who will demonstrate respectful engagement with others ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. PSO4: Developing a research framework and presenting their independent ideas effectively. PSO5: Equipping their employability skills to excel in professions like teaching and exposing them to various activities to empower them through communication skills.
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	POs										PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
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 SCIENCE

FIRST YEAR SEMESTER - I

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	nghJj;jkpo;-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	24S1UCS01	Python Programming	5	-	-	5	25	75	100
4	Part-III Core Practical I	24S1UCSP01	Practical-I Python Programming	-	-	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 Practical I		Choose from Annexure - I	-	-	2	2	40	60	100
7	Part-IV NME I	24S1UCSN01	Fundamentals of Information Technology	2	-	-	2	25	75	100
		24S1UCSN02	PC Hardware and Troubleshooting							
8	Part-IV Foundation Course I	24S1UCSF01	FC-Problem Solving Techniques and Word Processing	2	-	-	2	25	75	100
Total				25	-	05	23	215	585	800

BACHELOR OF COMPUTER SCIENCE

SEMESTER - II

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	nghJj;jkpo;-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	24S2UCS02	Data Structures and Algorithms	5	-	-	5	25	75	100
4	Part-III Core Practical II	24S2UCSP02	Practical – II Data Structure and Algorithms Lab	-	-	3	3	25	75	100
5	Part-III Generic Elective II		Choose from Annexure I	4	-	-	3	25	75	100
6	Part-III Generic Elective Practical II		Choose from Annexure I	-	-	2	2	40	60	100
7	Part-IV NME II	24S2UCSN03	Office Automation	2	-	-	2	25	75	100
		24S2UCSN04	Fundamentals of E-Commerce							
8	Part-IV SEC I		Choose from Annexure - II	2	-	-	2	25	75	100
Total				25	-	05	23	215	585	800

BACHELOR OF COMPUTER SCIENCE

SECOND YEAR SEMESTER - III

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	nghJj;jkpo;-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	24S3UCS03	Object Oriented Programming using C++	5	-	-	5	25	75	100
4	Part-III Core Practical III	24S3UCSP03	Practical-III Object Oriented Programming using C++ Lab	-	-	3	3	25	75	100
5	Part-III Generic Elective III		Choose from Annexure I	6	-	-	5	25	75	100
6	Part-IV SEC II		Choose from Annexure - II	2	-	-	2	25	75	100
7	Part-IV SEC III		Choose from Annexure - II	-	-	1	1	25	75	100
8	Part-IV EVS		Environmental Studies	1	-	-	-	-	-	-
Total				26	-	04	22	175	525	700

BACHELOR OF COMPUTER SCIENCE

SEMESTER – IV

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	nghJj;jkpo;-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	24S4UCS04	Java Programming	4	-	-	4	25	75	100
4	Part-III Core Practical IV	24S4UCSP04	Practical-IV Java Programming Lab	-	-	3	3	25	75	100
5	Part-III Generic Elective IV		Choose from Annexure I	4	-	-	4	25	75	100
6	Part-III Generic Elective Practical III		Choose from Annexure I	-	-	2	2	40	60	100
7	Part-IV SEC IV		Choose from Annexure - II	2	-	-	2	25	75	100
8	Part-IV SEC V		Choose from Annexure - II	-	-	2	2	25	75	100
9	Part-IV EVS	24S4UES01	Environmental Studies	1	-	-	2	25	75	100
Total				23	-	07	25	240	660	900

BACHELOR OF COMPUTER SCIENCE
THIRD YEAR SEMESTER–V

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	24S5UCS05	Software Engineering	5	-	-	4	25	75	100
2	Part–III Core VI	24S5UCS06	Database Management System	5	-	-	4	25	75	100
3	Part–III Core Practical V	24S5UCSP05	Practical-V Database Management System Lab	-	-	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	24S5UCSPR1	Project with Viva Voce	-	-	5	4	25	75	100
7	Part–IV	24S5UVE01	Value Education	2	-	-	2	25	75	100
8	Part–IV	24S5UIT01	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	-	-	-	2	-	-	-
Total				20	-	10	26	175	525	700

BACHELOR OF COMPUTER SCIENCE
SEMESTER – VI

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	24S6UCS07	Computer Networks	6	-	-	4	25	75	100
2	Part-III Core VIII	24S6UCS08	.NET Programming	6	-	-	4	25	75	100
3	Part-III Core Practical VI	24S6UCSP06	Practical-VI .Net 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	150	450	600
OVERALL SEMESTER (I – 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	24S5UCSE01	Agile Project Management
2	24S5UCSE02	Analytics Service Industry
3	24S5UCSE03	Artificial Intelligence
4	24S5UCSE04	Artificial Neural Network
5	24S5UCSE05	Image Processing

SEMESTER – V – EC6

S.No	Paper Code	Paper Name
1	24S5UCSE06	Big Data Analytics
2	24S5UCSE07	Robotics and its Applications
3	24S5UCSE08	Computing Intelligence
4	24S5UCSE09	Cryptography
5	24S5UCSE10	Software Project Management

SEMESTER – VI – EC7

S.No	Paper Code	Paper Name
1	24S6UCSE11	Fuzzy Logic
2	24S6UCSE12	Grid Computing
3	24S6UCSE13	Human Computer Interaction
4	24S6UCSE14	Introduction to Data Science

SEMESTER – VI – EC8

S.No	Paper Code	Paper Name
1	24S6UCSE15	IOT and its Applications
2	24S6UCSE16	Natural Language Processing
3	24S6UCSE17	Cloud Computing
4	24S6UCSE18	Virtual Reality and More

Annexure – II
Skill Enhancement Course
Semester –II

S.No	Paper Code	Paper Title
1	24S2UCSS01	Fundamentals of Information Technology
2	24S2UCSS02	Introduction to HTML
3	24S2UCSS03	Web Designing
4	24S2UCSS04	Multimedia Systems

Semester –III

S.No	Paper Code	Paper Title
1	24S3UCSS05	Office Automation
2	24S3UCSSP01	Office Automation Lab
3	24S3UCSS06	Advanced Excel
4	24S3UCSSP02	Advanced Excel Lab

Semester –IV

S.No	Paper Code	Paper Title
1	24S4UCSS07	Understanding Internet
2	24S4UCSSP03	Internet Basics Laboratory
3	24S4UCSS08	PHP Programming
4	24S4UCSSP04	PHP Programming Lab

Semester –VI

S.No	Paper Code	Paper Title
1	24S6UCSS09	Organization Behavior and more
2	24S6UCSS10	Quantitative Aptitude
3	24S6UCSS11	Cyber Forensics
4	24S6UCSS12	Pattern Recognition

SEMESTER I

FIRST YEAR
FIRST SEMESTER
CORE – PYTHON PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCS01	CORE	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	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, PO2, PO3, PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6

CORE – PYTHON PROGRAMMING

Unit	Details	No.of Hours
I	Basics of Python Programming: History of Python - Attributes 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-elif-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 – Function Decorators - 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. Case Study: 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 writelines() methods- append() method – read() and readlines() 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. Case Study: Create a login page using Database connectivity.	15
	Total	75
	Model Construction and Model Development – related to the above topic are to be considered for Internal Exam only	

Textbook

- ❖ Reema Thareja, —Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.

Reference books

- ❖ Vamsi Kurama, —Python Programming: A Modern Approach ,Pearson Education 2018
- ❖ Mark Lutz, || Learning Python, Orielly 5th Edition 2013
- ❖ Adam Stewarts,— Python Programming ,Online 2016
- ❖ Fabio Nelli,—Python Data Analytics, 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	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	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 POs	3.0	2.8	3.0	3.0	2.6

CORE – PRACTICAL I - PYTHON PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCSP01	CORE	Practical	-	-	Y	3	3

Learning Objectives

- ❖ To be able to design and program Python applications.
- ❖ To be able to create loops and decision statements in Python.
- ❖ To be able to work with functions and pass arguments in Python.
- ❖ To be able to build and package Python modules for reusability.
- ❖ To 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 of PYTHON language	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Identify th problem and solve using PYTHON programming techniques.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Identify suitable programming constructs for problem solving.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop a PYTHON program for a given problem and test for its correctness.	PO1, PO2, PO3, PO4, PO5, PO6

CORE – PRACTICAL I - PYTHON PROGRAMMING

Program List	No.of Hours
1. Program using variables, constants, I/O statements. 2. Program using Operators in Python. 3. Program using Conditional Statements. 4. Program using Loops and Jump Statements 5. Program using Functions. 6. Program using Recursion. 7. Program using Arrays, 8. Program using Strings 9. Program using Modules 10. Program using Lists 11. Program using Lists 12. Program using Tuples 13. Program using Dictionaries 14. Program for File Handling	60
Total	60

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	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

NME – I FUNDAMENTALS OF INFORMATION TECHNOLOGY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCSN01	NME	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, PO2, PO3, PO4, PO5, PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Learn the concept of storing data in computer using two headers namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6

NME – I 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, and Touch Screen. 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: 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. Hands on Training: Installation of Operating System	6
	Total	30
• Model Presentation and Hands on Training – related to the above topic are to be considered for Internal Exam only .		

Text books

- ❖ NeeharikaAdabala , V. Rajaraman, “Fundamentals of Computers”, 6th Edition, PHI Learning, 2014.
- ❖ Alexis Leon, Mathews Leon, “Fundamental of Information Technology”, 2nd Edition, Vikas Publishing House Pvt Limited, 2009.
- ❖ S.K Bansal, “Fundamental of Information Technology”, APH Publishing Corporation, 2004.

Reference books

- ❖ E.Balagurusamy, “Fundamentals of Computers”, McGraw Hill Education, 2009.
- ❖ ReemaThareja, “Fundamentals of Computers”, 2nd Edition, Oxford University Press, 2019.

- ❖ Rajaraman, “Fundamentals of Computers”, 6th Edition, PHI Learning, 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	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	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

NME – I PC HARDWARE AND TROUBLE SHOOTING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCSN02	NME	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.
- ❖ To learn about methods of troubleshooting.

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, PO2, PO3, PO4, PO5, PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3, PO4, PO5, 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, PO2, PO3, PO4, PO5, PO6
CO4	Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Learn the usage of Operating System in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6

NME – 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.	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.	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

Text books

- ❖ B. Ram, “Computers Fundamentals and Architecture”, 5th edition, New Age International Pvt Ltd, 2018.
- ❖ William Stallings, “Operating System”, 29th Edition, Pearson Education, 2018.

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 McGrawHill, New Delhi, 2003.

❖ B.Govindarajulu, “IBM PC and Clones hardware trouble shooting and maintenance”, Tata McGraw-Hill, New Delhi, 2002.

Web Resources

- ❖ <https://edu.gcfglobal.org/en/computerbasics/basic-troubleshooting-techniques/1/>
- ❖ <https://www.pluralsight.com/blog/tutorials/troubleshooting-hardware>
- ❖ <https://www.dummies.com/article/technology/computers/pcs/troubleshooting-maintaining-your-pc-all-in-one-for-dummies-cheat-sheet-208602/>

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	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

FC - PROBLEM SOLVING TECHNIQUES AND WORD PROCESSING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UCSF01	FOUNDATION COURSE	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ Identify different problem solving styles
- ❖ Identify methods appropriate for solving problems.
- ❖ Apply methods to specific problems.
- ❖ Define and use of arrays with simple applications
- ❖ Use data flow diagram, Pseudo code to implement solutions.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Study the basic knowledge of Computers. Analyze the programming languages.	PO1,PO2,PO3, PO4, PO5, PO6
CO2	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flowchart and pseudo code.	PO1,PO2,PO3, PO4, PO5, PO6
CO3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops	PO1,PO2,PO3, PO4, PO5, PO6
CO4	Study about Numeric data and character-based data. Analyze about Arrays.	PO1, PO2, PO3, PO4,PO5, PO6
CO5	Explain about DFD Illustrate program modules. Creating and reading Files	PO1,PO2,PO3, PO4, PO5, PO6

FC - PROBLEM SOLVING TECHNIQUES AND WORD PROCESSING

Unit	Details	No. of Hours
I	Introduction: History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. Programming Languages: Machine language, Assembly language, High-level language, 4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.	6
II	Data: Data types, Input, Processing of data, Arithmetic Operators, Relational and Logical Operators, Different phases in Program Development Cycle (PDC). Structured Programming: Algorithm: Features of good algorithm, Benefits and drawbacks of algorithm. Flowcharts: Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. Pseudocode: Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. Program design: Modular Programming. Model Development : Matrix Manipulation .	6
III	Selection Structures: Selecting from Several Alternatives – Repetition Structures: Loops –Nested Loops. Data: Numeric Data and Character Based Data. Arrays: One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters. Data Flow Diagrams: Definition, DFD symbols and types of DFDs. Program Modules: Subprograms-Value and Reference parameters-Scope of a variable - Functions – Recursion. Model Development: Sketch DFD for payroll system.	6
IV	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets and numbering; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers. Model Development: Design News paper content related to Sports article.	6
V	Page Layout: Margins, Orientation, Size, Page breaks and line numbers. Table creation: Insert, Delete, Merge: Hyperlinks: Internal and External. Mail merge: Composing and finalizing. Model Development: Prepare a seminar invitation and send it to various colleges using mail merge.	6
	Total	30
Model Presentation and Hands on Training – related to the above topic are to be considered for Internal Exam only		

Textbooks

- ❖ Stewart Venit, Elizabeth Drake , “Prelude to Programming Concepts and Design”, Addison-Wesley, 2014.
- ❖ Scott Basham, “Microsoft Word in easy steps”, In Easy Steps Limited, 2021.

Reference Books

- ❖ Joakim Wassberg, “Computer Programming for Absolute Beginners”, Packt Publishing, 2020.
- ❖ Joan Lambert, Curtis Frye, “Microsoft Office 2019 Step by Step”, Pearson Education, 2018.

Web Resources

- ❖ <https://www.codesansar.com/computer>
- ❖ <https://www.udemy.com/course/office>
- ❖ <https://www.javatpoint.com/automation>

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	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	2	2	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

SEMESTER II

FIRST YEAR
SECOND SEMESTER
CORE – DATA STRUCTURES AND ALGORITHMS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCS02	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 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	PO4,PO6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and Deletion of data	PO5,PO6

CORE – DATA STRUCTURES AND ALGORITHMS

Unit	Details	No. of Hours
I	Abstract Data Types (ADTs)- List ADT-array-based implementation- linked list implementation singly linked lists-circular linked lists-doubly- linkedlists-applicationsoflists-PolynomialManipulation-Alloperations-Insertion-Deletion-Merge-Traversal. Time complexity and Space complexity of an Algorithm. Model Development: Maintaining a directory of names	15
II	Stack ADT-Operations-Applications-Evaluating arithmetic expressions– Conversionofinfixtopostfixexpression-QueueADT-Operations-Circular Queue- Priority Queue- deQueue applications of queues. Sparse Matrices. Model Development: Application of stack-Towers of Hanoi.	15
III	TreeADT-treetraversals-BinaryTreeADT-expressiontrees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees- B- Tree- B+ Tree – Heap-Applications of heap. Model Development: Shortest distance between two nodes in BST.	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- Sorting with tapes. Case Study: Shortest Path using Dijkstra algorithm.	15
V	Searching-Linear search-Binary search-Sorting-Bubble sort-Selection sort- Insertion sort-Shell sort-Radix sort-Hashing-Hash functions-Separate chaining- Open Addressing-Rehashing Extendible Hashing- Index Techniques. Model Development: Sorting a list of names using Selection sort.	15
	Total	75

Text books

- ❖ Mark Allen Weiss,—Data Structures and Algorithm Analysis in C++,Pearson Education2014,4thEdition.
- ❖ ReemaThareja,—DataStructuresUsingC++,OxfordUniversitiesPress2014,2ndEdition.

Reference books

- ❖ Aho, Hopcroft and Ullman,—Data Structures and Algorithms, Pearson Education 2003.

Web Resources

- ❖ <https://www.programiz.com/dsa>
- ❖ <https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>

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	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	2	2	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

CORE PRACTICAL - DATA STRUCTURE AND ALGORITHMS LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSP02	CORE	Practical	-	-	Y	3	3

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 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	PO4,PO6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and Deletion of data	PO5,PO6

CORE PRACTICAL - DATA STRUCTURE AND ALGORITHMS LAB

List of Program	No. of Hours
1. Write a program to implement the List ADT using arrays and linked lists. 2. Write a programs to implement the following using a singly linked list. • Stack ADT • Queue ADT 3. Write a program threads 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 into 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 programs for the implementation of BFS and DFS for a given graph. 8. Write a programs for implementing the following searching methods: • Linear search • Binary search. 9. Write a programs for implementing the following sorting methods: • Bubble sort • Selection sort • Insertion sort • Radix sort.	45
Total	45

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	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	2	2	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

NME – II: OFFICE AUTOMATION

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSN03	NME	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand the basics of computer systems and its components
- ❖ To understand and apply the basic concepts of a word processing package
- ❖ To understand and apply the basic concepts of electronic spread sheet software.
- ❖ To understand and apply the basic concepts of database management system.
- ❖ To understand and create a presentation using Power Point tool.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Possess the knowledge on the basics of computers and its components	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 different automation tools.	PO3,PO4,PO5
CO5	Utilize the automation tools for documentation, Calculation and presentation purpose.	PO4,PO6

NME – II: OFFICE AUTOMATION

Unit	Details	No. of Hours
I	Introductory concepts: Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS– UNIX–Windows. Introduction to Programming Languages.	6
II	Word Processing: Open, Save and close word document; Editing text–tools, formatting, bullets; Spell Checker-Documents formatting–Paragraph alignment, indentation, headers and footers, numbering; printing–Preview, options, merge.	6
III	Spreadsheets: Excel– opening, entering text and data, formatting, navigating; Formulas– entering, handling and copying; Charts–creating ,formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	6
IV	Database Concepts: 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).	6
V	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.	6
	Total	30

Text book

- ❖ Peter Norton, “Introduction to Computers”, Tata McGraw-Hill, 6th edition, 2008.

Reference book

- ❖ Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw Hill, 2003.

Web Resources

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

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

NME – II: FUNDAMENTALS OF E-COMMERCE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSN04	NME	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To understand the basics of E-Commerce
- ❖ To understand the basic concepts of EDI
- ❖ To learn the importance and functionalities of Security tools.
- ❖ To understand the basic concepts of Consumer oriented applications.
- ❖ To understand the payment system in various modes.

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 automization and Coordination – Customization and internal commerce.	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.	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.	6
	Total	30

Text book

- ❖ P.T.Joseph, S.J., E-Commerce - An Indian Perspective, 5th Edition, PHI, 2023.

Reference books

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

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	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

SEMESTER III

SECOND YEAR

THIRD SEMESTER

CORE – OBJECT ORIENTED PROGRAMMING USING C++

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCS03	CORE	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 overloading, 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 (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
CO3	Apply the programming principles learnt in real-time problems	PO4 ,PO5
CO4	Analyze the various methods of solving a problem and choose the best method	PO6
CO5	An exposure to create real time applications using microcontroller	PO3, PO6

CORE – OBJECT ORIENTED PROGRAMMING USING C++

Unit	Details	No. of Hours
I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - inline functions – Function Overloading.	15
II	Classes and Objects: 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 – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal ,Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	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.	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 objects – String Attributes – Miscellaneous functions.	15
	Total	75

Text books

- ❖ E. Balagurusamy, —Object-Oriented Programming with C++I, TMH 2013, 7th Edition.

Reference books

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

Web Resources

- ❖ <https://alison.com/course/introduction-to-c-plus-plus-programming>

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
CO 1	3	3	3	3	3
CO 2	3	3	3	2	3
CO 3	3	2	2	2	3
CO 4	3	3	3	3	2
CO 5	3	2	3	2	3
Weight age of course contributed to each PSO	15	13	14	12	14
CO 1	3.0	2.6	2.8	2.4	2.8

Course Coordinator

BOS Chairman

PRACTICAL: OBJECT ORIENTED PROGRAMMING USING C++ LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCSP03	CORE	Practical	-	-	Y	3	3

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 overloading, 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.	PO4,PO5
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO6
CO3	Apply the programming principles learnt in real-time problems	PO4 ,PO5
CO4	Analyze the various methods of solving a problem and choose the best method.	PO6
CO5	Code, debug and test the programs with appropriate test cases	PO4, PO5

PRACTICAL: OBJECT ORIENTED PROGRAMMING USING C++LAB

S.No	List of Experiments	No.of Hours
1.	Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.	60
2.	Write a C++ program to demonstrate Class and Objects	
3.	Write a C++ program to demonstrate the concept of Passing Objects to Functions.	
4.	Construct a C++ program to demonstrate the Friend Functions.	
5.	Design a C++ program to demonstrate Constructor and Destructor	
6.	Develop a C++ program to demonstrate Unary Operator Overloading	
7.	Write a C++ program to demonstrate Binary Operator Overloading	
8.	Create a C++ program to demonstrate: • Single Inheritance • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance	
9.	Write a C++ program to demonstrate Class Template	
10.	Design a C++ program to demonstrate Exception Handling	
	Total	60

Text books

- ❖ E. Balagurusamy, —Object-Oriented Programming with C++, TMH 2013, 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>

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
CO 1	3	3	3	3	3
CO 2	3	3	3	2	3
CO 3	3	2	2	2	3
CO 4	3	3	3	3	2
CO 5	3	2	3	2	3
Weight age of course contributed to each PSO	15	13	14	12	14
	3.0	2.6	2.8	2.4	2.8

Course Coordinator

BOS Chairman

SEMESTER IV

SECOND YEAR
FOURTH SEMESTER
CORE – JAVA PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCS04	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 able to	Programme Outcome
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,PO5
CO4	Implement AWT and Event handling.	PO2, PO6
CO5	Use Swing to create GUI.	PO1, PO3, PO6

CORE – JAVA PROGRAMMING

Unit	Details	No. of Hours
I	Introduction: Review of Object Oriented concepts – History of Java – Java buzzwords – 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 Classes.	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 and Servlets : Swing: JApplet -Icons -JLabel –Jtext Field - JButton –Jcheck Box –Jradio Button -Menus - JSlider – Jcombo Box Servlets: Servlets and dynamic web pages -Lifecycle -Simple servlet.	12
	Total	60

Text books

- ❖ Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
- ❖ Gary Cornell, Core Java2 VolumeI –Fundamentals, AddisonWesley, 1999

Reference Books

- ❖ Head First Java, O'Reilly Publications,
- ❖ Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson

Web Resources

- ❖ <https://javabeginnerstutorial.com/core-java-tutorial>
- ❖ <http://docs.oracle.com/javase/tutorial/>
- ❖ <https://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	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	3	3	3	2	2
CO3	2	2	1	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	14	14	13	14	14
Weighted percentage of Course Contribution to POs	2.8	2.8	2.6	2.6	2.8

Course Coordinator

BOS Chairman

PRACTICAL: JAVA PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCSP04	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 Outcome
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 Core Java.	PO4,PO6
CO4	Implement AWT and Event handling.	PO4,PO5,PO6
CO5	Use Swing to create GUI.	PO3,PO6

PRACTICAL: JAVA PROGRAMMING LAB

List of Programs	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. 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 1to10 using Thread1 and to print 90 to100 using Thread2.To visualize a dataset using Matplotlib or Seaborn. 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	45
Total	45

Text book

- ❖ Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
- ❖ Gary Cornell, Core Java2 VolumeI –Fundamentals,AddisonWesley, 1999

Reference Books

- ❖ Head First Java,O’Rielly Publications,
- ❖ Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson

Web Resources

- ❖ <https://javabeginnerstutorial.com/core-java-tutorial>
- ❖ <http://docs.oracle.com/javase/tutorial/>
- ❖ <https://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	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	3	3	3	2	2
CO3	2	2	1	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	14	14	13	14	14
Weighted percentage of Course Contribution to POs	2.8	2.8	2.6	2.8	2.8

Course Coordinator

BOS Chairman

SEMESTER V

THIRD YEAR
FIFTH SEMESTER
CORE – SOFTWARE ENGINEERING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCS05	CORE	Theory	Y	Y	-	5	4

Learning Objectives

- ❖ Gain basic knowledge of analysis and design of systems
- ❖ Ability to apply software engineering principles and techniques.
- ❖ Model a reliable and cost-effective software system.
- ❖ Ability to design an effective model of the system.
- ❖ Perform Testing at various levels and produce an efficient system.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Gain basic knowledge of analysis and design of systems	PO1
CO2	Ability to apply software engineering principles and techniques	PO1, PO2
CO3	Model a reliable and cost-effective software system	PO4,PO5
CO4	Ability to design an effective model of the system	PO4, PO5
CO5	Perform Testing at various levels and produce an efficient system.	PO3, PO4

CORE – SOFTWARE ENGINEERING

Unit	Details	No. of Hours
I	Introduction: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering. Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.	15
II	Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS) Software Cost Estimation: Software Cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs. Software Design: Good software design, cohesion and coupling, neat arrangement, software design approaches, object- oriented vs function oriented design	15
III	Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design. User-Interface design: Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.	15
IV	Coding and Testing: Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing. Software Reliability and Quality Management: Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.	15
V	Computer Aided Software Engineering: CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. Software Maintenance: Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost.	15
	Total	75

Text books

- ❖ Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018

Reference books

- ❖ Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997
- ❖ Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
- ❖ James A. Senn, Analysis & Design of Information Systems, Second Edition, McGrawHill International Editions.

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	3	2	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	2	2
Weightage	15	15	14	14	10
Weighted percentage of Course Contribution to POs	3.0	3.0	2.8	2.8	2.0

Course Coordinator

BOS Chairman

CORE: DATABASE MANAGEMENT SYSTEM

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCS06	CORE	Theory	-	-	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

CORE: 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 - Database Schema - Integrity rules - relational set operators - data dictionary and the system catalog - relationships - data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram.	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 S.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

PRACTICAL: DATABASE MANAGEMENT SYSTEM LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCSP05	CORE	Practical	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)	PO4, PO5
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, PO4

PRACTICAL: DATABASE MANAGEMENT SYSTEM LAB

Program List	No.of Hours
1. SQL 1. DDL Commands 2. DML Commands 3. TCL Commands 2. PL/ SQL 4. Fibonacci Series 5. Factorial 6. String Reverse 7. Sum of Series 8. Trigger 3. CURSOR 9. Student Mark Analysis using Cursor 4. APPLICATION 10. Library Management System 11. Student Mark Analysis	75
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 S.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

SEMESTER VI

THIRD YEAR
SIXTH SEMESTER
CORE – COMPUTER NETWORKS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCS07	CORE	Theory	Y	Y	-	6	4

Learning Objectives

- ❖ To learn the basic concepts of Data communication and Computer network
- ❖ To learn about wireless Transmission.
- ❖ To learn about networking and data link layer.
- ❖ 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	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models.	PO1
CO2	To gain knowledge on Telephone systems using wireless network.	PO1, PO2
CO3	To understand the concept of MAC.	PO4,PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS.	PO3, PO4

CORE – COMPUTER NETWORKS

Unit	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 15 Algorithms – IP Protocol – IP Addresses – Internet Control Protocols	15
V	TRANSPORT LAYER: Elements of Transport Protocols – Internet Transport Protocols: TCP. APPLICATION LAYER: DNS – E-mail.	15
	Total	75

Text books

- ❖ S. Tanenbaum, —Computer Networks‖, 4th Edition, Prentice-Hall of India, 2008.

Reference books

- ❖ B.A.Forouzan, —Data Communications and Networking‖, Tata McGraw Hill, 4th Edition, 2017
- ❖ F. Halsall, —Data Communications, Computer Networks and Open Systems‖, Pearson Education, 2008.
- ❖ D. Bertsekas and R. Gallager, —Data Networks‖, 2nd Edition, PHI, 2008.
- ❖ Lamarca, —Communication Networks‖, Tata McGraw- Hill, 2002

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	3	2	2
CO3	3	2	3	3	2
CO4	3	2	3	2	2
CO5	3	3	3	2	2
Weightage	15	13	14	12	10
Weighted percentage of Course Contribution to POs	3.0	2.6	2.8	2.4	2.0

Course Coordinator

BOS Chairman

CORE – . NET PROGRAMMING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCS08	CORE	Theory	Y	Y	-	6	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 Database 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	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, PO5
CO3	To Work On Various Controls Files	PO1, PO3, PO6
CO4	To create a web application using MicrosoftADO.NET.	PO2, PO6
CO5	To develop web applications using XML	PO1, PO3, PO6

CORE – . NET PROGRAMMING

Unit	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.	18
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.	18
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.	18
IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties – Data Binding.	18
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.	18
	Total	90

Text books

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

Reference books

- ❖ Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
- ❖ Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013.
- ❖ Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc.2016.
- ❖ Matthew MacDonald, Beginning ASP.NET 4 in C# 2010,APRESS,2010.

Web Resources

- ❖ <https://www.geeksforgeeks.org/introduction-to-net-framework/>
- ❖ <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	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	3
CO2	3	3	3	2	3
CO3	3	2	3	3	2
CO4	2	2	2	3	3
CO5	3	3	3	3	3
Weightage	14	13	13	13	14
Weighted percentage of Course Contribution to POs	2.8	2.6	2.6	2.6	2.8

Course Coordinator

BOS Chairman

PRACTICAL: . NET PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSP06	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	To create web applications and implement various controls	PO1,PO2,PO4
CO2	Create web pages in Rich control.	PO3, PO5
CO3	Develop knowledge about file handling operations.	PO1,PO4, PO5
CO4	An ability to design XML classes.	PO2, PO4, PO5
CO5	To develop a software to solve real-world problems using ASP.NET	PO1, PO3, PO4,PO5

PRACTICAL: . NET PROGRAMMING LAB

S.No	Programs	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.	
11	Database application using Data Controls to perform insert, delete, edit, paging and sorting operation	
12	Implement the Xml classes.	
13	Implement Authentication – Authorization.	
14	Ticket reservation using ASP.NET controls.	
15	Online examination using ASP.NET controls	
	Total	75

Text books

- ❖ Svetlin Nakov,VeselinKolev& Co, Fundamentals of Computer Programming with C#, Faber publication,2019.
- ❖ Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

Reference books

- ❖ Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
- ❖ Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013.
- ❖ Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc.2016.
- ❖ Matthew MacDonald, Beginning ASP.NET 4 in C# 2010,APRESS,2010.

Web Resources

- ❖ <https://www.geeksforgeeks.org/introduction-to-net-framework/>
- ❖ <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	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	3
CO2	3	3	3	2	3
CO3	3	2	3	3	2
CO4	2	2	2	3	3
CO5	3	3	3	3	3
Weightage	14	13	13	13	14
Weighted percentage of Course Contribution to POs	2.8	2.6	2.6	2.6	2.8

Course Coordinator

BOS Chairman

ELECTIVE - ALLIED PHYSICS-I

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UPHA01	ELECTIVE	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

ELECTIVE - ALLIED PHYSICS-I

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 Wiley 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 toPos	3.0	3.0	3.0	3.0	3.0

Course Coordinator

BOS Chairman

ELECTIVE: ALLIED PHYSICS PRACTICAL-I

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UPHAP01	ELECTIVE	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

ELECTIVE: ALLIED PHYSICS PRACTICAL - I

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

ELECTIVE - ALLIED PHYSICS-II

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UPHA02	ELECTIVE	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

ELECTIVE - ALLIED PHYSICS-II

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. Handson 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

ELECTIVE: ALLIED PHYSICS PRACTICAL-II

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UPHAP02	ELECTIVE	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

ELECTIVE: ALLIED PHYSICS PRACTICAL-II

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

Discipline Specific Electives

Semester V

Elective - 5

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

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCSE01	ELECTIVE	Theory	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	Analysing 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 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 Behaviours 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 –	12

	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.	
V	Implementing Agile Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members – Creating an 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
24S5UCSE02	ELECTIVE	Theory	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- Phenol 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 Resourcesl, 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
24S5UCSE03	ELECTIVE	Theory	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=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghLMZVwICm_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
24S5UCSE04	ELECTIVE	Theory	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
24S5UCSE05	ELECTIVE	Theory	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-Loeve 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 Rafael C, Digital Image Processing, Pearson Education, 200

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%20image%20processing%20-Vijaya%20Raghavan.pdf>
- ❖ http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
- ❖ <https://dl.acm.org/doi/10.5555/559707>
- ❖ <https://www.ijert.org/image-processing-using-web-2-0-2>

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

Discipline Specific Electives

Semester – V

Elective - 6

ELECTIVE COURSE –EC6
ELECTIVE: BIG DATA ANALYTICS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCSE06	ELECTIVE	Theory	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 Graphll, 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: ROBOTICS AND ITS APPLICATIONS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCSE07	ELECTIVE	Theory	Y	-	-	4	3

Learning Objectives

- ❖ To understand the robotics fundamentals
- ❖ Understand the sensors and matrix methods
- ❖ Understand the Localization: Self-localizations and mapping
- ❖ To study about the concept of Path Planning, Vision system
- ❖ To learn about the concept of robot artificial intelligence

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Describe the different physical forms of robot architectures.	PO1
CO2	Kinematically model simple manipulator and mobile robots.	PO1, PO2
CO3	Mathematically describe a kinematic robot system	PO4, PO6
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	PO4, PO5, PO6
CO5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	PO3, PO4

ELECTIVE: ROBOTICS AND ITS APPLICATIONS

Unit	Details	No. of Hours
I	Introduction: Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.	12
II	Actuators and sensors: Types of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers-strain gauge based force torque sensor-proximity and distance measuring sensors Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, D-H matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot.	12
III	Localization: Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.	12
IV	Path Planning: Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance-case studies Vision system: Robotic vision systems-image representation-object recognition-and categorization-depth measurement- image data compression-visual inspection-software considerations	12
V	Application: Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space Applications-Industrial robots-artificial intelligence in robots-application of robots in material handling-continuous arc welding-spot welding-spray painting-assembly operation-cleaning-etc.	12
	Total	60

Text Books

- ❖ Richared D.Klafter. Thomas Achmielewski and Mickael Negin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001.
- ❖ Saeed B.Nikku, Introduction to robotics, analysis, control and applications, Wiley-India, 2nd edition 2011

Reference Books

- ❖ Industrial robotic technology-programming and application by M.P.Groover et.al, McGrawhill2008
- ❖ Robotics technology and flexible automation by S.R.Deb, THH-2009

Web Resources

- ❖ https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm
- ❖ <https://www.geeksforgeeks.org/robotics-introduction/>

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	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: COMPUTING INTELLIGENCE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S5UCSE08	ELECTIVE	Theory	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: COMPUTING 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
24S5UCSE09	ELECTIVE	Theory	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.
- ❖ AtulKahate, —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://gpgtools.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
24S5UCSE10	ELECTIVE	Theory	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 Practice, Addison Wesley 2002.
- ❖ Hughes, —Software Project Management, Tata McGraw Hill 2004, 3rd Edition.

NOTE: Latest Edition of Textbooks May be Used

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

Discipline Specific Electives

Semester – VI

Elective 7

THIRD YEAR - SIXTH SEMESTER

ELECTIVE COURSE –EC7

ELECTIVE: FUZZY LOGIC

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSE11	ELECTIVE	Theory	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.	12
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.	12
III	Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.	12
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.	12
V	Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.	12
	Total	60

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
24S6UCSE12	ELECTIVE	Theory	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.	12
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.	12
III	Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, Grid Architecture and relationship to other distributed technology.	12
IV	The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, Semantic Grids.	12
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.	12
Total		60

Text Book

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

Reference Book

- ❖ 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
24S6UCSE13	ELECTIVE	Theory	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	12
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	12
III	MODELS AND THEORIES: • HCI Models : Cognitive models:- Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW.	12
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	12
V	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies.	12
	Total	60

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: INTRODUCTION TO DATA SCIENCE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSE14	ELECTIVE	Theory	Y	-	-	5	3

Learning Objectives

- ❖ To learn about basics of Data Science and Big data.
- ❖ To learn about overview and building process of Data Science.
- ❖ To learn about various Algorithms in Data Science.
- ❖ To learn about Hadoop Framework.
- ❖ To learn about case study about Data Science.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the basics in Data Science and Big data.	PO1
CO2	Understand overview and building process in Data Science.	PO1, PO2
CO3	Understand various Algorithms in Data Science.	PO3, PO5
CO4	Understand Hadoop Framework in Data Science.	PO4, PO5
CO5	Case study in Data Science.	PO3, PO5

ELECTIVE: INTRODUCTION TO DATA SCIENCE

Unit	Details	No. of Hours
I	Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science.	12
II	The Data science process: Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building .	12
III	Algorithms : Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised.	12
IV	Introduction to Hadoop : Hadoop framework – Spark – replacing Map Reduce– NoSQL – ACID – CAP – BASE – types.	12
V	Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation	12
	Total	60

Text Book

- ❖ Davy Cielen, Arno D. B. Meysman, Mohamed Ali, —Introducing Data Sciencel, manning publications 2016

Reference Books

- ❖ Roger Peng, —The Art of Data Science, lulu.com 2016.
- ❖ MurtazaHaider, —Getting Started with Data Science – Making Sense of Data with Analytics, IBM press, E-book.
- ❖ Davy Cielen, Arno D.B. Meysman, Mohamed Ali,—Introducing Data Science: Big Data, Machine Learning, and More, Using Python Toolsl, Dreamtech Press 2016.
- ❖ Annalyn Ng, Kenneth Soo, —Numsense! Data Science for the Layman: No Math Addedll, 2017,1st Edition.
- ❖ Cathy O'Neil, Rachel Schutt, —Doing Data Science Straight Talk from the Frontlinel, O'Reilly Media 2013.
- ❖ Lillian Pierson, —Data Science for Dummies, 2017 II Edition

Web Resources

- ❖ <https://www.w3schools.com/datascience/>
- ❖ https://en.wikipedia.org/wiki/Data_science
- ❖ <http://www.cmap.polytechnique.fr/~lepenec/en/post/references/refs/>

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	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	2	3	3	2
CO5	3	3	3	3	2
Weightage	15	14	15	15	10
Weighted percentage of Course Contribution to POs	3.0	2.8	3.0	3.0	2.0

Course Coordinator

BOS Chairman

Discipline Specific Electives

Semester – VI

Elective 8

ELECTIVE COURSE – EC8

ELECTIVE: IOT AND ITS APPLICATIONS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSE15	ELECTIVE	Theory	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 APPLICATIONS

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.	12
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.	12
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.	12
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 GasIndustry, Opinions on IoT Application and Value for Industry, Home Management.	12
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.	12
	Total	60

Text Book

- ❖ Vijay Madiseti and Arshdeep Bahga, —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..Cuno Pfister, —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
24S6UCSE16	ELECTIVE	Theory	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.	12
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.	12
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.	12
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.	12
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.	12
	Total	60

Text Books

- ❖ Daniel Jurafsky, James H. Martin, —Speech & language processingI, 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
24S6UCSE17	ELECTIVE	Theory	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.	12
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	12
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).	12
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 –	12

	CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data atrest, securing data in motion – Key Management – Auditing.	
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.	12
	Total	60

Text Book

- ❖ Arshdeep Bahga, Vijay Madiseti, 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: VIRTUAL REALITY AND MORE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSE18	ELECTIVE	Theory	Y	-	-	5	3

Learning Objectives

- ❖ To provide knowledge on basic principles of virtual & augmented reality
- ❖ To have the ability to use its technology as a platform for real-world applications.
- ❖ Students will visualize and analyze 3D structures (e.g., molecular bonds, planetary orbits, or anatomical systems) to explain their functions.
- ❖ Learners will engage in 360-degree simulations (e.g., experiencing daily life in a different culture or under difficult living conditions) to articulate increased empathy and global awareness.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Outline the basic terminologies, techniques and applications of VR and AR	PO1
CO2	Describe different architectures and principles of VR and AR systems	PO1, PO2
CO3	Use suitable hardware and software technologies for different varieties of virtual and augmented reality applications	PO3, PO5
CO4	Analyze and explain the behavior of VR and AR technology relates to human perception and cognition	PO3, PO4, PO5
CO5	Assess the importance of VR/AR content and interactions to implement for the real-world problem	PO3, PO4

ELECTIVE: VIRTUAL REALITY AND MORE

Unit	Details	No. of Hours
I	Virtual Reality: The Three I's of VR – History – Early commercial VR Technology – Components of a VR System –Input Devices: Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces.	12
II	Output Devices: Graphics Displays – Sound Displays – Haptic Feedback - Computer Architecture for VR: The Rendering Pipeline- PC Graphics Architecture - VR Programming: Toolkits and Scene Graphs – Traditional and Emerging Applications of VR.	12
III	Augmented Reality: Introduction – Augmented Reality Concepts: Working Principle of AR –Concepts related to AR- Ingredients of an Augmented Reality Experience.	12
IV	Augmented Reality Hardware– Augmented Reality Software– Software to create content for AR Application – Tools and Technologies.	12
V	Augmented Reality Content: Introduction- Creating Content for Visual, Audio, and other senses – Interaction in AR - Mobile Augmented Reality: Introduction – Augmented Reality Applications Areas- Collaborative Augmented Reality.	12
	Total	60

Text Books

- ❖ Grigore C. Burdea and Philippe Coiffet, —Virtual Reality Technology, Wiley Student Edition , Second Edition (Unit I: Chapter 1,2 & Unit II: Chapter 3,4,6,8 & 9)
- ❖ Alan B. Craig(2013), —Understanding Augmented Reality: Concepts and Applications, (Unit III: Chapter 1, 2, Unit IV : Chapter 3, 4 & Unit V: Chapter 5,6,8)
- ❖ Jon Peddie (2017), —Augmented Reality: Where We Will All Live, Springer, 1st Edition (Unit IV: Chapter 7 (Tools & Technologies))

Reference Books

- ❖ Alan Craig & William R. Sherman & Jeffrey D. Will, Morgan Kaufmann(2009), —Developing Virtual Reality Applications: Foundations of Effective Design, Elsevier(Morgan Kaufmann Publishers)
- ❖ Paul Mealy (2018), —Virtual and Augmented Reality, Wiley
- ❖ Bruno Arnaldi & Pascal Guitton & Guillaume Moreau(2018), —Virtual Reality and Augmented Reality: Myths and Realities, Wiley

Web Resources

- ❖ <http://msl.cs.uiuc.edu/vr/>
- ❖ <http://www.britannica.com/technology/virtual-reality/Living-in-virtual-worlds>
- ❖ <https://mobidev.biz/blog/augmented-reality-development-guide>

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	2
CO2	3	2	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	2
Weightage	15	14	15	15	10
Weighted percentage of Course Contribution to POs	3.0	2.8	3.0	3.0	2.0

Course Coordinator

BOS Chairman

Skill Enhancement Courses

Semester – II

SEC-I

SEC- FUNDAMENTALS OF INFORMATION TECHNOLOGY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSS01	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, PO2, PO3, PO4, PO5, PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Learn the concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6

SEC- 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, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.	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, 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	6
IV	Software: Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word . Processing, Spread Sheets Presentation, Graphics, DBMS s/w.	6
V	Operating System: Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	6
	Total	30

Text book

❖ Anoop Mathew, S. KavithaMurugesan, “Fundamental of Information Technology”, Alpha Science International, Limited, 2013.

Reference books

- ❖ Bhardwaj Sushil Puneet Kumar, “Fundamental of Information Technology”, Excel books, 2009.
- ❖ GG Wilkinson, “Fundamentals of Information Technology”, Wiley-Blackwell, 2007.

- ❖ A Ravichandran , “Fundamentals of Information Technology”, Khanna Book Publishing, 2008.

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	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	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	2	3
Weightage	15	15	14	14	10
Weighted percentage of Course Contribution to POs	3.0	3.0	2.8	2.8	2.0

Course Coordinator

BOS Chairman

SEC- INTRODUCTION TO HTML

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSS02	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To insert a graphic within a web page.
- ❖ To create a link within a web page.
- ❖ To create a table within a web page
- ❖ To insert heading levels within a web page
- ❖ To insert ordered and unordered lists within a web page.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Learn the basic concept of resources in HTML.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Learn the basic concept of Meta Data.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the page formatting and learning the concept of list.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Know the concept of creating link to email address.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand the table creation.	PO1, PO2, PO3, PO4, PO5, 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, 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, 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

- ❖ Leslie Sikos, “Mastering HTML5 and CSS3 Made Easy”, Teach U Comp Inc., 2014.
- ❖ Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”, Pearson Education, 2013.

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	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 - WEB DESIGNING

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSS03	SEC	Theory	Y	Y	-	2	2

Learning Objectives

- ❖ To Understand the basics of HTML and its components
- ❖ To study about the Graphics in HTML
- ❖ To understand and apply the concepts of XML and DHTML
- ❖ To 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
CO2	Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3, PO6
CO3	Optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
CO4	Develop a java script.	PO1, PO2, PO3,
CO5	Develop web application using Ajax.	PO2, PO6

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. Model Development: Design a web form to get student details.	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 interactivity with JavaScript-simple Java Script, variables, functions ,conditions, loops and repetition. Model Development: Web form validation with JavaScript.	6
V	Advance script, Java Script and objects, Java Script own objects, the DOM and web browser environments, forms and validations. JavaScript with SQL: Database Connectivity-Store and Retrieval of data from database. Hands on Training: Website deployment.	6
	Total	30

Text books

- ❖ Mike Mcgrath, “Java Script”, 6th Edition, Dream Tech Press, 2020.
- ❖ Stanley Hoffman, Stephen Hoffman, “JavaScript The Ultimate Guide to Learn JavaScript and SQL (JavaScript for Beginners, SQL, Database Programming)”, Create Space Independent Publishing Platform, 2016.
- ❖ Achyut S, Godbole, AtulKahate,”Web Technologies”, Tata McGraw-Hill , 2008.

Reference books

❖ Laura Lemay, Rafe Colburn, Jennifer Kyrnin, “Mastering HTML, CSS & Javascript 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.geeksforgeeks.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	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	1	2	2
CO2	2	3	2	2	3
CO3	3	3	2	3	2
CO4	3	2	3	2	3
CO5	3	2	2	2	3
Weightage	14	12	10	12	13
Weighted percentage of Course Contribution to POs	2.8	2.4	2.0	2.4	2.6

Course Coordinator

BOS Chairman

SEC- MULTIMEDIA SYSTEMS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UCSS04	SEC	Theory	Y	Y	-	2	2

Learning Objectives

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

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 multimedia	PO1
CO2	Have basic knowledge and understanding about image related processings	PO1, PO2
CO3	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, PO6
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 - Midivs. 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 Systems 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

- ❖ TayVaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGraw-Hill, 2001.

Reference books

- ❖ Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.

Web Resources

❖ <https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/>

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
O1	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	2	3	3	3
CO2	2	3	2	3	2
CO3	1	2	3	3	3
CO4	3	2	2	2	1
CO5	2	3	1	3	3
Weightage	10	12	11	14	12
Weighted percentage of Course Contribution to POs	2.0	2.4	2.2	2.8	2.4

Course Coordinator

BOS Chairman

Skill Enhancement Course

Semester-III

SEC-II & SEC-III

SEC - OFFICE AUTOMATION

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCSS05	SEC	Theory	Y	-	-	2	2

Learning Objectives

- ❖ To understand the basics of computer systems and its components.
- ❖ To understand and apply the basic concepts of a word processing package.
- ❖ To understand and apply the basic concepts of electronic spreadsheet software.
- ❖ To understand and apply the basic concepts of database management system.
- ❖ To understand and create a presentation using PowerPoint tool.

Course Outcomes		
Course Outcomes	On completion of this course, students will be able to	Programme Outcome
CO1	Possess the knowledge on the basics of computers and its components	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Demonstrate the understanding of different automation tools.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO1, PO2, PO3, PO4, PO5, PO6

SEC- OFFICE AUTOMATION

Unit	Details	No. of Hours
I	Introductory concepts: Memory unit – CPU - Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS– UNIX– Windows. Introduction to Programming Languages.	6
II	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
III	Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	6
IV	Database Concepts: 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).	6
V	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.	6
	Total	30

Text book

- ❖ Peter Norton, “Introduction to Computers”, Tata McGraw-Hill, 2010.

Reference books

- ❖ Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGrawHill, 2003.

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	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	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 - PRACTICAL – OFFICE AUTOMATION LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCSSP01	SEC	Practical	-	-	-	1	1

Learning Objectives

- ❖ To Apply advanced features like styles, templates, tables, mail merge, and references.
- ❖ To Develop and manage spreadsheets using Microsoft Excel.
- ❖ To Design impactful presentations using Microsoft PowerPoint.
- ❖ To Create, manipulate, and query databases using Microsoft Access.
- ❖ To Automate repetitive tasks using macros and templates in Office applications.

Course Outcomes		
Course Outcomes	On completion of this course, students will be able to	Programme Outcome
CO1	Possess the knowledge on the basics of computers and its components	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Demonstrate the understanding of different automation tools.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO1, PO2, PO3, PO4, PO5, PO6

SEC - PRACTICAL – OFFICE AUTOMATION LAB

List of Programs	No. of Hours
1. Create a document, save it and edit the document as follows: a. Cut, Copy, Paste options. b. Find and Replace options. c. Undo and Redo options. 2. Format the document: a. Using Bold, Underline and Italic. b. Change Character style and size. c. Formatting paragraph: Centre, Left aligns & Right align d. Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs. e. Creating Hanging Paragraphs. 3. Enhance the documents using Header, Footer, Page Setup, Border, Page number, watermarking, Orientation and Print Preview. 4. Insert tables and pictures in a document as follows: a. Creating Tables in a document, Selecting Rows & Column sort the record b. Insert a picture – edit size and add name of the picture above it. c. Also do basic text formatting like – bold, italic, underline, alignments etc in table. 5 Using mail merge, send an invitation /notice (by creating the invitation/notice) for the following situation (at least 5 addresses to be entered) (Any one of the following) a. For opening a new branch b. Inauguration function c. Informing about new scheme or offer 6. Create a Excel sheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns). b. Formatting worksheets Bold, Italic, Font size changing, Auto fill, date format, Currency format.	

7.Open an excel and create fields as follows										
S.no	Name of the Student	M1	M2	M3	M4	M5	Total	Avg	Result	Grade
i. Enter S.No, Name, marks for 10 students ii. Find total and average using formula. iii. Find Result whether the student is pass or fail and also assign grade as per our university norms. iv. Insert a column chart showing the comparison of marks in different subjects of different students. 8. Create a presentation with apply background/Themes, apply custom animation on text, insert images/word art and animate the images with effects. 9. Create —My album use photos, audio, and videos with necessary Transition Effects. 10. Making an Organization Structure in Power Point Starting an organization chart, Entering names and Titles, Adding Members, Formatting the Boxes, Text and Lines, Rearranging the Org Chart, Finishing the Chart										
Total										15

Text book

- ❖ Peter Norton, “Introduction to Computers”, Tata McGraw-Hill, 2010.

Reference book

- ❖ Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGrawHill, 2003.

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	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	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- ADVANCED EXCEL

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCSS06	SEC	Theory	Y	-	-	2	2

Learning Objectives

- ❖ To Handle large amounts of data
- ❖ To Aggregate numeric data and summarize into categories and subcategories
- ❖ To apply Filtering, sorting, and grouping data or subsets of data
- ❖ To create pivot tables to consolidate data from multiple files
- ❖ To Present data in the form of charts and graphs.

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, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
O5	Learn No-SQL databases and management.	PO3, PO6

SEC- ADVANCED EXCEL

Unit	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 books

- ❖ 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

- ❖ <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	2	3	3
CO2	3	2	2	3	3
CO3	3	3	2	3	3
CO4	3	2	2	3	3
CO5	3	2	2	3	3
Weightage	15	12	10	15	15
Weighted percentage of Course Contribution to POs	3.0	2.4	2.0	3.0	3.0

Course Coordinator

BOS Chairman

SEC –PRACTICAL - ADVANCED EXCEL LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3UCSSP02	SEC	Practical	-	-	Y	1	1

Learning Objectives

- ❖ To Understand and apply advanced Excel functions such as VLOOKUP, HLOOKUP, INDEX, MATCH, IF, SUMIF, COUNTIF, TEXT, DATE, and nested formulas.
- ❖ To Apply conditional formatting, data bars, color scales, and icon sets to highlight trends and patterns.
- ❖ To Implement data validation rules to ensure data integrity.
- ❖ To Convert datasets into Excel Tables to leverage structured references.
- ❖ To Present data in the form of charts and graphs.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcome
CO1	Demonstrate proficiency in using complex Excel formulas, functions, and nested formulas to solve real-world problems efficiently.	PO1
CO2	Analyse large datasets using PivotTables, Pivot Charts, and conditional formatting to identify trends, patterns, and insight	PO1, PO2
CO3	Create macros and simple VBA programs to automate repetitive tasks, improving productivity and accuracy.	PO4, PO6
CO4	Ensure data integrity by applying validation rules and error-handling techniques in Excel worksheets.	PO4, PO5, PO6
CO5	Utilize tools like Goal Seek, Scenario Manager, and Data Tables to model business scenarios and support decision-making.	PO3, PO6

SEC –VI- PRACTICAL - ADVANCED EXCEL LAB

List of Programs	No. of Hours
1. Develop a program to create and editing worksheet by using Excel. 2. Create a program to Creating Excel Sheets with Formula and Functions. 3. Implement a program to implement the Simple Statistical functions. 4. Construct a program to implement the logical functions. 5. Design a program to implement Decision making using IF, SUMIF, COUNTIF etc. 6. Perform a program to perform the Text Functions. 7. Demonstrate a program to perform the Lookup Functions. 8. Write a program for Creating and Formatting a Sales Table in Excel. 9. Design a program for implementing the Visualization using charts. 10. Perform programs for implementing Page referencing.	15
Total	15

Text books

- ❖ Lokesh Lalwani, “Excel 2019 All-in-One, Master the New Features of Excel 2019 / Office 365” BPB Publications, 2019.
- ❖ Bill Jelen, Michael Alexander, “Microsoft Excel 2019 Pivot Table Data Crunching”, Pearson Education, 2018.

Reference book

- ❖ Paul McFedries, Greg Harvey, “Excel 2019 All-in-One for Dummies”, Willey Publications, 2021.

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	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	2	3	3
CO2	3	2	2	3	3
CO3	3	3	2	3	3
CO4	3	2	2	3	3
CO5	3	2	2	3	3
Weightage	15	12	10	15	15
Weighted percentage of Course Contribution to POs	3.0	2.4	2.0	3.0	3.0

Course Coordinator

BOS Chairman

Skill Enhancement Courses

Semester-IV

SEC-IV & SEC-V

SEC- UNDERSTANDING INTERNET

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCSS07	SEC	Theory	Y	-	-	2	2

Learning Objectives

- ❖ To learn the basics of Internet medium.
- ❖ To learn the concept Internet as a mass medium
- ❖ To learn the features of Internet Technology
- ❖ To learn the Internet as source of infotainment

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcome
CO1	Know the basic concept in internet	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows the concept of internet as a technology.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand 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 and psychographic description of internet	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand the concept of cyber crime and future possibilities	PO1, PO2, PO3, PO4, PO5, PO6

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 psychographic 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

- ❖ Kumar, Keval, “Mass Communication in India”. Jaico publishing house, 2020.
- ❖ Srivastava, K M, “Media Issues”, Sterling Publishers Pvt Ltd, 2020.

Reference books

- ❖ Acharya, R N, “Television in India”, Manas Publications, New Delhi, 1977.
- ❖ Barnouw, E, “Documentary – A History of Nonfiction”, Oxford, OUP, 1974.
- ❖ Luthra, H R, “Indian Broadcasting”, Ministry of I& B, New Delhi, 1986.

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 - INTERNET BASICS LABORATORY

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCSSP03	SEC	Practical	-	-	Y	2	2

Learning Objectives

- ❖ To Understand the history, architecture, and functioning of the Internet.
- ❖ To Develop skills to effectively browse the Internet using web browsers.
- ❖ To Set up and manage email accounts.
- ❖ To use Google Apps for education effectively.
- ❖ To Enhance digital literacy and research skills for academic and professional tasks

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,
CO5	Utilize Internet-based tools for document creation, presentations, spread sheets, surveys, and basic web applications.	PO2, PO3, PO4

SEC- INTERNET BASICS LABORATORY

EX. NO.	Contents	No. of Hours
1	Set up an email account in Gmail. Using the account, compose a mail to invite other college students for your college fest, attach the invitation, and send the mail to at least 10 recipients. Use CC and BCC options accordingly	3
2	Open your inbox in the Gmail account, check the mail received from your peer from another college inviting you for their college fest, download the invitation, reply with a thank you note, and forward the mail to other friends.	3
3	Assuming you are in the final year of your graduation and looking for a job, visit any job portal and upload your resume	3
4	Set up a label and import bulk contacts using the Google Contacts import option.	3
5	Type a one-page document in your mother tongue using the voice recognition facility of Google Docs.	3
6	Set up your own Google Classroom, invite all your friends via email, post study material using Google Drive, organize it by creating separate folders for each subject, and upload all unit-wise E-Content material.	3
7	Share a folder in Google Drive using the “share link” option and set permissions so that only your friends can access it.	3
8	Schedule a meet using Google Calendar and record the session using Google Meet.	3
9	Design a registration form for your Department Seminar or Conference using Google Forms.	3
10	Develop a question paper with multiple-choice questions for a subject of your choice using Google Forms.	3
	Total	30

Text book

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

Reference books

- ❖ Teaching Internet Basics: The Can-Do Guide" by Joel Nichols, ABC-CLIO Year 2016.
- ❖ "Fluency with Information Technology: Skills, Concepts, and Capabilities" by Lawrence Snyder, Addison-Wesley, Year 2007.

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
24S4UCSS08	SEC	Theory	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 Outcome
CO1	Write PHP scripts to handle HTML forms	PO1,PO4,PO6
CO2	Write regular expressions including modifiers, operators, and meta characters.	PO2,PO5
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

Unit	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 the 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

- ❖ Lynn Mighley and Michael Morrison, “Head First PHP & MySQL: A Brain-Friendly Guide”, O'Reilly Media, 2008.
- ❖ Alan Forbes, “The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL”, CreateSpace Independent Publishing Platform, 2012.

Reference books

- ❖ Steven Holzner, “PHP: The Complete Reference”, McGraw-Hill Education, 2008.
- ❖ DT Editorial Services, “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Willey India Pvt. Limited, Paperback 2016.

Web Resources

- ❖ [Opensource digital libraries: PHP Programming](#)
- ❖ <https://www.w3schools.com/php/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	2	1	2	1
CO2	3	3	2	2	3
CO3	3	3	2	3	3
CO4	3	2	3	2	2
CO5	3	2	2	2	3
Weightage	15	12	10	11	12
Weighted percentage of Course Contribution to POs	3.0	2.4	2.0	2.2	2.4

Course Coordinator

BOS Chairman

SEC- PRACTICAL - PHP PROGRAMMING LAB

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UCSSP04	SEC	Practical	-	-	Y	2	2

Learning Objectives

- ❖ To provide the necessary knowledge on basics of PHP.
- ❖ To Learn the structure, syntax, and basic constructs of PHP.
- ❖ To Implement conditional statements (if, else, switch) and loops (for, while, for each).
- ❖ To Develop reusable code using PHP functions and parameter passing.
- ❖ To Read from and write to files using PHP.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcome
CO1	Demonstrate knowledge of PHP syntax, variables, data types, constants, and operators to develop dynamic web pages.	PO1,PO2,PO3
CO2	Use conditional statements, loops, and PHP functions effectively to solve programming problems.	PO2,PO5
CO3	Create PHP Program using the concept of array.	PO3,PO4,PO5
CO4	Manipulate arrays and strings, and perform file handling operations to store and retrieve data efficiently.	PO2,PO3,PO5
CO5	Apply secure coding practices to prevent vulnerabilities such as SQL injection and XSS while developing functional web applications.	PO3,PO5,PO6

SEC -PRACTICAL -PHP PROGRAMMING LAB

Details	No.of. Hours
1. Develop a PHP program to get name of the user from a form and show greeting text. 2. Implement a PHP program to check whether given number is Armstrong or not. 3. Design a mathematical calculator program using PHP. 4. Build an age calculator program using PHP. 5. Develop a PHP program to check whether a given string is a palindrome. 6. Perform array manipulation using a PHP program. 7. Create a PHP page for a login system with SQL database connection. 8. Implement a PHP program to perform file handling operations. 9. Develop a hit counter using PHP and cookies. 10. Create a PHP page for a login system using sessions.	30
Total hours	30

Text Books:

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

Reference Books:

- ❖ PHP: The Complete Reference- Steven Holzner.
- ❖ 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](#)
- ❖ <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

Semester-VI

SEC-VI

SEC-ORGANIZATION BEHAVIOR AND MORE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSS09	SEC	Theory	Y	-	-	2	2

Learning Objectives

- ❖ To have extensive knowledge on OB and the scope of OB.
- ❖ To create awareness of Individual Behaviour.
- ❖ To enhance the understanding of Group Behaviour
- ❖ To know the basics of Organizational Culture and Organisational Structure
- ❖ To understand Organisational Change, Conflict and Power

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	To define Organisational Behavior, Understand the opportunity through OB.	PO1, PO2, PO5,
CO2	To apply self-awareness, motivation, leadership and learning theories at workplace	PO2, PO4, PO5,
CO3	To analyze the complexities and solutions of group behavior.	PO1, PO2, PO4, PO5,
CO4	To impact and bring positive change in the culture of the organization.	PO2, PO3, PO4, PO5,
CO5	To create a congenial climate in the organization.	PO1, PO2, PO3, PO4

SEC-ORGANIZATION BEHAVIOR AND MORE

Unit	Details	No. of Hours
I	INTRODUCTION : Concept of Organizational Behavior (OB): Nature, Scope and Role of OB: Disciplines that contribute to OB; Opportunities for OB (Globalization, Indian workforce diversity, customer service, innovation and change, networked organizations, work-life balance, people skills, positive work environment, ethics)	6
II	INDIVIDUAL BEHAVIOUR: 1. Learning, attitude and Job satisfaction: Concept of learning, conditioning, shaping and reinforcement. Concept of attitude, components, behavior and attitude. Job satisfaction: causation; impact of satisfied employees on workplace. 2. Motivation : Concept; Theories (Hierarchy of needs, X and Y, Two factor, McClelland, Goal setting, Self-efficacy, Equity theory); Job characteristics model; Redesigning jobs, 3. Personality and Values : Concept of personality; Myers-Briggs Type Indicator (MBTI); Big Five model. Relevance of values; Linking personality and values to the workplace (person-job fit, person-organization fit) 4. Perception, Decision Making : Perception and Judgments; Factors; Linking perception to individual decision making.	6
III	GROUP BEHAVIOUR : 1. Groups and Work Teams : Concept : Five Stage model of group development; Group norms, cohesiveness ; Group think and shift ; Teams; types of teams; Creating team players from individuals and team based work(TBW) 2. Leadership : Concept; Trait theories; Behavioral theories (Ohio and Michigan studies); Contingency theories (Fiedler, Hersey and Blanchard, Path-Goal).	6
IV	ORGANISATIONAL CULTURE AND STRUCTURE : Concept of culture; Impact (functions and liability); Creating and sustaining culture: Concept of structure, Prevalent organizational designs: New design options.	6
V	ORGANISATIONAL CHANGE, CONFLICT AND POWER: Forces of change; Planned change; Resistance; Approaches (Lewin's model, Organisational development);. Concept of conflict, Conflict process, Types, Functional/ Dysfunctional. Introduction to power and politics.	6
	Total	30

Text Books

- ❖ Neharika Vohra Stephen P. Robbins, Timothy A. Judge , Organizational Behaviour, Pearson Education, 18th Edition, 2022.
- ❖ Fred Luthans, Organizational Behaviour, Tata McGraw Hill, 2017.
- ❖ Ray French, Charlotte Rayner, Gary Rees & Sally Rumbles, Organizational Behaviour, John Wiley & Sons, 2011.

- ❖ Dr. Christopher P. Neck, Jeffery D. Houghton and Emma L. Murray, Organizational Behaviour: A Skill-Building Approach, SAGE Publications, Inc; 2nd edition (29 November 2018).

Reference Books

- ❖ Uma Sekaran, Organizational Behaviour Text & cases, 2nd edition, Tata McGraw Hill Publishing CO. Ltd
- ❖ Gangadhar Rao, Narayana, V.S.P Rao, Organizational Behaviour 1987, Reprint 2000, Konark Publishers Pvt. Ltd, 1st edition
- ❖ S.S. Khanka, Organizational Behaviour, S. Chand & Co, New Delhi.
- ❖ J. Jayasankar, Organizational Behaviour, Margham Publications, Chennai, 2017.

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	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	3	3	2	3	3
CO3	3	3	3	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

SEC- QUANTITATIVE APTITUDE

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSS10	SEC	Theory	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 processings	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- 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- CYBER FORENSICS

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSS11	SEC	Theory	Y	-	-	2	2

Learning Objectives

- ❖ Understand the definition of computer forensics fundamentals.
- ❖ To study about the Types of Computer Forensics Evidence
- ❖ Understand and apply the concepts of Duplication and Preservation of Digital Evidence
- ❖ Understand the concepts of Electronic Evidence and Identification of Data
- ❖ To study about the Digital Detective, Network Forensics Scenario, Damaging Computer Evidence.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the definition of computer forensics fundamentals.	PO1
CO2	Evaluate the different types of computer forensics technology.	PO1, PO2
CO3	Analyze various computer forensics systems.	PO4, PO5
CO4	Apply the methods for data recovery, evidence collection and data seizure.	PO4, PO5
CO5	Gain your knowledge of duplication and preservation of digital evidence.	PO2, PO3

SEC- CYBER FORENSICS

Unit	Details	No. of Hours
I	Overview of Computer Forensics Technology: Computer Forensics Fundamentals: What is Computer Forensics Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer. Forensics Technology: Types of Business Computer Forensic, Technology–Types of Military Computer Forensic Technology–Types of Law Enforcement–Computer Forensic. Technology–Types of Business Computer Forensic Technology.	6
II	Computer Forensics Evidence and Capture: Data Recovery: Data Recovery Defined, Data Back-up and Recovery, The Role of Back – up in Data Recovery, The Data –Recovery Solution. Evidence Collection and Data Seizure: Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collections, Artefacts, Collection Steps, Controlling Contamination: The chain of custody	6
III	Duplication and Preservation of Digital Evidence: Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication: Special needs of Evidential Authentication, Practical Consideration, Practical Implementation.	6
IV	Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. Identification of Data: Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices.	6
V	Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, a technical approach, Destruction Of E–Mail, Damaging Computer Evidence, Documenting The Intrusion on Destruction of Data, System Testing.	6
	Total	30

Text Book

- ❖ John R. Vacca, —Computer Forensics: Computer Crime Investigation, 3/E , Firewall Media, New Delhi, 2002.

Reference Books

- ❖ Nelson, Phillips Enfinger, Steuart,—Computer Forensics and Investigations
Enfinger, Steuart, CENGAGE Learning, 2004.
- ❖ Anthony Sammes and Brian Jenkinson, Forensic Computing: A Practitioner's
Guidell, Second Edition, Springer–Verlag London Limited, 2007.
- ❖ Robert M.Slade, Software Forensics Collecting Evidence from the Scene of a
Digital Crimell, TMH 2005.

Web Resources

- ❖ <https://www.vskills.in>
- ❖ <https://www.hackingarticles.in/best-of-computer-forensics-tutorials/>

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	1	2	2	2
CO2	2	3	2	3	1
CO3	3	2	2	3	2
CO4	3	3	1	3	2
CO5	3	3	2	3	3
Weightage	14	12	9	14	10
Weighted percentage of Course Contribution to POs	2.8	2.4	1.8	2.8	2.0

Course Coordinator

BOS Chairman

SEC- PATTERN RECOGNITION

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S6UCSS12	SEC	Theory	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 Book

- ❖ 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