SRINIVAS UNIVERSITY
INSTITUTE OF ENGINEERING AND TECHNOLOGY

UNIVERSITY VISION & MISSION

VISION

To be a trendsetter among universities and build students who emerge as leaders with competence, Conscience and compassion by empowering them with sound education and high standards of ethical and Professional behavior enabling them to build and promote a more humane, just and sustainable world for Future generations.

MISSION

Our mission is to provide an exceptional learning environment where students can develop and enhance their leadership and teamwork skills, creative and intellectual powers and passion for learning by providing an uncompromising standard of excellence in teaching, embodying the spirit of excellence to educate the citizen -leaders of society with distinction.

INSTITUTIONAL VISION

To impart state of the art technical education by providing conducive learning environment for technological innovation, to inculcate research culture and skills necessary to meet the changing needs of the industry and the society in the field of Engineering and allied disciplines

INSTITUTIONAL MISSION

The Institute of Engineering & Technology was established with the aim to

- Provide international standards in education and training
- Prepare graduates with Knowledge and Skills in the field of Engineering
- Deliver a distinctive, all round, excellence driven engineering education that will groom future generations of engineers and entrepreneurs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO):

Graduates will be

PEO1: Electronics and communication engineering professionals are qualified to seek careers in a variety of fields and higher education.

PEO2: Capable of coming up with original, technically sound, financially viable, and socially acceptable solutions to real-world issues.

PEO3: Capable of collaborating with others and adjusting to new technologies while Upholding moral principles.

PROGRAM OUTCOME (PO):

PO1 Engineering Knowledge: To apply knowledge of mathematics, science, engineering fundamentals, problem
Solving skills, algorithmic analysis to solve complex engineering problems.

PO2 Problem analysis: To analyze the problem by finding its domain and applying domain specific skills.

PO3 Design/development of solutions: To understand the design issues of the product/software and develop effective solutions with appropriate consideration of public health and safety, cultural, societal, and environmental issues.

PO4 Conduct investigations of complex problems: To find solutions of complex problems by conducting investigations applying
Suitable techniques.

PO5 Modern tool usage: To adapt the usage of modern tools and recent software.

PO6 The engineer and society: To contribute towards the society by understanding the impact of Engineering on Global aspect.

PO7 Environment and sustainability: To understand environment issues and design a sustainable system.

PO8 Ethics: To understand and follow professional ethics.

PO9 Individual and team work: To function effectively as an individual and as member or leader in diverse teams
And interdisciplinary settings.

PO10 Communication: To demonstrate effective communication at various levels.

PO11 Project Management and finance: To apply the knowledge of Computer Engineering for development of projects, and
Its finance and management.

PO12 Life-Long Learning: To keep in touch with current technologies and inculcate the practices of lifelong Learning

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1: Ability to apply electronics principles in various areas of analog and digital systems, as well as various modes of communication systems and signal processing.

PSO2: Ability to recognize, design, simulate, analyze, and create electronic circuits and systems using modern engineering tools and programming languages (hardware and hardware-software co-design).

COURSE OUTCOMES (CO):

Semester	Title	Course Outcomes
I	MATHEMATICAL FOUNDATION FOR ENGINEERS	After studying this course, students will be able to: • Understand the matrix theory for solving the system of linear equations. • Apply the knowledge of calculus to solve problems related to polar curves and modular arithmetic to computer algorithms. • Solve problems with modern mathematical tools namely SCILAB/PYTHON/MATLAB.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	APPLIED PHYSICS IN ENGINEERING	After studying this course, students will be able to: • Develop the knowledge of basic principles of physics and problem-solving skills. CO-2: Understand the principles, concepts, working and application of new technology CO-3: Apply the concept of

		superconductivity in engineering.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

I	PROGRAMMING FOR PROBLEM SOLVING – C	After studying this course, students will be able to: • To understand structural programming concepts like array handling and string manipulations • Develop programs and test a given logic. • Solve a problem into functions and to develop modular reusable code.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	ELECTRICAL AND ELECTRONIC ENGINEERING	After studying this course, students will be able to: • Understand concepts of electrical circuits and elements, Logic circuits and gates • Analyze simple circuits containing transistors. • Apply the inverting and non-inverting configuration of Op-Amp.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INFORMATION COMMUNICATION AND COMPUTING TECHNOLOGY	After studying this course, students will be able to: • Identify and classify different types of waste and assess their environmental impact. • Evaluate various waste treatment and disposal methods and select appropriate techniques for specific waste types.

		• Analyze and describe the 3D printing technologies, information storage technology and devices, quantum computers and supercomputers and also understand applications of cyber security.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO ELECTRIC VEHICLES	At the end of the course the student will be able to: • Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS • Analyse embedded system software and hardware requirements • Develop programming skills in embedded systems for various applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO EMBEDDED SYSTEM	At the end of the course the student will be able to: • Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS • Analyse embedded system software and hardware requirements. • Develop programming skills in embedded systems for various applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO CYBER SECURITY	At the end of the course the student will be able to: • Identify and assess potential cyber threats and vulnerabilities. • Implement security measures to safeguard information and systems. • Develop strategies to address evolving cyber security challenges effectively.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	BASICS OF ARDUINO PROGRAMMING	At the end of the course the student will be able to: • Demonstrate a comprehensive understanding of Arduino programming fundamentals, including variables, loops, and functions. • Integrate various sensors and actuators with Arduino to build interactive projects. • Design and implement Arduino-based embedded systems for practical applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	TECHNICAL SKILLS IN ENGLISH	After studying this course, students will be able to: • To understand English language appropriately in real-life situations • To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, Writing. • To apply the technicalities of communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	ENVIRONMENTAL STUDIES	After studying this course, students will be able to: • To gain the knowledge of causes and control measures of Air Pollution & Automobile Pollution • To understand the activities of Pollution Control Boards, including industrial regulations • To solve and manage Solid Waste, E-Waste, Biomedical Waste, and Smart Technologies for the circular economy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	COMPUTATIONAL TECHNIQUES	After studying this course, students will be able to: • Develop the knowledge of probability distribution of discrete, continuous random variables • Understand the scope and necessity of numerical techniques and probability distribution. • Apply the knowledge of solution of algebraic and transcendental equations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	FOUNDATIONS OF INTERNET AND WEB TECHNOLOGY	• To develop the knowledge of fundamentals of HTML, CSS and JavaScript. • To understand the Document Object Model and enable them

		• To create dynamic web pages that react to user input

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	PYTHON FOR COMPUTATIONAL PROBLEM SOLVING	After studying this course, students will be able to: • Develop the knowledge of programs for string processing and file organization • Demonstrate proficiency in handling loops and creation of functions. • Identify the methods to create and manipulate lists, tuples, and dictionaries.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	FUNDAMENTALS OF PROCESS AUTOMATION	After studying this course, students will be able to: • To develop the knowledge of basic concepts of Internet of Things • Understand the concept of IoT in comparison with Mobile-to-Mobile framework. • Demonstrate devices like sensors and endpoints.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	RENEWABLE ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT	After studying this course, students will be able to: • To Understand the Need, importance and scope of non- conventional and alternate energy resources.

		• To understand role significance of solar energy, wind energy, and ocean energy. • To utilization of Biogas plants and geothermal energy and understand the concept of energy Conservation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	OPERATION AND MAINTENANCE OF SOLAR ELECTRIC SYSTEMS	After studying this course, students will be able to: • Evaluate and design solar electric systems, considering energy requirements and site-specific factors. • Safely operate, maintain, and troubleshoot solar electric systems, ensuring optimal performance. • Implement necessary repairs, upgrades, and life extension measures to prolong the life of solar systems and minimize waste.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	WASTE MANAGEMENT	After studying this course, students will be able to: • Describe recent trends in the computation technologies. • Evaluate various waste treatment and disposal methods and select appropriate techniques for specific waste types. • Analyze and propose sustainable waste management strategies integrating the principles of the circular economy and extended producer responsibility.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	EMERGING APPLICATIONS OF BIOTECHNOLOGY	After studying this course, students will be able to: • Explain the principles and applications of biotechnology in medicine, agriculture, industry, and environmental conservation. • Critically evaluating the potential benefits and risks associated with the use of biotechnological advancements in various fields.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	INTRODUCTION TO DRONE TECHNOLOGY	After studying this course, students will be able to: • Explain the different types of drones and their applications in various industries. • Identify the key components of drones and comprehend their functionalities. • Apply drone technology in practical scenarios to address real-world challenges.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	COMMUNICATION SKILLS IN ENGLISH	• To communicate effectively and appropriately in real-life situations. • To understand English for study purpose across the curriculum. • To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking,

								Writing.				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	CONSTITUTION OF INDIA	• To gain the knowledge about Indian constitution. • To understand the fundamental rights and duties listed in Indian constitution. • To identify individual role and ethical responsibility towards society.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	SAMSKRUTHIKA KANNADA – II	
II	SANSKRIT - II	
III	DISCRETE MATHEMATICS & GRAPH THEORY	On successful completion of this course, the student should be able to: • Understand and apply the principles of propositional and predicate logic. • Analyze proficiency in performing calculations involving integers, including prime factorization, modular arithmetic. • Apply partitioning techniques and generating functions to solve combinatorial problems and analyze the complexity of algorithms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	ECTRONIC DEVICES AND CIRCUITS	On completion of this course, students are able to: • Understand application circuits using different components. • Realize CMOS and its

		Characteristics. • Understand circuits design using Gates. • Design circuits using combinational logics. • Design circuits using registers and flip flops.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

III	OOP USING JAVA	At the end of the course, the student will be able to: • Understand the object-oriented concepts and JAVA. • Develop computer programs to solve real world problems in Java. • Apply simple GUI interfaces for a computer program to interact with users and understand the event-based GUI handling principles using Applets and swings.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	DIGITAL SYSTEM DESIGN USING HDL	On completion of this course, students are able to: • Understand application circuits using different components. • Realize CMOS and its Characteristics. • Understand circuits design using Gates. • Design circuits using combinational logics. • Design circuits using registers and flip flops.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓

CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

III	NETWORK ANALYSIS	On successful completion of this course, the student should be able to: • Use network techniques, like node analysis and loop analysis, to write equations for large linear circuits. • Apply the knowledge of basic circuit law to simplify the networks using network theorems. • Analyze the resonating behavior of series and parallel circuits.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	ELECTRICAL AND ELECTRONICS MEASUREMENT	On successful completion of this course, the student should be able to: • Analyze instrument characteristics, errors and generalized measurement system. • Use of Ammeters, Voltmeter and Multimeters and CRO for measurement • Analyze and interpret different signal generator circuits for the generation of various waveforms

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	DATA COMMUNICATIONS	On successful completion of this course, the student should be able to: • Understand basic Data Communication Technology and Network Types & Topologies. • Analyze the different Network Models and Transmission Media. • Apply the different Multiplexing and Switching Techniques. Error Detection and Correction Techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	IT INFRASTRUCTURE AND MANAGEMENT	On successful completion of this course, the student should be able to: • Understand the Infrastructure of IT Building blocks. • Analyze the compute and Storage blocks & storage security • Apply concepts to demonstrate the Server & Network virtualization

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	UNIX AND SHELL PROGRAMMING	On successful completion of this course, the student should be able to: • Explain Unix Architecture, File system, and use of basic commands • Analyze the Shell Programming constructs, process fundamentals • CO3: Apply the concepts and writing the shell scripts

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	FRONT END TECHNOLOGIES	This subject will be handled by IBM Skills Academy
III	PLOYABILITY SKILLS ENHANCEMENT PROGRAMME 1	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills

		• Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	<u>INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-1</u>	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

III	INTERNSHIP -1	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and

		techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	MATHEMATICS AND STATISTICS FOR ENGINEERS	On successful completion of this course, the student should be able to: • Demonstrate a deep understanding of vector spaces, linear independence, basis, and rank, and apply these concepts to solve problems in linear algebra. • of linear mappings and understand the relationship between basis change, image, and kernel. • Compute norms, inner products, lengths, and distances in vector spaces, and utilize these measures to analyze and compare vectors. • Identify and apply the concepts of angles, orthogonality, orthonormal basis, and orthogonal projections in matrix decompositions. • Calculate gradients of scalar and vector-valued functions, and apply them to solve optimization problems and analyse the behavior of functions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

IV	EMBEDDED SYSTEM DESIGN	On completion of this course, students are able to: • Expound the History of evaluation of Microprocessors, Architecture and instruction set of 8086, CISC & RISC, Von-Neumann & Harvard CPU Architecture. • Enlighten the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, and Interfacing of 8051 to external memory and Instruction set of 8051. • Recognize the Instruction set of 8051. • Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. • Design and develop modules using RTOS, Implement RPC, threads and tasks

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

IV	COMPUTER NETWORKS	At the end of the course, the student will be able to: • Understand the fundamental concepts of computer networks by explaining network architectures, protocols, and communication models. • Apply computer networking principles to design, configure, and troubleshoot network setups, showcasing practical skills in network configuration and troubleshooting. • Critically assess and optimize computer networks by analyzing network

		performance, security measures, and scalability considerations to ensure efficient and reliable data communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	LINEAR INTEGRATED CIRCUITS	On completion of this course, students are able to: • Understand Op-Amp circuit and parameters including CMRR, PSRR, Input and Output Impedances and Slew Rate. • Design Op-Amp based Inverting, Non-inverting, Summing & Difference Amplifier, and AC Amplifiers including Voltage Follower • Design first & second order Low Pass, High Pass, Band Pass, Band Stop Filters and Voltage Regulators using Op-Amps. • Understand Schmitt Trigger circuit • Understand Astable and Multivibrator Circuit.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

IV	INFORMATION THEORY AND CODING	On successful completion of this course, the student should be able to: • Understand concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source. • Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding

		Algorithms. • Analyze the continuous and discrete communication channels using input, output and joint.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	SIGNALS AND SYSTEMS	On successful completion of this course, the student should be able to: • Classify the signals as continuous/discrete, periodic/aperiodic, even/odd, energy/power and deterministic/random signals. • Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems. • Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	SOFTWARE ENGINEERING	On successful completion of this course, the student should be able to: • Understand the fundamental concepts of software engineering by explaining software development life cycle, requirements engineering, and software process models. • Apply software engineering principles to design, develop, and test software systems, showcasing practical skills in requirements analysis, design patterns, and testing techniques. • Critically assess and optimize software engineering processes by analyzing project management, quality

		assurance, and software maintenance considerations to ensure effective and reliable software development outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DATA ANALYTICS USING R PROGRAMMING	On successful completion of this course, the student should be able to: • Understand the fundamental concepts of data analytics using R programming by explaining data manipulation, visualization, and basic statistical analysis. • Apply R programming techniques to perform data analysis and visualization, showcasing practical skills in data cleaning, exploratory data analysis, and statistical modeling. • Critically evaluate and communicate data-driven insights using R by analyzing patterns, drawing conclusions, and effectively visualizing results to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	UNIFIED MODELING LANGUAGE	On successful completion of this course, the student should be able to: • Understand the fundamental concepts of Unified Modeling Language (UML) by explaining diagram types, modeling elements, and notation. • Apply UML techniques to model and document software systems, showcasing practical skills in creating use case diagrams, class diagrams, and sequence diagrams.

		• Critically assess and optimize UML models by analyzing modeling choices, diagram consistency, and modeling tool features to ensure clear and effective representation of software systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	RDBMS MYSQL, NOSQL AND MONGODB	This subject will be handled by IBM Skills Academy
IV	MINI PROJECT WORK – 1	On successful completion of this course, the student should be able to: • Apply programming skills and software development methodologies to design, implement, and test a functional application that addresses a specific Problem/Scenario. • Analyze the requirements of the mini-project, break down complex problems into smaller components, and make informed design decisions to ensure efficiency and usability. • Evaluate the effectiveness of their Application in meeting user needs and solving the targeted problem. They will also critically assess the strengths and limitations of their solution and propose potential areas for enhancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME 2	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY

		• Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-2	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

V	DIGITAL SIGNAL PROCESSING	On completion of this course, students are able to: • Classify the signals as continuous/discrete, periodic/aperiodic, even/odd, energy/power and deterministic/random signals. • Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum. • Compute DFT of real and

		complex discrete time signals. • Computation of DFT using FFT algorithms and linear filtering approach. • Analyze structure for FIR and FTIR Systems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

V	COMMUNICATION SYSTEMS	On completion of this course, students are able to: • Understand the basics of communication system. • Apply the basic knowledge of electronic circuits and understand the effect of Noise in communication system. • Apply the basic knowledge of signals and systems and understand the concepts of various modulations and their spectral analysis. • Apply the effect of noise on AM and FM system. • Analyze the operation of receivers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

V	VLSI	At the end of the course, the student will be able to: • Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling. • Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects. • Interpret Memory elements along with timing considerations

		• Demonstrate knowledge of FPGA based system design Interpret testing and testability • Issues in VLSI Design Analyze CMOS subsystems and architectural issues with the design constraints.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

V	FUNDAMENTALS OF AI & ML	On completion of this course, students are able to: • Understand the fundamental concepts of artificial intelligence and machine learning by explaining key principles, algorithms, and applications. • Apply artificial intelligence and machine learning techniques to solve problems, showcasing practical skills in data preprocessing, model training, and evaluation. • Critically evaluate and optimize artificial intelligence and machine learning models by analyzing model performance, hyper parameters, and interpretability to achieve effective and accurate predictions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	CONTROL SYSTEMS	On successful completion of this course, the student should be able to: • Develop the mathematical model of mechanical and electrical systems. • Develop transfer function for a given control system using block diagram reduction techniques and

		signal flow graph method. • Analysis of time response of first and second order systems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	ELECTROMAGNETICS	On successful completion of this course, the student should be able to: • Use different coordinate systems, Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations. • Calculate the energy and potential due to a system of charges & explain the behavior of electric field across a boundary conditions. • Explain the Poisson's, Laplace equations and behavior of steady magnetic fields

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	OPERATING SYSTEM	On successful completion of this course, the student should be able to: • Demonstrate need for OS and different types of OS. • Apply suitable techniques for management of different resources. • Use processor, memory, storage and file system commands.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	STATISTICAL PROGRAMMING WITH R	On successful completion of this course, the student should be able to: • Understand the fundamental principles of statistical programming using R by explaining data manipulation, visualization, and basic statistical analysis. • Apply R programming techniques to perform data analysis and visualization, showcasing practical skills in data manipulation, exploratory data analysis, and basic statistical modeling. • Critically evaluate and communicate statistical insights using R by analyzing data, interpreting statistical results, and effectively visualizing findings to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	INTRODUCTION TO DATA SCIENCE	On successful completion of this course, the student should be able to: • Understand the fundamental concepts of data science by explaining data manipulation, visualization, and basic statistical analysis. • Apply data science techniques to explore and analyze datasets, showcasing practical skills in data cleaning, visualization, and basic modeling. • Critically assess and communicate data-driven insights by analyzing patterns, drawing conclusions, and effectively visualizing results to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	INTRODUCTION TO BIG DATA, HADOOP & ECOSYSTEM	This subject will be handled by IBM Skills Academy
V	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME - 3	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	<u>INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS - 3</u>	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

CO4	✓	✓				✓			✓		✓	✓

V	INTERNSHIP - 2	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	ANTENNA & WAVE PROPAGATION	On successful completion of this course, the student should be able to: • Understand the radiation mechanism of EM waves by antennas and their radiation patterns. • Analyse the power radiated by different antennas and their radiation characteristics. • Interpret the relationships between antenna parameters. • Design and analyse different antennas and antenna arrays. • Understand the wave propagation mechanism at different frequencies.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓

CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VI	DIGITAL IMAGE PROCESSING	• Explain fundamentals of image processing • Compare transformation algorithms • Perform Contrast enhancement on images. • Apply algorithms for segmentation • Apply compression techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VI	ADVANCED VLSI	At the end of the course, the student will be able to: • Understand the fundamental concepts of computer networks by explaining network architectures, protocols, and communication models. • Apply computer networking principles to design, configure, and troubleshoot network setups, showcasing practical skills in network configuration and troubleshooting. • Critically assess and optimize computer networks by analyzing network performance, security measures, and scalability considerations to ensure efficient and reliable data communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	BUSINESS INTELLIGENCE	On completion of this course, students are able to: • Understand the fundamental

		concepts of business intelligence by explaining data warehousing, data mining, and reporting techniques. • Apply business intelligence techniques to analyze and visualize data, showcasing practical skills in data extraction, transformation, and loading (ETL) processes. • Critically assess and optimize business intelligence solutions by analyzing data quality, dashboard design, and decision support systems to enhance informed decision-making within organizations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTRODUCTION TO BUSINESS MANAGEMENT	On completion of this course, students are able to: • Remember and list fundamental business management concepts, theories, and key terminology covered in the course. • Apply their understanding of business management principles to analyze case studies and develop effective strategies for addressing real-world business challenges. • CO3: Evaluate different management approaches, comparing their strengths and weaknesses in various business contexts, and recommend suitable strategies for optimizing business outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTRODUCTION TO ENTREPRENEURSHIP	On completion of this course, students are able to: • Remember and list essential entrepreneurship concepts, terminology, and the characteristics of successful entrepreneurs discussed in the course. • Understanding of the key principles of entrepreneurship by explaining the process of identifying opportunities, assessing risks, and creating value in the market. • Analyze real-life entrepreneurial ventures, critically evaluating the factors that contributed to success or failure, and identifying the strategies that were effectively employed.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	OPERATION RESEARCH	On completion of this course, students are able to: • Remember and list the fundamental concepts, methodologies, and terminologies used in operations research, as presented during the course. • Apply operations research techniques to model and solve complex real-world optimization problems, demonstrating their ability to choose appropriate methods and interpret the results. • Evaluate the strengths and limitations of different operations research techniques, comparing their applicability to various problem scenarios and proposing improvements or alternative approaches.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	TOTAL QUALITY MANAGEMENT	On completion of this course, students are able to: • Remember and list the fundamental principles, concepts, and key terminology related to total quality management as covered in the course. • Apply total quality management tools and techniques to analyze and improve processes within organizations, demonstrating their ability to identify areas for improvement and implement quality initiatives. • Evaluate the effectiveness of different quality management strategies in various organizational contexts, comparing their impacts on performance, customer satisfaction, and overall success

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	MICROWAVE COMMUNICATIONS	On successful completion of this course, the student should be able to: • Need of waveguides, and micro strip transmission line. • Apply suitable techniques for management of different microwave resources. • Measurement of microwaves, power, and Frequency.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	NANO ELECTRONICS	On successful completion of this course, the student should be able to: • To introduce the challenges faced by present CMOS VLSI device design and fundamental limits of operation • To study novel MOS based silicon devices and various multi gate devices • To learn about SOI devices and its performance comparison with Silicon devices

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	ARTIFICIAL NEURAL NETWORKS	On successful completion of this course, the student should be able to: • Explain the fundamental principles of artificial neural networks, showcasing comprehension of their basic components and functioning. • Apply artificial neural network architectures to solve diverse problems, demonstrating the ability to design and train networks for various tasks. • Critically assess and optimize artificial neural network performance by analysing activation functions, network topologies, and training algorithms to achieve advanced outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DEEP LEARNING TECHNIQUES	On successful completion of this course, the student should be able to: • Demonstrate an understanding of foundational concepts in deep learning by explaining key principles and methodologies. • Apply deep learning

		techniques to solve complex problems by designing and implementing neural network models for various tasks. • Analyze and optimize deep learning models through critical assessment of architecture choices, hyper parameters, and training strategies to achieve advanced performance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	VIRTUAL REALITY	On successful completion of this course, the student should be able to: • Understand foundation of virtual reality in real world and overview of input devices, output devices and graphic displays. • To become familiar with different approaches of modelling. • Understand user performance studies, VR health and safety issues.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	REST API, JAVASCRIPT, CLEAN CODING	This subject will be handled by IBM Skills Academy
VI	MINI PROJECT WORK – 2	On successful completion of this course, the student should be able to: • Apply programming skills and software development methodologies to design, implement, and test a functional application that addresses a specific Problem/Scenario. • Analyze the requirements of the mini-project, break down complex problems

		into smaller components, and make informed design decisions to ensure efficiency and usability. • Evaluate the effectiveness of their application in meeting user needs and solving the targeted problem. They will also critically assess the strengths and limitations of their solution and propose potential areas for enhancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME 4	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-4	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence

		• Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VI	SELF-MOTIVATED PROGRAM	On successful completion of this course, the student should be able to: • Improve learnability • Acquire additional knowledge in the field of study • Develop the skill • Industry ready • Have more confidence level

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VII	CLOUD COMPUTING	On completion of this course, students are able to: • Demonstrate an understanding of cloud computing fundamentals by explaining key concepts, service models, and deployment models. • Apply cloud computing skills to design, deploy, and manage applications in cloud environments, showcasing practical proficiency in utilizing cloud services. • Critically assess and optimize cloud-based solutions by analyzing scalability, security, and cost considerations, making informed decisions to maximize the benefits of cloud computing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	POWER ELECTRONICS	On completion of this course, students are able to: • Describe the characteristics of different power devices

		and identify the various applications associated with it. • Determine the output response of a thyristor circuit with various triggering options. • Determine the response of controlled rectifier with resistive and inductive loads. Illustrate the operation of inverter circuit and static switches. • Illustrate the working of power circuit as DC-DC converter. • Illustrate the operation of inverter circuit and static switches.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VII	DIGITAL SWITCHING SYSTEM	On successful completion of this course, the student should be able to: • Describe the electromechanical switching systems • Compare electromechanical switching systems with the digital switching. • Determine the telecommunication traffic and its measurements. • Define the technologies associated with the data switching operations. • Describe the software aspects of switching systems and its maintenance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VII	NETWORK SECURITY	On successful completion of this course, the student should be able to: • Understand the importance of security attacks and

		service mechanism • Explain basic structure of DES and AES • Understand importance of Primes, Primality testing, Factorization, Cinese remainder theorem and RSA Cryptosystem. • Explain the concept of Kerbores, Symmetric Key Agreement, PGPS/MIME. • Understand SSL Architecture, Hash Algorithm SSL Message Formats, ISAKMP

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VII	SYSTEM ON CHIP	On successful completion of this course, the student should be able to: • Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling. • Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects. • Interpret Memory elements along with timing considerations • Demonstrate knowledge of FPGA based system design Interpret testing and testability issues in VLSI Design • Analyze CMOS subsystems and architectural issues with the design constraints.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VII	MIXED SIGNAL DESIGN	On successful completion of this course, the student should be able to:

		• Apply the concepts for mixed signal MOS circuit. • Analyze the characteristics of IC based CMOS filters. • Design of various data converter architecture circuits. • Analyze the signal to noise ratio and modeling of mixed signals. • Design of oscillators and phase lock loop circuit.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

VII	INTRODUCTION TO NEMS	On successful completion of this course, the student should be able to: • Understand Microsensors and Actuators • Apply different transduction platforms • Analyzing Micromachining and MEMS materials

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SENSORS AND ACTUATORS	On successful completion of this course, the student should be able to: • Use concepts in common methods for converting a physical parameter into an electrical quantity. • Predict correctly the expected performance of various sensors. • Locate different type of sensors used in real life applications and paraphrase their importance. • Understand the concept of actuator

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓

VII	WIRELESS SENSOR NETWORKS AND MOBILE COMPUTING	On successful completion of this course, the student should be able to: • Understand the foundational principles of wireless sensor networks and mobile computing by explaining network protocols, energy management, and mobility issues. • Apply wireless sensor network and mobile computing concepts to design and deploy efficient and reliable communication systems. • Critically analyze and optimize wireless sensor networks and mobile computing solutions by evaluating network performance, energy efficiency, and security considerations for effective data transmission and mobility support.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SOFTWARE TESTING	On successful completion of this course, the student should be able to: • Understand the fundamental principles of software testing by explaining testing methodologies, techniques, and testing levels. • Apply software testing techniques to design and execute test cases, showcasing practical skills in identifying defects and ensuring software quality. • Critically assess and optimize software testing processes by analyzing test coverage, automation strategies, and regression testing to ensure effective software validation and verification.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SOCIAL AND WEB ANALYTICS	On successful completion of this course, the student should be able to: • Understand the foundational concepts of social and web analytics by explaining data collection methods, metrics, and tools. • Apply social and web analytics techniques to analyze and interpret online user behavior and engagement patterns. • Critically assess and optimize social and web analytics strategies by analyzing insights, refining metrics, and making informed decisions to enhance digital marketing and user experience.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	BIOMEDICAL INSTRUMENTATION	On successful completion of this course, the student should be able to: • Differentiate different bio potentials and its propagations. • Illustrate different electrode placement for various physiological recordings • Design bio amplifier for various physiological recordings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	OPTICAL FIBER NETWORKS	On successful completion of this course, the student should be able to: • Obtain the knowledge optical fibre communications • Understand transmission characteristics of optical fibre. • Identify and explain working of various optical sources.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	CYBER LAWS AND DATA PRIVACY	On successful completion of this course, the student should be able to: • Understand the fundamental principles of cyber laws and data privacy by explaining legal frameworks, regulations, and ethical considerations. • Apply knowledge of cyber laws and data privacy regulations to analyse and address legal challenges in digital environments. • Critically assess and recommend strategies for safeguarding data privacy and complying with cyber laws, considering global perspectives and emerging legal issues.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	DISTRIBUTED COMPUTING SYSTEMS	• Explain the fundamental concepts of distributed computing systems by demonstrating comprehension of distributed architecture, communication protocols, and synchronization mechanisms. • Apply distributed computing techniques to design and implement scalable and fault-tolerant systems, showcasing practical skills in distributed algorithms and data consistency. • Critically assess and optimize distributed computing solutions by analysing performance bottlenecks, load balancing strategies, and fault recovery mechanisms to achieve efficient and reliable distributed systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓

CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	COMPUTER VISION	On successful completion of this course, the student should be able to: • Explain the foundational concepts of computer vision, demonstrating comprehension of image processing, feature extraction, and object recognition techniques. • Apply computer vision techniques to analyze and interpret visual data, showcasing practical skills in tasks such as image segmentation, object tracking, and facial recognition. • Critically assess and optimize computer vision models by analyzing accuracy, robustness, and computational efficiency, making informed decisions to improve the quality and reliability of visual analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	MAJOR PROJECT PHASE – 1	Each student, under the guidance of a faculty, is required to: • Understand the scope and objectives of the major project, and be able to summarize the project's goals, requirements, and anticipated outcomes. • Plan and design the major project by outlining a comprehensive project proposal that includes project scope, objectives, methodologies, expected deliverables, and a preliminary timeline • Evaluate the feasibility of their proposed major project, considering factors such as available resources, potential challenges, and

		expected impact. They will justify their project proposal by demonstrating how it addresses a real-world problem and contributes to the field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	INTERNSHIP - 3	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	PATENT FILING AND IPR	After studying this course, students will be able to: • Understand the basic concepts of intellectual property rights (IPR) and patent filing, and be able to recall key terminology, legal frameworks, and the importance of protecting intellectual property. • Apply their knowledge of IPR to analyze real-world

		scenarios, identifying potential intellectual property assets, and determining suitable strategies for patent filing, trademark registration, or copyright protection. • Evaluate the benefits and challenges of different IPR strategies within specific industries or business contexts. They will demonstrate the ability to create a comprehensive intellectual property protection plan that aligns with business goals and ensures legal compliance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VIII	TECHNICAL SEMINAR	Each student, under the guidance of a faculty, is required to: • Understand the chosen technical topic and be able to summarize its key concepts, principles, and relevance within the context of the seminar. • Analyze the topic by gathering and synthesizing relevant information from various sources. They will then present their findings in a coherent and engaging manner, highlighting the main points, challenges, and potential applications of the subject. • Evaluate the strengths and limitations of the chosen technical topic. They will identify potential areas for further research, discuss potential implications, and engage in thoughtful discussions about the topic's broader impact.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VIII	MAJOR INTERNSHIP	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VIII	PROJECT	Each student, under the guidance of a faculty, is required to: • Understand the scope and objectives of the major project, and be able to summarize the project's goals, requirements, and anticipated outcomes. • Plan and design the major project by outlining a comprehensive project proposal that includes project scope, objectives, methodologies, expected deliverables, and a preliminary timeline. • Evaluate the feasibility of their proposed major project, considering factors such as available resources,

			potential challenges, and expected impact. They will justify their project proposal by demonstrating how it addresses a real-world problem and contributes to the field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

PROGRAMME SPECIFIC OUTCOMES (PSO):

- PSO1: Programming and software development skills: Ability to employ modern

Computer languages, computing environments and standard practices for analysing, Designing and developing optimal solutions to deliver quality software products.

- PSO2: Domain specific skills: Ability to apply techniques to develop computer based solutions in various domains like Artificial Intelligence, Machine Learning, Network Engineering, Image Processing, Web Technologies and Data Sciences.

COURSE OUTCOMES (CO):

Semester	Title	Course Outcomes
I	MATHEMATICAL FOUNDATION FOR ENGINEERS	After studying this course, students will be able to: • Understand the matrix theory for solving the system of linear equations. • Apply the knowledge of calculus to solve problems related to polar curves and modular arithmetic to computer algorithms. • Solve problems with modern mathematical tools namely SCILAB/PYTHON/MATLAB.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	APPLIED PHYSICS IN ENGINEERING	After studying this course, students will be able to: • Develop the knowledge of basic principles of physics and problem-solving skills. • Understand the principles, concepts, working and application of new technology • Apply the concept of superconductivity in engineering.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	PROGRAMMING FOR PROBLEM SOLVING – C	After studying this course, students will be able to: • To understand structural programming concepts like array handling and string manipulations • Develop programs and test a given logic. • Solve a problem into functions and to develop modular reusable code.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	ELECTRICAL AND ELECTRONIC ENGINEERING	After studying this course, students will be able to: • Understand concepts of electrical circuits and elements, Logic circuits and gates • Analyze simple circuits containing transistors. • Apply the inverting and non-inverting configuration of Op-Amp.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INFORMATION COMMUNICATION AND COMPUTING TECHNOLOGY	After studying this course, students will be able to: • Identify and classify different types of waste and assess their environmental impact. • Evaluate various waste treatment and disposal methods and select appropriate techniques for specific waste types. • Analyze and describe the 3D printing technologies, information storage technology and devices,

		quantum computers and supercomputers and also understand applications of cyber security.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO ELECTRIC VEHICLES	At the end of the course the student will be able to: • Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS • Analyse embedded system software and hardware requirements • Develop programming skills in embedded systems for various applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO EMBEDDED SYSTEM	At the end of the course the student will be able to: • Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS • Analyse embedded system software and hardware requirements. • Develop programming skills in embedded systems for various applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO CYBER SECURITY	At the end of the course the student will be able to: • Identify and assess potential cyber threats and vulnerabilities.

		• Implement security measures to safeguard information and systems. • Develop strategies to address evolving cyber security challenges effectively.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	BASICS OF ARDUINO PROGRAMMING	At the end of the course the student will be able to: • Demonstrate a comprehensive understanding of Arduino programming fundamentals, including variables, loops, and functions. • Integrate various sensors and actuators with Arduino to build interactive projects. • Design and implement Arduino-based embedded systems for practical applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	TECHNICAL SKILLS IN ENGLISH	After studying this course, students will be able to: • To understand English language appropriately in real-life situations • To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, Writing. • To apply the technicalities of communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	ENVIRONMENTAL STUDIES	After studying this course, students will be able to: • To gain the knowledge of causes and control measures of Air Pollution & Automobile Pollution

		• To understand the activities of Pollution Control Boards, including industrial regulations • To solve and manage Solid Waste, E-Waste, Biomedical Waste, and Smart Technologies for the circular economy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	COMPUTATIONAL TECHNIQUES	After studying this course, students will be able to: • Develop the knowledge of probability distribution of discrete, continuous random variables • Understand the scope and necessity of numerical techniques and probability distribution. • Apply the knowledge of solution of algebraic and transcendental equations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	FOUNDATIONS OF INTERNET AND WEB TECHNOLOGY	• To develop the knowledge of fundamentals of HTML, CSS and JavaScript. • To understand the Document Object Model and enable them • To create dynamic web pages that react to user input.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	PYTHON FOR COMPUTATIONAL PROBLEM SOLVING	After studying this course, students will be able to: • Develop the knowledge of programs for string processing and file organization

		• Demonstrate proficiency in handling loops and creation of functions. • Identify the methods to create and manipulate lists, tuples, and dictionaries.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	FUNDAMENTALS OF PROCESS AUTOMATION	After studying this course, students will be able to: • To develop the knowledge of basic concepts of Internet of Things • Understand the concept of IoT in comparison with Mobile-to-Mobile framework. • Demonstrate devices like sensors and endpoints.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	RENEWABLE ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT	After studying this course, students will be able to: • To Understand the Need, importance and scope of non-conventional and alternate energy resources. • To understand role significance of solar energy, wind energy, and ocean energy. • To utilization of Biogas plants and geothermal energy and understand the concept of energy Conservation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	OPERATION AND MAINTENANCE OF	After studying this course, students will be able to:

	SOLAR ELECTRIC SYSTEMS	• Evaluate and design solar electric systems, considering energy requirements and site-specific factors. • Safely operate, maintain, and troubleshoot solar electric systems, ensuring optimal performance. • Implement necessary repairs, upgrades, and life extension measures to prolong the life of solar systems and minimize waste.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	WASTE MANAGEMENT	After studying this course, students will be able to: • Describe recent trends in the computation technologies. • Evaluate various waste treatment and disposal methods and select appropriate techniques for specific waste types. • Analyze and propose sustainable waste management strategies integrating the principles of the circular economy and extended producer responsibility.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	EMERGING APPLICATIONS OF BIOTECHNOLOGY	After studying this course, students will be able to: • Explain the principles and applications of biotechnology in medicine, agriculture, industry, and environmental conservation. • Critically evaluating the potential benefits and risks associated with the use of biotechnological advancements in various fields. • Propose innovative solutions to real-world problems using biotechnological approaches,

		considering ethical and sustainable practices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	INTRODUCTION TO DRONE TECHNOLOGY	After studying this course, students will be able to: • Explain the different types of drones and their applications in various industries. • Identify the key components of drones and comprehend their functionalities. • Apply drone technology in practical scenarios to address real-world challenges.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	COMMUNICATION SKILLS IN ENGLISH	• To communicate effectively and appropriately in real-life situations. • To understand English for study purpose across the curriculum. • To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, Writing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	CONSTITUTION OF INDIA	• To gain the knowledge about Indian constitution. • To understand the fundamental rights and duties listed in Indian constitution. • To identify individual role and ethical responsibility towards society.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	SAMSKRUTHIKA KANNADA – II (Common for both Circuit and Non-Circuit branches)	
II	SANSKRIT - II (For Kannadigas, Common to all branches)	
III	DISCRETE MATHEMATICS AND GRAPH THEORY	• Understand and apply the principles of propositional and predicate logic • Analyze proficiency in performing calculations involving integers, including prime factorization, modular arithmetic • Apply partitioning techniques and generating functions to solve combinatorial problems and analyze the complexity of algorithms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	DATA STRUCTURES - 1	
III	OOP USING JAVA	At the end of the course, the student will be able to: • Understand the object-oriented concepts and JAVA. • Develop computer programs to solve real world problems in Java. • Apply simple GUI interfaces for a computer program to interact with users and understand the event-based GUI handling principles using Applets and swings.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	MICROPROCESSORS AND MICROCONTROLLERS	After studying this course, students will be able to: • Design and implement interfacing of peripheral with microprocessor and microcontroller • Analyze, comprehend, design and simulate microprocessor-based systems used for control and monitoring. • Ability to analyze, comprehend, design and simulate microcontroller-based systems used for control and monitoring, appreciate advanced architecture evolving microprocessor field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	PRINCIPLES OF ARTIFICIAL INTELLIGENCE	After Learning this Course, Students will be able to: • Explain the basic principles and concepts of artificial intelligence, including key terminology, machine learning, and neural networks. • Apply machine learning techniques to real-world datasets, design simple neural networks, and analyze their performance using relevant evaluation metrics. • Analyze the ethical implications of artificial intelligence technologies on society, considering issues such as bias in algorithms, job displacement, and privacy concerns.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	IT INFRASTRUCTURE AND MANAGEMENT	After studying this course, students will be able to: • Understand the Infrastructure of IT Building blocks. • Analyze the compute and Storage blocks & storage security

		• Apply concepts to demonstrate the Server & Network virtualization

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	BUSINESS PROCESS FUNDAMENTALS	After studying this course, students will be able to: • Understand and suggest improvements that will benefit organizational performance. • Analyze, implement and integration strategy for processes that leverages organizational and technical capabilities of an organization. • To apply and improve Business Processes in organizations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	SUPPLY CHAIN MANAGEMENT	After studying this course, students will be able to: • Understand about SCM and basics of Reverse & Agile supply chain • Analyze Mathematical modeling of Supply Chain. • Apply information system in supply chain.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	UNIX AND SHELL PROGRAMMING	After studying this course, students will be able to: • Explain Unix Architecture, File system, and use of basic commands • Analyze the Shell Programming constructs, process fundamentals • Apply the concepts and writing the shell scripts

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	DATA COMMUNICATIONS	After Learning this Course, Students will be able to: • Understand basic Data Communication Technology and Network Types & Topologies. • Analyze the different Network Models and Transmission Media. • Apply the different Multiplexing and Switching Techniques. Error Detection and Correction Techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	IBM WATSON SERVICES	
III	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -1 (ESEP-1) INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-1	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-1	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓
CO4	✓			✓		✓	✓					✓
CO5	✓		✓	✓		✓		✓		✓	✓	

III	INTERNSHIP -1	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	SOFTWARE ENGINEERING WITH AI	On completion of this course, students will be able to: • Understand the fundamental principles and relevance of AI in software engineering. • Apply AI techniques to optimize software engineering processes and testing.

		• Design and lead complex AL based software projects, integrating advanced algorithms and technologies, while assessing ethical and social implications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DATABASE MANAGEMENT SYSTEMS	After studying this course, students will be able to: • Understand the fundamental concepts of database management systems by explaining relational data models, SQL, and normalization. • Apply database management techniques to design, query, and manage databases, showcasing practical skills in data modeling, database creation, and data manipulation. • Critically assess and optimize database solutions by analyzing performance, indexing, and transaction management to ensure efficient and reliable data storage and retrieval.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DATA STRUCTURES - 2	After studying this course, students will be able to: • Understand the basic principles and operations of data structures. • Apply Hashing, Disjoint sets, String Matching techniques, advanced Trees and Graphs for solving problems effectively. • Analyze the given scenario and choose appropriate Data Structure for solving problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	FUNDAMENTALS OF MACHINE LEARNING	After studying this course, students will be able to: • Comprehend the foundational concepts of machine learning, including supervised and unsupervised learning, feature engineering, and model evaluation, enabling informed selection and application of appropriate techniques. • Apply machine learning algorithms to real-world datasets, demonstrating the ability to preprocess data, train models, and assess performance using various metrics, fostering practical problem-solving skills. • Analyze the ethical implications and considerations in machine learning, critically examining topics such as bias, fairness, and interpretability, and proposing strategies to mitigate potential issues in model development and deployment.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	KNOWLEDGE REPRESENTATION AND REASONING	After studying this course, students will be able to: • Analyze and apply various knowledge representation techniques, including semantic networks, frames, and logic-based approaches, to model complex real-world knowledge domains. • Evaluate the role of knowledge representation in artificial intelligence systems, demonstrating the ability to design and implement effective knowledge-based systems for solving problems and making informed decisions.

		• Utilize advanced reasoning mechanisms such as inference engines and rule-based systems to infer new knowledge, resolve inconsistencies, and simulate human-like reasoning processes within intelligent systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	COMPUTER ORGANIZATION	After studying this course, students will be able to: • Understand the fundamental concepts of computer organization by explaining CPU architecture, memory hierarchy, and input/output systems. • Apply computer organization principles to design and analyze digital circuits, showcasing practical skills in logic design and assembly language programming. • Critically assess and optimize computer organization solutions by analyzing performance bottlenecks, instruction pipelines, and memory access patterns to achieve efficient and effective hardware-software interactions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DATA ANALYTICS USING R PROGRAMMING	After studying this course, students will be able to: • Understand the fundamental concepts of data analytics using R programming by explaining data manipulation, visualization, and basic statistical analysis. • Apply R programming techniques to perform data analysis and visualization, showcasing practical skills in data cleaning, exploratory data analysis, and statistical modeling.

		• Critically evaluate and communicate data-driven insights using R by analyzing patterns, drawing conclusions, and effectively visualizing results to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	UNIFIED MODELING LANGUAGE	After studying this course, students will be able to: • Understand the fundamental concepts of Unified Modeling Language (UML) by explaining diagram types, modeling elements, and notation. • Apply UML techniques to model and document software systems, showcasing practical skills in creating use case diagrams, class diagrams, and sequence diagrams. • Critically assess and optimize UML models by analyzing modeling choices, diagram consistency, and modeling tool features to ensure clear and effective representation of software systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	UNIX SYSTEM PROGRAMMING	After studying this course, students will be able to: • Explain the foundational concepts of Unix shell programming, demonstrating comprehension of shell commands, scripting, and utilities. • Apply Unix shell programming skills to automate tasks, write shell scripts, and perform system administration tasks, showcasing practical proficiency in shell scripting.

		• Critically evaluate and optimize shell scripts by analyzing code efficiency, error handling, and script portability, making informed decisions to enhance automation and system management.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	IBM CE - PREDICTIVE MODELLING USING SPSS	
IV	MINI PROJECT WORK-1	After studying this course, students will be able to: • Apply programming skills and software development methodologies to design, implement, and test a functional application that addresses a specific Problem/Scenario. • Analyze the requirements of the mini-project, break down complex problems into smaller components, and make informed design decisions to ensure efficiency and usability. • Evaluate the effectiveness of their Application in meeting user needs and solving the targeted problem. They will also critically assess the strengths and limitations of their solution and propose potential areas for enhancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -2 (ESEP-2) INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-2	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING

		• Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-2	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓
CO4	✓			✓		✓	✓					✓
CO5	✓		✓	✓		✓		✓		✓	✓	

V	INTRODUCTION TO ARTIFICIAL NEURAL NETWORK	After studying this course, students will be able to: • Demonstrate comprehension of fundamental Artificial Neural Network concepts by explaining basic neural network architecture and components.. • Apply critical thinking and analysis skills to evaluate and optimize ANN models for specific tasks, showcasing an advanced understanding of neural network design principles. • Synthesize advanced knowledge of deep learning and ANN techniques leading to the creation

		of innovative solutions for complex real-world problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	OPERATING SYSTEMS	After studying this course, students will be able to: • Understand the foundational concepts of operating systems by explaining process management, memory management, and file system organization. • Apply operating system principles to design and implement efficient process scheduling, memory allocation, and I/O management strategies. • Critically evaluate and optimize operating system performance by analyzing resource utilization, concurrency control, and security mechanisms for achieving efficient and reliable system operation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	COMPUTER NETWORKS	After studying this course, students will be able to: • Understand the fundamental concepts of computer networks by explaining network architectures, protocols, and communication models. • Apply computer networking principles to design, configure, and troubleshoot network setups, showcasing practical skills in network configuration and troubleshooting. • Critically assess and optimize computer networks by analyzing network performance, security measures, and scalability considerations to ensure efficient and reliable data communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	DESIGN AND ANALYSIS OF ALGORITHMS	After studying this course, students will be able to: • Understand the fundamental concepts of algorithm design and analysis by explaining algorithm complexity, recurrence relations, and algorithmic paradigms. • Apply algorithm design techniques to solve computational problems, showcasing practical skills in designing efficient algorithms and analyzing their correctness. • Critically assess and optimize algorithmic solutions by analyzing time and space complexity, evaluating trade-offs, and implementing advanced data structures to achieve effective problem-solving outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	COMPUTATIONAL INTELLIGENCE	After studying this course, students will be able to: • Demonstrate a strong comprehension of the fundamental concepts, paradigms, and principles of Computational Intelligence, encompassing Neural Networks, Evolutionary Algorithms, and Fuzzy Logic. • Apply Computational Intelligence techniques, including designing and implementing Artificial Neural Networks, Evolutionary Algorithms, and Fuzzy Logic systems, to solve complex engineering and optimization problems. • Analyze, evaluate, and synthesize information from diverse sources, enabling students to make informed decisions and creatively

		apply Computational Intelligence methods to address real-world challenges in fields such as robotics, data analysis, and control systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	SOFTWARE PROJECT MANAGEMENT	After studying this course, students will be able to: At the end of the course, the students should be able to: • Understand the fundamental principles of software project management by explaining project lifecycle, planning, and risk management. • Apply software project management techniques to plan, execute, and monitor software development projects, showcasing practical skills in resource allocation and scheduling. • Critically evaluate and optimize software project management processes by analyzing project progress, stakeholder communication, and change management to ensure successful project delivery.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	INTRODUCTION TO DATA SCIENCE	After studying this course, students will be able to: • Understand the fundamental concepts of data science by explaining data manipulation, visualization, and basic statistical analysis. • Apply data science techniques to explore and analyze datasets, showcasing practical skills in data cleaning, visualization, and basic modeling. • Critically assess and communicate data-driven insights by analyzing

		patterns, drawing conclusions, and effectively visualizing results to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	STATISTICAL PROGRAMMING WITH R	After studying this course, students will be able to: • Understand the fundamental principles of statistical programming using R by explaining data manipulation, visualization, and basic statistical analysis. • Apply R programming techniques to perform data analysis and visualization, showcasing practical skills in data manipulation, exploratory data analysis, and basic statistical modeling. • Critically evaluate and communicate statistical insights using R by analyzing data, interpreting statistical results, and effectively visualizing findings to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	PRINCIPLES OF USER INTERFACE DESIGN	After studying this course, students will be able to: • Understand the fundamental principles of user interface design by explaining usability, user-centered design, and design guidelines. • Apply user interface design principles to create user-friendly and intuitive interfaces, showcasing practical skills in information architecture and interaction design. • Critically assess and optimize user interfaces by analyzing user feedback, usability testing, and

		accessibility considerations to ensure effective and engaging user experiences.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	MACHINE LEARNING USING WATSON STUDIO	
V	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -3 (ESEP-3) INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-3	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-3	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓
CO4	✓			✓		✓	✓					✓
CO5	✓		✓	✓		✓		✓		✓	✓	

V	INTERNSHIP -2	After studying this course, students will be able to:

		• Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DEEP LEARNING TECHNIQUES	After studying this course, students will be able to: • Comprehend the fundamental concepts of Deep Learning and their applicability within Business Intelligence. • Utilize Deep Learning techniques to extract, process, and interpret complex patterns and information from BI datasets. • Innovate and implement advanced Deep Learning models to optimize data-driven decision-making in a business context.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	SYSTEM SOFTWARE AND COMPILER DESIGN	After studying this course, students will be able to: • CO-1: Demonstrate an understanding of software and compiler design principles by explaining their foundational concepts. • CO-2: Apply theoretical knowledge to practical scenarios

			by designing software systems and developing basic compilers for programming languages. • CO-3: Analyze and optimize complex software systems, including compilers, through critical evaluation and informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTERNET OF THINGS	After studying this course, students will be able to: • Demonstrate an understanding of IoT concepts and protocols by explaining their principles and functionalities. • Design and develop IoT solutions by applying knowledge of sensors, communication protocols, and data processing techniques. • Evaluate and strategize IoT architectures for specific use cases through critical analysis, considering security, scalability, and integration aspects.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	BUSINESS INTELLIGENCE	After studying this course, students will be able to: • Understand the fundamental concepts of business intelligence by explaining data warehousing, data mining, and reporting techniques. • Apply business intelligence techniques to analyze and visualize data, showcasing practical skills in data extraction, transformation, and loading (ETL) processes. • Critically assess and optimize business intelligence solutions by analyzing data quality, dashboard design, and decision support systems to enhance informed

		decision-making within organizations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTRODUCTION TO BUSINESS MANAGEMENT	After studying this course, students will be able to: • Remember and list fundamental business management concepts, theories, and key terminology covered in the course. • Apply their understanding of business management principles to analyze case studies and develop effective strategies for addressing real-world business challenges. • Evaluate different management approaches, comparing their strengths and weaknesses in various business contexts, and recommend suitable strategies for optimizing business outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTRODUCTION TO ENTREPRENEURSHIP	After studying this course, students will be able to: • Remember and list essential entrepreneurship concepts, terminology, and the characteristics of successful entrepreneurs discussed in the course. • Understanding of the key principles of entrepreneurship by explaining the process of identifying opportunities, assessing risks, and creating value in the market. • Analyze real-life entrepreneurial ventures, critically evaluating the factors that contributed to success or failure, and identifying the strategies that were effectively employed.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	OPERATIONS RESEARCH	After studying this course, students will be able to: • Remember and list the fundamental concepts, methodologies, and terminologies used in operations research, as presented during the course. • Apply operations research techniques to model and solve complex real-world optimization problems, demonstrating their ability to choose appropriate methods and interpret the results. • Evaluate the strengths and limitations of different operations research techniques, comparing their applicability to various problem scenarios and proposing improvements or alternative approaches.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	TOTAL QUALITY MANAGEMENT	After studying this course, students will be able to: • Remember and list the fundamental principles, concepts, and key terminology related to total quality management as covered in the course. • Apply total quality management tools and techniques to analyze and improve processes within organizations, demonstrating their ability to identify areas for improvement and implement quality initiatives. • Evaluate evaluate the effectiveness of different quality management strategies in various organizational contexts, comparing their impacts on performance, customer satisfaction, and overall success

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DATA WAREHOUSE AND DATA MINING	After studying this course, students will be able to: • Explain the fundamental concepts of data warehousing and data mining, demonstrating comprehension of their underlying principles. • Apply data warehousing and data mining techniques to analyze and interpret complex datasets, showcasing practical application of knowledge. • Critically evaluate and optimize data mining processes and strategies, making informed decisions to enhance insights and outcomes •

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	HIGH PERFORMANCE COMPUTING	After studying this course, students will be able to: • Apply foundational concepts of parallel computing to solve computational problems in high-performance computing • Analyze and evaluate advanced parallel algorithms and architectures in high-performance computing, showcasing critical thinking and synthesis • Design and implement optimized parallel computing solutions for complex scientific simulations, showcasing creativity and advanced problem-solving skills.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	BIG DATA ANALYTICS	After studying this course, students will be able to: • demonstrate an understanding of fundamental Big Data Analytics

		concepts and techniques through written explanations and basic problem-solving. • Apply advanced Big Data Analytics methodologies to real-world datasets, extracting actionable insights and making data-driven decisions. • evaluate and analyze complex Big Data scenarios, designing innovative solutions and assessing their impact on organizations' strategic decision-making processes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DIGITAL IMAGE PROCESSING	After studying this course, students will be able to: • Demonstrate understanding of the foundational concepts of digital image processing by explaining key techniques and terminology. • Apply digital image processing methods to analyze and enhance images, showcasing practical skills in image manipulation and restoration. • Critically evaluate and optimize digital image processing algorithms by analyzing their effectiveness, exploring advanced techniques, and making informed decisions to achieve desired visual outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DESIGNING EMBEDDED SYSTEMS	After studying this course, students will be able to: • Demonstrate an understanding of embedded systems design principles by explaining fundamental concepts and components.

		• Apply embedded systems design methodologies to develop functional and efficient systems, showcasing practical skills in hardware-software integration. • Critically assess and optimize embedded systems performance by analyzing resource constraints, communication protocols, and power consumption for achieving optimal system design.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	BUSINESS INTELLIGENCE USING IBM COGNOS	
VI	MINI PROJECT WORK - 2	After studying this course, students will be able to: • Apply programming skills and software development methodologies to design, implement, and test a functional application that addresses a specific Problem/Scenario. • Analyze the requirements of the mini-project, break down complex problems into smaller components, and make informed design decisions to ensure efficiency and usability. • Evaluate the effectiveness of their Application in meeting user needs and solving the targeted problem. They will also critically assess the strengths and limitations of their solution and • propose potential areas for enhancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	EMPLOYABILITY SKILLS ENHANCEMENT	After studying this course, students will be able to:

	PROGRAMME -4 (ESEP-4) INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-4	• Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓
CO4	✓			✓		✓	✓					✓
CO5	✓		✓	✓		✓		✓		✓	✓	

VI	INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS-4	On completion of this course, students are able to: • Have exposure on the latest development • Acquire new skills • Become Industry ready • Have more confidence • Get additional knowledge

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓
CO4	✓			✓		✓	✓					✓
CO5	✓		✓	✓		✓		✓		✓	✓	

VII	CLOUD COMPUTING	After studying this course, students will be able to: • Demonstrate an understanding of cloud computing fundamentals by explaining key concepts, service models, and deployment models. • Apply cloud computing skills to design, deploy, and manage applications in cloud environments, showcasing practical proficiency in utilizing cloud services. • Critically assess and optimize cloud-based solutions by

		analyzing scalability, security, and cost considerations, making informed decisions to maximize the benefits of cloud computing.
VII	ADVANCED DBMS & NOSQL DATABASES	After studying this course, students will be able to: • Remember and list the advanced concepts, data models, and terminology related to relational databases and NoSQL databases as covered in the course. • Apply their knowledge of advanced database concepts to design, implement, and optimize complex database solutions, demonstrating their ability to choose appropriate database technologies and structures. • Evaluate the strengths and limitations of relational databases and NoSQL databases in various application scenarios, comparing their performance, scalability, and suitability for different types of data and workloads.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	NATURE INSPIRED COMPUTING	After studying this course, students will be able to: • Demonstrate proficiency in understanding and applying various Nature-Inspired Computing (NIC) techniques, including Genetic Algorithms, Swarm Intelligence, Artificial Neural Networks, and Quantum-Inspired Computing. • Apply NIC algorithms effectively to real-world scenarios, optimizing solutions and achieving practical results in problem-solving. • Analyze, adapt, and innovate NIC approaches, fostering critical thinking and research skills to address complex computational and optimization challenges.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	PROMPT ENGINEERING FOR CHATGPT	After studying this course, students will be able to: • Demonstrate an understanding of prompt engineering principles and apply them effectively in real-world applications, showcasing a foundational level of expertise. • Analyze advanced prompt engineering techniques, evaluate their applications, and create practical solutions, showcasing critical thinking and creative problem-solving skills. • Evaluate ethical challenges in prompt engineering, apply ethical design principles, and propose responsible AI solutions, demonstrating ethical reasoning and practical application in AI development.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	NATURAL LANGUAGE PROCESSING	After studying this course, students will be able to: • Explain the fundamental concepts of natural language processing (NLP), demonstrating comprehension of text processing, linguistic analysis, and NLP applications. • Apply NLP techniques to process and analyze textual data, showcasing practical skills in tasks such as sentiment analysis, named entity recognition, and text classification. • Critically evaluate and optimize NLP models by analyzing performance metrics, feature engineering, and language model selection, making informed decisions to enhance the quality of NLP solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SOFT COMPUTING	After studying this course, students will be able to: • Demonstrate understanding of soft computing principles by explaining key concepts of fuzzy logic, neural networks, and evolutionary algorithms. • Apply soft computing techniques to solve complex problems, showcasing practical skills in designing and implementing fuzzy systems, neural networks, and genetic algorithms. • Critically assess and optimize soft computing solutions by analyzing algorithm parameters, rule bases, and training strategies, making informed decisions to achieve advanced problem-solving outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	COMPUTER GRAPHICS AND VISUALIZATION	After studying this course, students will be able to: • Explain the fundamental concepts of computer graphics and visualization, demonstrating comprehension of graphics rendering, modeling, and visualization techniques. • Apply computer graphics and visualization skills to create and manipulate visual content, showcasing practical proficiency in 2D and 3D graphics rendering and animation. • Critically assess and optimize visualizations by analyzing data representation, visualization techniques, and user interaction, making informed decisions to enhance the clarity and

		effectiveness of visual communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	MATHEMATICS AND STATISTICS FOR AI	On successful completion of this course, the student should be able to: • Develop mathematical proficiency essential for AI, including calculus, linear algebra, and probability. • Apply statistical methods for data analysis and decision-making in AI applications. • Implement mathematical models into practical AI systems, including algorithms for machine learning tasks.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SOCIAL AND WEB ANALYTICS	After studying this course, students will be able to: • Understand the foundational concepts of social and web analytics by explaining data collection methods, metrics, and tools. • Apply social and web analytics techniques to analyze and interpret online user behavior and engagement patterns. • Critically assess and optimize social and web analytics strategies by analyzing insights, refining metrics, and making informed decisions to enhance digital marketing and user experience.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	WIRELESS SENSOR NETWORKS AND MOBILE COMPUTING	After studying this course, students will be able to: • Understand the foundational principles of wireless sensor networks and mobile computing

			by explaining network protocols, energy management, and mobility issues. • Apply wireless sensor network and mobile computing concepts to design and deploy efficient and reliable communication systems. • Critically analyze and optimize wireless sensor networks and mobile computing solutions by evaluating network performance, energy efficiency, and security considerations for effective data transmission and mobility support.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SOFTWARE TESTING		After studying this course, students will be able to: • Understand the fundamental principles of software testing by explaining testing methodologies, techniques, and testing levels. • Apply software testing techniques to design and execute test cases, showcasing practical skills in identifying defects and ensuring software quality. • Critically assess and optimize software testing processes by analyzing test coverage, automation strategies, and regression testing to ensure effective software validation and verification.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	COMPUTER VISION		After studying this course, students will be able to: • Explain the foundational concepts of computer vision, demonstrating comprehension of image processing, feature extraction, and object recognition techniques.

		• Apply computer vision techniques to analyze and interpret visual data, showcasing practical skills in tasks such as image segmentation, object tracking, and facial recognition. • Critically assess and optimize computer vision models by analyzing accuracy, robustness, and computational efficiency, making informed decisions to improve the quality and reliability of visual analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	ADVANCED COMPUTER ARCHITECTURE	After studying this course, students will be able to: • Explain the advanced concepts of computer architecture, demonstrating comprehension of pipelining, memory hierarchy, and parallel processing techniques. • Apply advanced computer architecture principles to design and analyze high-performance computing systems, showcasing practical skills in optimizing instruction pipelines and memory access patterns. • Critically evaluate and optimize computer architectures by analyzing trade-offs in performance, power consumption, and scalability, making informed decisions to enhance the efficiency and effectiveness of computing systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	SERVICE ORIENTED ARCHITECTURE	After studying this course, students will be able to: • Understand the fundamental principles of service-oriented architecture (SOA) by explaining

		its key concepts, components, and benefits. • Apply service-oriented architecture principles to design and develop modular and interoperable software systems using web services. • Critically analyze and optimize service-oriented architectures by evaluating service composition, orchestration, and security considerations for efficient and reliable distributed systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	DISTRIBUTED COMPUTING SYSTEMS	After studying this course, students will be able to: • Explain the fundamental concepts of distributed computing systems by demonstrating comprehension of distributed architecture, communication protocols, and synchronization mechanisms. • Apply distributed computing techniques to design and implement scalable and fault-tolerant systems, showcasing practical skills in distributed algorithms and data consistency. • Critically assess and optimize distributed computing solutions by analyzing performance bottlenecks, load balancing strategies, and fault recovery mechanisms to achieve efficient and reliable distributed systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	CYBER LAWS AND DATA PRIVACY	After studying this course, students will be able to: • Understand the fundamental principles of cyber laws and data privacy by explaining legal frameworks, regulations, and ethical considerations.

		• Apply knowledge of cyber laws and data privacy regulations to analyze and address legal challenges in digital environments. • Critically assess and recommend strategies for safeguarding data privacy and complying with cyber laws, considering global perspectives and emerging legal issues.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	DATA VISUALIZATION USING R, PYTHON AND WATSON STUDIO	
VII	MAJOR PROJECT PHASE-1	Each student, under the guidance of a Faculty, is required to: • understand the scope and objectives of the major project, and be able to summarize the project's goals, requirements, and anticipated outcomes. • Plan and design the major project by outlining a comprehensive project proposal that includes project scope, objectives, methodologies, expected deliverables, and a preliminary timeline • Evaluate the feasibility of their proposed major project, considering factors such as available resources, potential challenges, and expected impact. They will justify their project proposal by demonstrating how it addresses a real-world problem and contributes to the field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	INTERNSHIP -3	After studying this course, students will be able to:

		• Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VII	PATENT FILING & IPR	After studying this course, students will be able to: • Understand the basic concepts of intellectual property rights (IPR) and patent filing, and be able to recall key terminology, legal frameworks, and the importance of protecting intellectual property. • Apply their knowledge of IPR to analyze real-world scenarios, identifying potential intellectual property assets, and determining suitable strategies for patent filing, trademark registration, or copyright protection. • Evaluate the benefits and challenges of different IPR strategies within specific industries or business contexts. They will demonstrate the ability to create a comprehensive intellectual property protection plan that aligns with business goals and ensures legal compliance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VIII	TECHNICAL SEMINAR	Each student, under the guidance of a Faculty, is required to: • understand the chosen technical topic and be able to summarize its key concepts, principles, and relevance within the context of the seminar. • analyze the topic by gathering and synthesizing relevant information from various sources. They will then present their findings in a coherent and engaging manner, highlighting the main points, challenges, and potential applications of the subject. • evaluate the strengths and limitations of the chosen technical topic. They will identify potential areas for further research, discuss potential implications, and engage in thoughtful discussions about the topic's broader impact.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VIII	MAJOR INTERNSHIP	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VIII	PROJECT WORK	Each student, under the guidance of a Faculty, is required to: • Understand the scope and objectives of the major project, and be able to summarize the project's goals, requirements, and anticipated outcomes. • Plan and design the major project by outlining a comprehensive project proposal that includes project scope, objectives, methodologies, expected deliverables, and a preliminary timeline • Evaluate the feasibility of their proposed major project, considering factors such as available resources, potential challenges, and expected impact. They will justify their project proposal by demonstrating how it addresses a real-world problem and contributes to the field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

PROGRAMME SPECIFIC OUTCOMES (PSO):

- PSO1: Programming and software development skills: Ability to employ modern computer languages, computing environments and standard practices for analysing, designing and developing optimal solutions to deliver quality software products.

- PSO2: Domain specific skills: Ability to apply techniques to develop computer-based solutions in various domains like Artificial Intelligence, Machine Learning, Network Engineering, Image Processing, Web Technologies, and Data Sciences.

COURSE OUTCOMES (CO):

Semester	Title	Course Outcomes
I	MATHEMATICAL FOUNDATION FOR ENGINEERS	After studying this course, students will be able to: • Understand the matrix theory for solving the system of linear equations. • Apply the knowledge of calculus to solve problems related to polar curves and modular arithmetic to computer algorithms. • Solve problems with modern mathematical tools namely SCILAB/PYTHON/MATLAB.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	APPLIED PHYSICS IN ENGINEERING	After studying this course, students will be able to:

		• Develop the knowledge of basic principles of physics and problem-solving skills. CO-2: Understand the principles, concepts, working and application of new technology CO-3: Apply the concept of superconductivity in engineering.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

I	PROGRAMMING FOR PROBLEM SOLVING – C	After studying this course, students will be able to: • To understand structural programming concepts like array handling and string manipulations • Develop programs and test a given logic. • Solve a problem into functions and to develop modular reusable code.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	ELECTRICAL AND ELECTRONIC ENGINEERING	After studying this course, students will be able to: • Understand concepts of electrical circuits and elements, Logic circuits and gates • Analyze simple circuits containing transistors. • Apply the inverting and non-inverting configuration of Op-Amp.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INFORMATION COMMUNICATION AND COMPUTING TECHNOLOGY	After studying this course, students will be able to: • Identify and classify different types of waste and assess their environmental impact. • Evaluate various waste treatment and disposal methods and select

		appropriate techniques for specific waste types. • Analyze and describe the 3D printing technologies, information storage technology and devices, quantum computers and supercomputers and also understand applications of cyber security.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO ELECTRIC VEHICLES	At the end of the course the student will be able to: • Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS • Analyse embedded system software and hardware requirements • Develop programming skills in embedded systems for various applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO EMBEDDED SYSTEM	At the end of the course the student will be able to: • Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS • Analyse embedded system software and hardware requirements. • Develop programming skills in embedded systems for various applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	INTRODUCTION TO CYBER SECURITY	At the end of the course the student will be able to: • Identify and assess potential cyber threats and vulnerabilities. • Implement security measures to safeguard information and systems. • Develop strategies to address evolving cyber security challenges effectively.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	BASICS OF ARDUINO PROGRAMMING	At the end of the course the student will be able to: • Demonstrate a comprehensive understanding of Arduino programming fundamentals, including variables, loops, and functions. • Integrate various sensors and actuators with Arduino to build interactive projects. • Design and implement Arduino-based embedded systems for practical applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	TECHNICAL SKILLS IN ENGLISH	After studying this course, students will be able to: • To understand English language appropriately in real-life situations • To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, Writing. • To apply the technicalities of communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	ENVIRONMENTAL STUDIES	After studying this course, students will be able to: • To gain the knowledge of causes and control measures of Air Pollution & Automobile Pollution • To understand the activities of Pollution Control Boards, including industrial regulations • To solve and manage Solid Waste, E-Waste, Biomedical Waste, and Smart Technologies for the circular economy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

I	KANNADA KALI –I	
I	SANSKRIT - I	
II	COMPUTATIONAL TECHNIQUES	After studying this course, students will be able to: • Develop the knowledge of probability distribution of discrete, continuous random variables • Understand the scope and necessity of numerical techniques and probability distribution. • Apply the knowledge of solution of algebraic and transcendental equations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	FOUNDATIONS OF INTERNET AND WEB TECHNOLOGY	• To develop the knowledge of fundamentals of HTML, CSS and JavaScript. • To understand the Document Object Model and enable them

		• To create dynamic web pages that react to user input	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	PYTHON FOR COMPUTATIONAL PROBLEM SOLVING	After studying this course, students will be able to: • Develop the knowledge of programs for string processing and file organization • Demonstrate proficiency in handling loops and creation of functions. • Identify the methods to create and manipulate lists, tuples, and dictionaries.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	FUNDAMENTALS OF PROCESS AUTOMATION	After studying this course, students will be able to: • To develop the knowledge of basic concepts of Internet of Things • Understand the concept of IoT in comparison with Mobile-to-Mobile framework. • Demonstrate devices like sensors and endpoints.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	RENEWABLE ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT	After studying this course, students will be able to: • To Understand the Need, importance and scope of non-conventional and alternate energy resources. • To understand role significance of solar energy, wind energy, and ocean energy.

		• To utilization of Biogas plants and geothermal energy and understand the concept of energy Conservation.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	OPERATION AND MAINTENANCE OF SOLAR ELECTRIC SYSTEMS	After studying this course, students will be able to: • Evaluate and design solar electric systems, considering energy requirements and site-specific factors. • Safely operate, maintain, and troubleshoot solar electric systems, ensuring optimal performance. • Implement necessary repairs, upgrades, and life extension measures to prolong the life of solar systems and minimize waste.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	WASTE MANAGEMENT	After studying this course, students will be able to: • Describe recent trends in the computation technologies. • Evaluate various waste treatment and disposal methods and select appropriate techniques for specific waste types. • Analyze and propose sustainable waste management strategies integrating the principles of the circular economy and extended producer responsibility.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	EMERGING APPLICATIONS OF BIOTECHNOLOGY	After studying this course, students will be able to: • Explain the principles and applications of biotechnology in medicine, agriculture, industry, and environmental conservation. • Critically evaluating the potential benefits and risks associated with the use of biotechnological advancements in various fields.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓

II	INTRODUCTION TO DRONE TECHNOLOGY	After studying this course, students will be able to: • Explain the different types of drones and their applications in various industries. • Identify the key components of drones and comprehend their functionalities. • Apply drone technology in practical scenarios to address real-world challenges.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	COMMUNICATION SKILLS IN ENGLISH	• To communicate effectively and appropriately in real-life situations. • To understand English for study purpose across the curriculum. • To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, Writing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	CONSTITUTION OF INDIA	• To gain the knowledge about Indian constitution. • To understand the fundamental rights and duties listed in Indian constitution.

		• To identify individual role and ethical responsibility towards society.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

II	SAMSKRUTHIKA KANNADA – II	
II	SANSKRIT - II	
III	DISCRETE MATHEMATICS AND GRAPH THEORY	• Understand and apply the principles of propositional and predicate logic • Analyze proficiency in performing calculations involving integers, including prime factorization, modular arithmetic • Apply partitioning techniques and generating functions to solve combinatorial problems and analyze the complexity of algorithms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	DATA STRUCTURES - 1	After studying this course, students will be able to: • Understand the types of data structures, operations, and algorithms and apply searching and sorting operations on files. • Analyze the computational complexity of different algorithms using asymptotic analysis. • Apply the greedy paradigm and dynamic programming and explain when an algorithmic design situation calls for it.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓

CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	OOP USING JAVA	At the end of the course, the student will be able to: • Understand the object-oriented concepts and JAVA. • Develop computer programs to solve real world problems in Java. • Apply simple GUI interfaces for a computer program to interact with users and understand the event-based GUI handling principles using Applets and swings.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	MICROPROCESSORS AND MICROCONTROLLERS	After studying this course, students will be able to: • Design and implement interfacing of peripheral with microprocessor and microcontroller • Analyze, comprehend, design and simulate microprocessor-based systems used for control and monitoring. • Ability to analyze, comprehend, design and simulate microcontroller-based systems used for control and monitoring, appreciate advanced architecture evolving microprocessor field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	DATA COMMUNICATIONS	After Learning this Course, Students will be able to: • Understand basic Data Communication Technology and

		Network Types & Topologies. • Analyze the different Network Models and Transmission Media. • Apply the different Multiplexing and Switching Techniques. Error Detection and Correction Techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	IT INFRASTRUCTURE AND MANAGEMENT	After studying this course, students will be able to: • CO-1: Understand the Infrastructure of IT Building blocks. • Analyze the compute and Storage blocks & storage security • Apply concepts to demonstrate the Server & Network virtualization

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	BUSINESS PROCESS FUNDAMENTALS	After studying this course, students will be able to: • Understand and suggest improvements that will benefit organizational performance. • Analyze, implement and integration strategy for processes that leverages organizational and technical capabilities of an organization. • To apply and improve Business Processes in organizations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	SUPPLY CHAIN MANAGEMENT	After studying this course, students will be able to: • Understand about SCM and basics of Reverse & Agile

		supply chain • Analyze Mathematical modeling of Supply Chain. • Apply information system in supply chain.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	UNIX AND SHELL PROGRAMMING	After studying this course, students will be able to: • Explain Unix Architecture, File system, and use of basic commands • Analyze the Shell Programming constructs, process fundamentals • Apply the concepts and writing the shell scripts

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	BUSINESS INTELLIGENCE USING IBM COGNOS	This subject will be handled by IBM Skills Academy
III	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -1 (ESEP-1)	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III	INTERNSHIP -1	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	BLOCK CHAIN TECHNOLOGY	On completion of this course, students will be able to: • Demonstrate understanding of blockchain fundamentals by explaining key concepts, distributed ledger technology, and consensus mechanisms. • Apply blockchain technology skills to design, develop, and deploy decentralized applications (DApps), showcasing practical proficiency in smart contract development. • Critically assess and optimize blockchain solutions by analyzing security, scalability, and interoperability considerations, making informed decisions to enhance the effectiveness and adoption of

		blockchain technology.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DATABASE MANAGEMENT SYSTEMS	After studying this course, students will be able to: • Understand the fundamental concepts of database management systems by explaining relational data models, SQL, and normalization. • Apply database management techniques to design, query, and manage databases, showcasing practical skills in data modeling, database creation, and data manipulation. • Critically assess and optimize database solutions by analyzing performance, indexing, and transaction management to ensure efficient and reliable data storage and retrieval.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	COMPUTER NETWORKS	After studying this course, students will be able to: • Understand the fundamental concepts of computer networks by explaining network architectures, protocols, and communication models. • Apply computer networking principles to design, configure, and troubleshoot network setups, showcasing practical skills in network configuration and troubleshooting. • Critically assess and optimize computer networks by analyzing network performance, security measures, and scalability considerations to ensure efficient and reliable data communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DESIGN AND ANALYSIS OF ALGORITHMS	After studying this course, students will be able to: • Understand the fundamental concepts of algorithm design and analysis by explaining algorithm complexity, recurrence relations, and algorithmic paradigms. • Apply algorithm design techniques to solve computational problems, showcasing practical skills in designing efficient algorithms and analyzing their correctness. • Critically assess and optimize algorithmic solutions by analyzing time and space complexity, evaluating trade-offs, and implementing advanced data structures to achieve effective problem-solving outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	SOFTWARE ENGINEERING	After studying this course, students will be able to: • Understand the fundamental concepts of software engineering by explaining software development life cycle, requirements engineering, and software process models. • Apply software engineering principles to design, develop, and test software systems, showcasing practical skills in requirements analysis, design patterns, and testing techniques. • Critically assess and optimize software engineering processes by analyzing project management, quality assurance, and software maintenance considerations to ensure effective and reliable software

			development outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	COMPUTER ORGANIZATION	After studying this course, students will be able to: • Understand the fundamental concepts of computer organization by explaining CPU architecture, memory hierarchy, and input/output systems. • Apply computer organization principles to design and analyze digital circuits, showcasing practical skills in logic design and assembly language programming. • Critically assess and optimize computer organization solutions by analyzing performance bottlenecks, instruction pipelines, and memory access patterns to achieve efficient and effective hardware-software interactions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	DATA ANALYTICS USING R PROGRAMMING	After studying this course, students will be able to: • Understand the fundamental concepts of data analytics using R programming by explaining data manipulation, visualization, and basic statistical analysis. • Apply R programming techniques to perform data analysis and visualization, showcasing practical skills in data cleaning, exploratory data analysis, and statistical modeling. • Critically evaluate and communicate data-driven insights using R by analyzing patterns, drawing conclusions, and effectively visualizing results to support informed

		decision-making.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	UNIFIED MODELING LANGUAGE	After studying this course, students will be able to: • Understand the fundamental concepts of Unified Modeling Language (UML) by explaining diagram types, modeling elements, and notation. • Apply UML techniques to model and document software systems, showcasing practical skills in creating use case diagrams, class diagrams, and sequence diagrams. • Critically assess and optimize UML models by analyzing modeling choices, diagram consistency, and modeling tool features to ensure clear and effective representation of software systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	UNIX SYSTEM PROGRAMMING	After studying this course, students will be able to: • Explain the foundational concepts of Unix shell programming, demonstrating comprehension of shell commands, scripting, and utilities. • Apply Unix shell programming skills to automate tasks, write shell scripts, and perform system administration tasks, showcasing practical proficiency in shell scripting. • Critically evaluate and optimize shell scripts by analyzing code efficiency, error handling, and script portability, making informed decisions to enhance automation and system management.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	INTRODUCTION TO BIG DATA, HADOOP & ECOSYSTEM	This subject will be handled by IBM Skills Academy
IV	MINI PROJECT-1	After studying this course, students will be able to: • Apply programming skills and software development methodologies to design, implement, and test a functional application that addresses a specific Problem/Scenario. • Analyze the requirements of the mini-project, break down complex problems into smaller components, and make informed design decisions to ensure efficiency and usability. • Evaluate the effectiveness of their Application in meeting user needs and solving the targeted problem. They will also critically assess the strengths and limitations of their solution and propose potential areas for enhancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -2	On completion of this course, students are able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability

		• Learn domain specific knowledge • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	OPERATING SYSTEMS	After studying this course, students will be able to: • Understand the foundational concepts of operating systems by explaining process management, memory management, and file system organization. • Apply operating system principles to design and implement efficient process scheduling, memory allocation, and I/O management strategies. • Critically evaluate and optimize operating system performance by analyzing resource utilization, concurrency control, and security mechanisms for achieving efficient and reliable system operation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	ADVANCED JAVA AND J2EE	After studying this course, students will be able to: • Understand the advanced concepts of Java and J2EE technologies by explaining frameworks, design patterns, and enterprise application architecture. • Apply advanced Java and J2EE skills to design and develop enterprise-level applications, showcasing practical proficiency in using frameworks like Spring

		and Hibernate. • Critically assess and optimize Java and J2EE applications by analyzing performance, scalability, and security considerations to achieve robust and efficient enterprise software solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	DATA STRUCTURES - 2	After studying this course, students will be able to: • Understand the basic principles and operations of data structures. • Apply Hashing, Disjoint sets, String Matching techniques, advanced Trees and Graphs for solving problems effectively. • Analyze the given scenario and choose appropriate Data Structure for solving problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	FUNDAMENTALS OF AI & ML	After studying this course, students will be able to: • CO-1: Understand the fundamental concepts of artificial intelligence and machine learning by explaining key principles, algorithms, and applications. • CO-2: Apply artificial intelligence and machine learning techniques to solve problems, showcasing practical skills in data preprocessing, model training, and evaluation. • CO-3: Critically evaluate and optimize artificial intelligence and machine learning models by analyzing model performance, hyper parameters, and interpretability to achieve effective and accurate predictions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	NETWORK AND INFORMATION SECURITY	After studying this course, students will be able to: • Understand the fundamental concepts of network and information security by explaining security principles, threats, and vulnerabilities. • Apply network and information security techniques to design and implement secure network architectures and protocols. • Critically assess and optimize network and information security measures by analyzing risk management, cryptography, and access controls to ensure comprehensive and effective protection of digital assets.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	SOFTWARE PROJECT MANAGEMENT	After studying this course, students will be able to: At the end of the course, the students should be able to: • Understand the fundamental principles of software project management by explaining project lifecycle, planning, and risk management. • Apply software project management techniques to plan, execute, and monitor software development projects, showcasing practical skills in resource allocation and scheduling. • Critically evaluate and optimize software project management processes by analyzing project progress, stakeholder communication, and change management to ensure successful project delivery.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	INTRODUCTION TO DATA SCIENCE	After studying this course, students will be able to: • Understand the fundamental concepts of data science by explaining data manipulation, visualization, and basic statistical analysis. • Apply data science techniques to explore and analyze datasets, showcasing practical skills in data cleaning, visualization, and basic modeling. • Critically assess and communicate data-driven insights by analyzing patterns, drawing conclusions, and effectively visualizing results to support informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	STATISTICAL PROGRAMMING WITH R	After studying this course, students will be able to: • Understand the fundamental principles of statistical programming using R by explaining data manipulation, visualization, and basic statistical analysis. • Apply R programming techniques to perform data analysis and visualization, showcasing practical skills in data manipulation, exploratory data analysis, and basic statistical modeling. • Critically evaluate and communicate statistical insights using R by analyzing data, interpreting statistical results, and effectively visualizing findings to support informed decision making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	PRINCIPLES OF USER INTERFACE DESIGN	After studying this course, students will be able to: • Understand the fundamental principles of user interface design by explaining usability, usercentered design, and design guidelines. • Apply user interface design principles to create user-friendly and intuitive interfaces, showcasing practical skills in information architecture and interaction design. • Critically assess and optimize user interfaces by analyzing user feedback, usability testing, and accessibility considerations to ensure effective and engaging user experiences.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	IBM CE - PREDICTIVE MODELLING USING SPSS	This subject will be handled by IBM Skills Academy
V	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -	On completion of this course, students are able to: ● Understand the basic concepts of QUANTITATIVE ABILITY ● Understand the basic concepts of LOGICAL REASONING Skills ● Acquire satisfactory competency in use of VERBAL REASONING ● Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability ● Learn domain specific knowledge ● Compete in various competitive exams like

		CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓				✓			✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

V	INTERNSHIP -2	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	ADVANCED WEB TECHNOLOGY	After studying this course, students will be able to: • Recognize and summarize the fundamental concepts and components of advanced web technologies. • Construct novel web applications that incorporate advanced technologies covered in the course, demonstrating the ability to transfer knowledge to real-world situations. • Analyze and evaluate the suitability of various web

		technologies for specific project needs, leading to informed decision-making and the ability to defend their choices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	SYSTEM SOFTWARE AND COMPILER DESIGN	After studying this course, students will be able to: • Demonstrate an understanding of software and compiler design principles by explaining their foundational concepts. • Apply theoretical knowledge to practical scenarios by designing software systems and developing basic compilers for programming languages. • Analyze and optimize complex software systems, including compilers, through critical evaluation and informed decision-making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTERNET OF THINGS	After studying this course, students will be able to: • Demonstrate an understanding of IoT concepts and protocols by explaining their principles and functionalities. • Design and develop IoT solutions by applying knowledge of sensors, communication protocols, and data processing techniques. • Evaluate and strategize IoT architectures for specific use cases through critical analysis, considering security, scalability, and integration aspects.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓

CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	BUSINESS INTELLIGENCE	After studying this course, students will be able to: • Understand the fundamental concepts of business intelligence by explaining data warehousing, data mining, and reporting techniques. • Apply business intelligence techniques to analyze and visualize data, showcasing practical skills in data extraction, transformation, and loading (ETL) processes. • Critically assess and optimize business intelligence solutions by analyzing data quality, dashboard design, and decision support systems to enhance informed decision-making within organizations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTRODUCTION TO BUSINESS MANAGEMENT	After studying this course, students will be able to: • Remember and list fundamental business management concepts, theories, and key terminology covered in the course. • Apply their understanding of business management principles to analyze case studies and develop effective strategies for addressing real-world business challenges. • Evaluate different management approaches, comparing their strengths and weaknesses in various business contexts, and recommend suitable strategies for optimizing business outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	INTRODUCTION TO ENTREPRENEURSHIP	After studying this course, students will be able to: • Remember and list essential entrepreneurship concepts, terminology, and the characteristics of successful entrepreneurs discussed in the course. • Understanding of the key principles of entrepreneurship by explaining the process of identifying opportunities, assessing risks, and creating value in the market. • Analyze real-life entrepreneurial ventures, critically evaluating the factors that contributed to success or failure, and identifying the strategies that were effectively employed.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	OPERATIONS RESEARCH	After studying this course, students will be able to: • Remember and list the fundamental concepts, methodologies, and terminologies used in operations research, as presented during the course. • Apply operations research techniques to model and solve complex real-world optimization problems, demonstrating their ability to choose appropriate methods and interpret the results. • Evaluate the strengths and limitations of different operations research techniques, comparing their applicability to various problem scenarios and proposing improvements or alternative approaches.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	TOTAL QUALITY MANAGEMENT	After studying this course, students will be able to: • Remember and list the fundamental principles, concepts, and key terminology related to total quality management as covered in the course. • Apply total quality management tools and techniques to analyze and improve processes within organizations, demonstrating their ability to identify areas for improvement and implement quality initiatives. • Evaluate the effectiveness of different quality management strategies in various • organizational contexts, comparing their impacts on performance, customer satisfaction, and overall success

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DATA WAREHOUSE AND DATA MINING	After studying this course, students will be able to: • Explain the fundamental concepts of data warehousing and data mining, demonstrating comprehension of their underlying principles. • Apply data warehousing and data mining techniques to analyze and interpret complex datasets, showcasing practical application of knowledge. • Critically evaluate and optimize data mining processes and strategies, making informed decisions to enhance insights and

			outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DEEP LEARNING TECHNIQUES	After studying this course, students will be able to: • Demonstrate an understanding of foundational concepts in deep learning by explaining key principles and methodologies. • Apply deep learning techniques to solve complex problems by designing and implementing neural network models for various tasks. • Analyze and optimize deep learning models through critical assessment of architecture choices, hyperparameters, and training strategies to achieve advanced performance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	ARTIFICIAL NEURAL NETWORKS	After studying this course, students will be able to: • Explain the fundamental principles of artificial neural networks, showcasing comprehension of their basic components and functioning. • Apply artificial neural network architectures to solve diverse problems, demonstrating the ability to design and train networks for various tasks. • Critically assess and optimize artificial neural network performance by analyzing activation functions, network topologies, and training algorithms to achieve advanced outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓

CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DIGITAL IMAGE PROCESSING	After studying this course, students will be able to: • Demonstrate understanding of the foundational concepts of digital image processing by explaining key techniques and terminology. • Apply digital image processing methods to analyze and enhance images, showcasing practical skills in image manipulation and restoration. • Critically evaluate and optimize digital image processing algorithms by analyzing their effectiveness, exploring advanced techniques, and making informed decisions to achieve desired visual outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	DESIGNING EMBEDDED SYSTEMS	After studying this course, students will be able to: • Demonstrate an understanding of embedded systems design principles by explaining fundamental concepts and components. • Apply embedded systems design methodologies to develop functional and efficient systems, showcasing practical skills in hardware-software integration. • Critically assess and optimize embedded systems performance by analyzing resource constraints, communication protocols, and power consumption for achieving optimal system design.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	MICROSERVICES ARCHITECTURE & IMPLEMENTATION	This subject will be handled by IBM Skills Academy

VI	MINI PROJECT-2	After studying this course, students will be able to: • Apply programming skills and software development methodologies to design, implement, and test a functional application that addresses a specific Problem/Scenario. • Analyze the requirements of the mini-project, break down complex problems into smaller components, and make informed design decisions to ensure efficiency and usability. • Evaluate the effectiveness of their Application in meeting user needs and solving the targeted problem. They will also critically assess the strengths and limitations of their solution and propose potential areas for enhancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VI	EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME -4	After studying this course, students will be able to: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VI	SELF-MOTIVATED PROGRAMME	On completion of this course, students are able to: • Improve learnability • Acquire additional knowledge in the field of study

		• Develop the skill • Industry ready • Have more confidence level

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓
CO4	✓			✓		✓	✓					✓
CO5	✓		✓	✓		✓		✓		✓	✓	

VII	CLOUD COMPUTING	After studying this course, students will be able to: • Demonstrate an understanding of cloud computing fundamentals by explaining key concepts, service models, and deployment models. • Apply cloud computing skills to design, deploy, and manage applications in cloud environments, showcasing practical proficiency in utilizing cloud services. • Critically assess and optimize cloud-based solutions by analyzing scalability, security, and cost considerations, making informed decisions to maximize the benefits of cloud computing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	ADVANCED DBMS & NOSQL DATABASES	After studying this course, students will be able to: • Remember and list the advanced concepts, data models, and terminology related to relational databases and NoSQL databases as covered in the course. • Apply their knowledge of advanced database concepts to design, implement, and optimize complex database solutions, demonstrating their ability to choose appropriate database technologies and structures. • Evaluate the strengths and limitations of relational databases and NoSQL databases in various application scenarios, comparing

			their performance, scalability, and suitability for different types of data and workloads.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	BIG DATA ANALYTICS	After studying this course, students will be able to: • Explain the foundational concepts of big data analytics, demonstrating comprehension of data volume, variety, velocity, and veracity challenges. • Apply big data analytics techniques to process, analyze, and extract insights from large and complex datasets, showcasing practical skills in data manipulation and analysis. • Critically evaluate and optimize big data analytics processes by analyzing data preprocessing, algorithm selection, and scalability considerations to achieve meaningful and actionable insights.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	PROMPT ENGINEERING FOR CHATGPT	After studying this course, students will be able to: • Demonstrate an understanding of prompt engineering principles and apply them effectively in real-world applications, showcasing a foundational level of expertise. • Analyze advanced prompt engineering techniques, evaluate their applications, and create practical solutions, showcasing critical thinking and creative problem-solving skills. • Evaluate ethical challenges in prompt engineering, apply ethical design principles, and propose responsible AI solutions, demonstrating ethical reasoning and

		practical application in AI development

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	NATURAL LANGUAGE PROCESSING	After studying this course, students will be able to: • Explain the fundamental concepts of natural language processing (NLP), demonstrating comprehension of text processing, linguistic analysis, and NLP applications. • Apply NLP techniques to process and analyze textual data, showcasing practical skills in tasks such as sentiment analysis, named entity recognition, and text classification. • Critically evaluate and optimize NLP models by analyzing performance metrics, feature engineering, and language model selection, making informed decisions to enhance the quality of NLP solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	SOFT COMPUTING	After studying this course, students will be able to: • Demonstrate understanding of soft computing principles by explaining key concepts of fuzzy logic, neural networks, and evolutionary algorithms. • Apply soft computing techniques to solve complex problems, showcasing practical skills in designing and implementing fuzzy systems, neural networks, and genetic algorithms. • Critically assess and optimize soft computing solutions by analyzing algorithm parameters, rule bases, and training strategies, making informed decisions to achieve advanced

			problem-solving outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	COMPUTER GRAPHICS AND VISUALIZATION	After studying this course, students will be able to: • Explain the fundamental concepts of computer graphics and visualization, demonstrating comprehension of graphics rendering, modeling, and visualization techniques. • Apply computer graphics and visualization skills to create and manipulate visual content, showcasing practical proficiency in 2D and 3D graphics rendering and animation. • Critically assess and optimize visualizations by analyzing data representation, visualization techniques, and user interaction, making informed decisions to enhance the clarity and effectiveness of visual communication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	SOCIAL AND WEB ANALYTICS	After studying this course, students will be able to: • Understand the foundational concepts of social and web analytics by explaining data collection methods, metrics, and tools. • Apply social and web analytics techniques to analyze and interpret online user behavior and engagement patterns. • Critically assess and optimize social and web analytics strategies by analyzing insights, refining metrics, and making informed decisions to enhance digital marketing and user experience.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	WIRELESS SENSOR NETWORKS AND MOBILE COMPUTING	After studying this course, students will be able to: • Understand the foundational principles of wireless sensor networks and mobile computing by explaining network protocols, energy management, and mobility issues. • Apply wireless sensor network and mobile computing concepts to design and deploy efficient and reliable communication systems. • Critically analyze and optimize wireless sensor networks and mobile computing solutions by evaluating network performance, energy efficiency, and security considerations for effective data transmission and mobility support

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	SOFTWARE TESTING	After studying this course, students will be able to: • Understand the fundamental principles of software testing by explaining testing methodologies, techniques, and testing levels. • Apply software testing techniques to design and execute test cases, showcasing practical skills in identifying defects and ensuring software quality. • Critically assess and optimize software testing processes by analyzing test coverage, automation strategies, and regression testing to ensure effective software validation and verification.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓

CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	COMPUTER VISION	After studying this course, students will be able to: • Explain the foundational concepts of computer vision, demonstrating comprehension of image processing, feature extraction, and object recognition techniques. • Apply computer vision techniques to analyze and interpret visual data, showcasing practical skills in tasks such as image segmentation, object tracking, and facial recognition. • Critically assess and optimize computer vision models by analyzing accuracy, robustness, and computational efficiency, making informed decisions to improve the quality and reliability of visual analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	ADVANCED COMPUTER ARCHITECTURE	After studying this course, students will be able to: • Explain the advanced concepts of computer architecture, demonstrating comprehension of pipelining, memory hierarchy, and parallel processing techniques. • Apply advanced computer architecture principles to design and analyze high-performance computing systems, showcasing practical skills in optimizing instruction pipelines and memory access patterns. • Critically evaluate and optimize computer architectures by analyzing trade-offs in performance, power consumption, and scalability, making informed decisions to enhance the efficiency and effectiveness of computing systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	SERVICE ORIENTED ARCHITECTURE	After studying this course, students will be able to: • Understand the fundamental principles of service-oriented architecture (SOA) by explaining its key concepts, components, and benefits. • Apply service-oriented architecture principles to design and develop modular and interoperable software systems using web services. • Critically analyze and optimize service-oriented architectures by evaluating service composition, orchestration, and security considerations for efficient and reliable distributed systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	DISTRIBUTED COMPUTING SYSTEMS	After studying this course, students will be able to: • Explain the fundamental concepts of distributed computing systems by demonstrating comprehension of distributed architecture, communication protocols, and synchronization mechanisms. • Apply distributed computing techniques to design and implement scalable and fault-tolerant systems, showcasing practical skills in distributed algorithms and data consistency. • Critically assess and optimize distributed computing solutions by analyzing performance bottlenecks, load balancing strategies, and fault recovery mechanisms to achieve efficient and reliable distributed systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	CYBER LAWS AND DATA PRIVACY	After studying this course, students will be able to: • Understand the fundamental principles of cyber laws and data privacy by explaining legal frameworks, regulations, and ethical considerations. • Apply knowledge of cyber laws and data privacy regulations to analyze and address legal challenges in digital environments. • Critically assess and recommend strategies for safeguarding data privacy and complying with cyber laws, considering global perspectives and emerging legal issues.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	RDBMS MYSQL,NOSQL AND MONGODB	This subject will be handled by IBM Skills Academy
VII	MAJOR PROJECT PHASE-1	Each student, under the guidance of a faculty, is required to: • Understand the scope and objectives of the major project, and be able to summarize the project's goals, requirements, and anticipated outcomes. • Plan and design the major project by outlining a comprehensive project proposal that includes project scope, objectives, methodologies, expected deliverables, and a preliminary timeline • Evaluate the feasibility of their proposed major project, considering factors such as available resources, potential challenges, and expected impact. They will justify their project proposal by demonstrating how it

		addresses a real-world problem and contributes to the field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	INTERNSHIP -3	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VII	PATENT FILING & IPR	After studying this course, students will be able to: • Understand the basic concepts of intellectual property rights (IPR) and patent filing, and be able to recall key terminology, legal frameworks, and the importance of protecting intellectual property. • Apply their knowledge of IPR to analyze real-world scenarios, identifying potential intellectual property assets, and determining suitable strategies for patent filing, trademark registration, or copyright protection. • Evaluate the benefits and challenges of different IPR strategies within specific industries or business contexts. They will demonstrate the ability to create a comprehensive intellectual

		property protection plan that aligns with business goals and ensures legal compliance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VIII	TECHNICAL SEMINAR	Each student, under the guidance of a faculty, is required to: • Understand the chosen technical topic and be able to summarize its key concepts, principles, and relevance within the context of the seminar. • Analyze the topic by gathering and synthesizing relevant information from various sources. They will then present their findings in a coherent and engaging manner, highlighting the main points, challenges, and potential applications of the subject. • Evaluate the strengths and limitations of the chosen technical topic. They will identify potential areas for further research, discuss potential implications, and engage in thoughtful discussions about the topic's broader impact.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VIII	MAJOR INTERNSHIP	After studying this course, students will be able to: • Remember and list the essential policies, procedures, and guidelines of the organization as presented during the orientation and training sessions. • Apply the knowledge gained from their coursework to real-world projects within the organization, effectively implementing the skills and techniques relevant to their field of study. • Critically assess their contributions to the organization's goals, evaluate the challenges faced during their internship, and propose recommendations for process

		improvements or innovative solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

VIII	PROJECT WORK	Each student, under the guidance of a faculty, is required to: • Understand the scope and objectives of the major project, and be able to summarize the project's goals, requirements, and anticipated outcomes. • Plan and design the major project by outlining a comprehensive project proposal that includes project scope, objectives, methodologies, expected deliverables, and a preliminary timeline • Evaluate the feasibility of their proposed major project, considering factors such as available resources, potential challenges, and expected impact. They will justify their project proposal by demonstrating how it addresses a real-world problem and contributes to the field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓		✓	✓	✓		✓
CO2	✓		✓	✓		✓					✓	✓
CO3	✓	✓		✓	✓		✓	✓	✓			✓

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