

2.6.1. Teachers and students are aware of the stated Programme and course outcomes of the Programmes offered by the institution.

Head of the department and teachers discussed POs and framed PEOs & PSOs of their program considering the Vision and Mission of the department.

Every course has its own learning outcomes defined by the university in the curriculum and adopted by the institute. Course Outcomes which are not defined in the syllabus of the university are prepared by the respective subject teacher along with domain experts as per of objectives mentioned in the university syllabus.


The Program outcomes and Course outcomes of the department are disseminated to internal and external stakeholders through the following ways:

- **HOD cabins**
- **Notice Boards**
- **Department Library**
- **Department Laboratories**
- **Course File**

The course planner of each subject is prepared according to the program outcomes & course outcomes. The learning outcomes of each subject are also informed to the students by the teachers at the beginning of every academic year during the introductory lecture of respective course and also during lecture delivery.

All newly admitted first year students and their parents are briefed about the institute's vision, mission and program objectives in the Induction Programme.




Principal
Indira College of Engineering & Management
Parandwadi Pune-410506



INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT
Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University

MECH-SW

ACADEMIC YEAR 2023-24

COURSE OUTCOMES

SE(MECHANICAL SANDWICH)(2019 pat)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
SE (SEM-III, TERM-I)	207002	Engineering Mathematics - III	207002.1	Solve higher order linear differential equations and apply to Mechanical engineering problems such as mechanical vibrations and heat transfer.
			207002.2	Integral Transform techniques such as laplace transform, Fourier transform
			207002.3	Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management.
			207002.4	Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
			207002.5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
	202043	Thermodynamics*	202043.1	Apply various laws of thermodynamics to various processes and real systems.
			202043.2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
			202043.3	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
			202043.4	Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
			202043.5	Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
			202043.6	Use Psychrometric charts and estimate various essential properties related to Psychrometry and processes
	202051	Strength of Materials*	202051.1	Apply Knowledge of Mathematics science for Engineering applications
			202051.2	Design and conduct experiments, as well to analyse interpret data
			202051.3	Design a component to meet desired needs within realistic constraints of health and safety
			202051.4	Identify formulate and solve engineering problems
			202051.5	Practice professional and ethical responsibility
			202051.6	Use the techniques, skills, and modern engineering tools necessary for engineering practice
	202061	Material Science and Metallurgy	202061.1	Understanding basic concepts and properties of Material Science
			202061.2	Understanding mechanical behavior of materials and their testing and estimate properties of materials
			202061.3	knowledge in various classes of materials, their properties, compositions and applications
			202061.4	Understanding various heat treatments suitable for ferrous and non ferrous materials
			202061.5	Understanding various processes of Powder Metallurgy techniques its application and various non ferrous materials
			202061.6	understanding various polymers composites and ceramics, their properties, application and structure
	202062	Fluid Mechanics and Machinery	202062.1	Understand and apply various fluid properties and hydrostatic concept to various geometry
			202062.2	Apply Bernoulli's principle to various flow system and concept of Fluid kinematics to find velocities and acceleration at any point in a flow field.
			202062.3	Estimate the major and minor losses through pipe and Velocity, shear stress distribution for laminar flow in a pipe
			202062.4	Apply thermodynamics and kinematics principles to turbo machines
			202062.5	Estimate and Analyze the performance of turbo machines
202062.6			Identify the components of a centrifugal pump and determine the operating performance characteristics of a centrifugal pump	
202055	Audit Course	202055.1	To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues.	
		202055.2	To pursue research and development in fire safety engineering, hazard management and disseminate its findings.	
		202055.3	To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner.	
		202055.4	To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation.	
202063	Thermal Engineering	202063.1	Understand the types of compressors, selection, work and related efficiencies	
		202063.2	To know different refrigeration systems and COP	
		202063.3	Conversant with gas turbines and Jet propulsion	
		202063.4	Understand all the IC Engine systems, layouts and its importance	
		202063.5	Able to understand methods to test the IC Engine	
		202063.6	Understand the concept of normal and abnormal combustion in engine and emission	
			202064.1	develop and evaluate measurement techniques



SE (SEM-IV, TERM-II)	202064	Metrology and Quality Control	202064.2	create awareness among the students regarding different gauges used in industries.
			202064.3	understand limits, fits and tolerances will aid them while assembling different parts to perform desired function developing interchangeability concept.
			202064.4	understand SQC tools will help the students in continual improvement process.
	202065	Manufacturing Engineering	202065.1	Understand various casting methods and suggest appropriate method pertaining to the application
			202065.2	Understand basics of metal forming processes, selection of equipments and tooling
			202065.3	Classify, describe and configure the principles of various welding techniques
			202065.4	Understanding mechanism of chip formation, differentiate between oblique and orthogonal cutting, estimate cutting forces in metal cutting
			202065.5	Demonstrate and configure the functions of milling, drilling and grinding machines and estimate machining time for various metal cutting operations
			202065.6	Identify characteristics of non-conventional machining processes, describe basic mechanisms and list-out applications
	202066	Computer Aided Machine Drawing	202066.1	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
			202066.2	Understand the significance of parametric technology and its application in 2D sketching.
			202066.3	Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling.
			202066.4	Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
			202066.5	Ability to ensure manufacturability and proper assembly of components and assemblies.
			202066.6	Ability to communicate between Design and Manufacturing using 2D drawings.
	202067	Soft Skills	202067.1	Improved communication, interaction and presentation of ideas.
			202067.2	Right attitudinal and behavioural change
			202067.3	Developed right-attitudinal and behavioral change
	202068	THEORY OF MACHINES	202068.1	Identify mechanisms in real life applications.
			202068.2	Perform kinematic analysis of simple mechanisms.
202068.3			Perform static and dynamic force analysis of slider crank mechanism.	
202068.4			Determine moment of inertia of rigid bodies experimentally.	
202068.5			Analyze velocity and acceleration of mechanisms by vector and graphical methods.	
203152	Electrical and Electronics Engineering	203152.1	Develop the capability to identify and select suitable DC motor / induction motor / special	
		203152.2	Program Arduino IDE using conditional statements	
		203152.3	Interfacing sensors with Arduino IDE	

TE(MECHANICAL SANDWICH)(2019 pat)

TE (SEM-V, TERM-I)	302041	Numerical and Statistical Methods	302041.1	SOLVE system of equations using direct and iterative numerical methods
			302041.2	ESTIMATE solutions for differential equations using numerical techniques
			302041.3	DEVELOP solution for engineering applications with numerical integration.
			302041.4	DESIGN and CREATE a model using a curve fitting and regression analysis.
			302041.5	APPLY statistical Technique for quantitative data analysis
	302042	Heat and Mass Transfer	302041.6	DEMONSTRATE the data, using the concepts of probability and linear algebra
			302042.1	ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
			302042.2	DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
			302042.3	EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results
			302042.4	INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
			302042.5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
	302043	Design of Machine Elements	302042.6	DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance
			302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading
			302043.2	DESIGN shafts, keys and couplings under static loading conditions.
			302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
			302043.4	EVALUATE dimensions of machine components under fluctuating loads.
			302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
	302044	Mechatronics	302043.6	APPLY the design and development procedure for different types of springs.
			302044.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.
			302044.2	UTILIZE concept of signal processing and MAKE use of Interfacing systems such as ADC, DAC, Digital I/O.
302044.3			DETERMINE the transfer function by using block diagram reduction technique.	
302044.4			EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system	
302044.5			APPLY the concept of different controller modes to an industrial application.	
302061	Fundamentals Computer Aided Engineering	302044.6	DEVELOP the ladder programming for industrial application	
		302061.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.	
		302061.2	APPLY the various meshing techniques for better evaluation of approximate results.	
			302061.3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.



		302061.4	Develop code for a component for CNC machines
		302061.5	Describe various methods of Automation and Robot Architecture
		302061.6	GENERATE the results in the form of contour plot by the USE of CAE tools.
302046	Digital Manufacturing Laboratory	302046.1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
		302046.2	ANALYZE cutting tool parameters for machining given job.
		302046.3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.
		302046.4	SELECT and DESIGN jigs and Fixtures for a given component.
		302046.5	DEMONSTRATE different parameters for CNC retrofitting and reconditioning.
302062	Mechanical Measurement Laboratory	302062.1	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement
		302062.2	ANALYZE the calibration process of dial gauge by using dial calibration tester.
		302062.3	EXAMINE surface Textures, surface finish using equipment like Talysurf and analyze surface finish requirements of metrological equipments like gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
		302062.4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time
		302062.5	IDENTIFY surface patterns/ flatness of given specimens by using optical flat.
		302062.6	COMPILE the information of opportunities of entrepreneurship/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.
302048	Audit Course V Entrepreneurship and IP strategy		
302063	Industrial In-plant Training-I	302063.1	To understand the industrial environment with better understanding of different industry attributes
		302063.2	To Understand industrial practices and technical details followed in industry.
		302063.3	To analyze and solve engineering problems by applying engineering knowledge with teamwork and multidisciplinary approach.
		302063.4	To work in professional organisations with all the professional ethics.
		302063.5	To handle the industrial assignments and projects with good confidence level and with better understanding of basic engineering concepts and principles.
		302063.6	Write and present technical reports / projects with effective presentation skills.
302064	Industrial Mini-Project	302064.1	To identify specific areas for improvement in industry with better understanding.
		302064.2	To develop and implement systematic approach to solve specific industrial problem.
		302064.3	To develop methodology for providing solution to industrial problems with teamwork and multidisciplinary approach
		302064.4	To understand and implement basic principles of project management.
		302064.5	To solve and analyze industrial problems.
302065	Seminar	302065.1	Read and understand recent trends and technologies in the area of mechanical engineering.
		302065.2	Recognize problems after doing research literature survey using various resources.
		302065.3	Prepare concise, comprehend and conclude selective topic in area of mechanical engineering
		302065.4	Effective presentation and discussion of research topics in a public forum
		302065.5	Make use of new and recent technology (e.g. Latex) for creating technical reports
		302067.1	Interpret and analyse Part print of an industrial component.
302067	Process Planning & Tool Selection	302067.2	Illustrate the meaning of geometric dimensions and understand the tolerance chart.
		302067.3	Understand Principles of location and clamping and Establish suitable manufacture sequence.
		302067.4	Select appropriate equipment and tooling requirements.
		302067.5	Estimate the total unit time per piece for a component in mass production.
		302067.6	Design of Process picture sheet and operation route sheet on GPM for batch production or a special purpose machine for mass production.
302068	Advanced Materials & Manufacturing (Self Study-II)	302068.1	DEFINE & COMPARE composites with traditional materials.
		302068.2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
		302068.3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
		302068.4	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications.
		302068.5	CLASSIFY various advanced welding processes and SELECT suitable welding processes for particular applications.
		302068.6	COMPREHEND various non-conventional machining processes and SELECT suitable processes for particular applications.
302056	Audit Course VI Business and Sustainable Development		

BE(Mechanical Sandwich)(2019)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOMES
			402061.1 life-long learning
			402061.2 Knack to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills.
	402061	Industrial In-plant Training - II	402061.3 Capability to acquire and apply fundamental principles of engineering.



BE(SEM-VII,TERM-I)	402062	Industrial Project	402061.4	approach.	
			402061.5	Awareness of the social, cultural, global and environmental responsibility as an engineer.	
			402061.6	Ability to communicate efficiently.	
	402063	Technical Paper Presentation	402062.1	Correlate and implement theory knowledge to solve specific industrial problems.	
			402062.2	Develop systematic approach to solve specific industrial problem.	
			402062.3	Competent to face industrial problems.	
	402064	Energy Engineering and Management	402063.1	DEVELOP self-learning skills	
			402063.2	IDENTIFY new trends in engineering research	
			402063.3	SUMMARIZE the understanding research in different areas of engineering	
	402065	Industrial Engineering and Organizational Management	402063.4	DEMONSTRATE communication and presentation skills	
			402064.1	ANALYZE working of thermal power plant and observe environmental impact of energy	
			402064.2	EXPLAIN layout, construction and working of hydel Energy and Nuclear Energy plants.	
	BE(SEM-VIII,TERM-II)	402066	Design of Transmission Elements	402064.3	EXPLAIN fundamental of Renewable Energy Systems.
				402064.4	EXPLAIN the energy need and role of Energy management.
				402064.5	CARRY OUT Audit of an organization/Industry.
402067		Machine Dynamics and Vibration	402064.6	ANALYZE the economics of power generation and EXPLAIN waste heat recovery systems.	
			402065.1	Understand Concept of Industrial engineering and its role in production management.	
			402065.2	Apply work study techniques and understands its importance for better productivity in	
402068		Artificial Intelligence in Mechanical Engineering	402065.3	Demonstrate the ability to select plant location, appropriate layout and material handling	
			402065.4	Use PPC tools for effective planning, scheduling and managing the shop floor control and	
			402065.5	Apply aspects of Process planning for process chart, ALB and group technology.	
402069A		Automobile Engineering	402065.6	Apply Ergonomics and legislations for human comfort at work place and understands the	
			402066.1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a	
			402066.2	EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design	
402069B		Refrigeration and Air-Conditioning	402066.3	SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue	
			402066.4	DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.	
			402066.5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications	
402069C	Fluid Power Control	402066.6	ELABORATE various modes of operation, degree of hybridization and allied terms associated		
		402067.1	APPLY balancing technique for static& dynamic balancing of rotating & reciprocating parts.		
		402067.2	ANALYZE the gyroscopic effect in mechanical systems.		
402045A	Product Design and Development	402067.3	ESTIMATE natural frequency for single DOF un-damped & damped free vibratory systems.		
		402067.4	DETERMINE response to forced vibrations due to harmonic excitation, base excitation and		
		402067.5	ESTIMATE natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and		
402045D	Operations Research	402067.6	DESCRIBE vibration measuring instruments for industrial / real life applications along with		
		402068.1	DEMONSTRATE fundamentals of artificial intelligence and machine learning.		
		402068.1	APPLY feature extraction and selection techniques.		
402045D.1	Operations Research	402068.1	APPLY machine learning algorithms for classification and regression problems.		
		402068.1	DEVISE AND DEVELOP a machine learning model using various steps.		
		402068.1	EXPLAIN concepts of reinforced and deep learning.		
402045D.2	Operations Research	402068.1	SIMULATE machine learning model in mechanical engineering problems.		
		402069A.1	Identify the different part and types of the automobile		
		402069A.2	Describe the systems and sub-systems of a typical automobile		
402045D.3	Operations Research	402069A.3	Apply analysis for selection of automobile sub systems		
		402069A.4	Understand and apply knowledge for selection of Automobile electrical systems.		
		402069A.5	Understand the environmental implications of automobile emissions and maintenance.		
402045D.4	Operations Research	402069A.6	To apply the knowledge of EVs, HEVs and Engine Management system		
		402069B.1	Illustrate the fundamental principles and applications of refrigeration and air conditioning		
		402069B.2	Evaluate the performance of vapor compression refrigeration systems.		
402045D.5	Operations Research	402069B.3	Identify refrigerant for the particular application considering all the properties of refrigerant.		
		402069B.4	Calculate cooling load for air conditioning systems used for various applications.		
		402069B.5	Operate and analyze the refrigeration and air conditioning systems.		
402045D.6	Operations Research	402069B.6	Develop air distribution duct system for air conditioning system.		
		402069C.1	DEFINE working principle of components used in hydraulic and pneumatic systems.		
		402069C.2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.		
402045D.7	Operations Research	402069C.3	SELECT an appropriate component required for hydraulic and pneumatic systems using		
		402069C.4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile		
		402069C.5	DESIGN a hydraulic and pneumatic system for the industrial applications.		
402045D.8	Operations Research	402069C.6	DESIGN & DEMONSTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.		
		402045A.1	UNDERSTAND Product design and Product development processes		
		402045A.2	UNDERSTAND Processes, tools and techniques for Market Survey & Product Specification Finalization		
402045D.9	Operations Research	402045A.3	UNDERSTAND Processes, tools and techniques for Concept Inception, Verification and selection		
		402045A.4	UNDERSTAND Processes, tools and techniques for Concept Exploration & Development		
		402045A.5	UNDERSTAND Processes, tools and techniques for Design Verification and Validation		
402045D.10	Operations Research	402045A.6	UNDERSTAND Processes, tools and techniques for Robust Design and Development		
		402045D.1	EVALUATE various situations of Games theory and Decision techniques and APPLY them to solve them in real life for decision making.		
		402045D.2	SELECT appropriate model for queuing situations and sequencing situations and FIND the optimal solutions using models for different situations.		
402045D.11	Operations Research	402045D.3	FORMULATE various management problems and SOLVE them using Linear programming using graphical method and simplex method.		
		402045D.4	FORMULATE variety of problems such as transportation, assignment, travelling salesman and SOLVE these problems using linear programming approach.		




		402045D.5	PLAN optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation.
		402045D.6	APPLY concepts of simulation and Dynamic programming
402051E	Electrical and Hybrid Vehicle	402051E.1	UNDERSTAND the basics related to e-vehicle
		402051E.2	CLASSIFY the different hybrid vehicles
		402051E.3	IDENTIFY and EVALUATE the Prime Movers, Energy Storage and Controllers
		402051E.4	DISCOVER and CATEGORIZE the Electric Vehicle Configuration with respect to Propulsion, Power distribution and Drive-Train Topologies
		402051E.5	DEVELOP body frame with appropriate suspension system&TESTING of for e-Vehicles
		402051E.6	CLASSIFY and EVALUATE Battery Charging techniques and management
402071	Systems Analysis Laboratory	402071.1	DEVELOP an understanding of the Systems Engineering Process and the range of factors that influence the product need, problem-specific information collection, Problem Definition, Task Specification, Solution Concept Inception, Concept Development, System's Mathematical Modelling, Synthesis, Analysis, final solution Selection, Simulation, Detailed Design, Construction, Prototyping, Testing, fault-finding, Diagnosis, Performance Analysis, and Evaluation, Maintenance, Modification, Validation, Planning, Production, Evaluation and use of a system using manual calculation, computational tools to automate product development process, redesign from customer feedback and control of technological systems.
		402071.2	ILLUSTRATE the concepts and USE the developed skill-set of use of computational tools (FEA, CFD, MBD, FSI, CAE) to automate the complete product development process.
		402071.3	EVALUATE the knowledge of new developments and innovations in technological systems to carry forward to next stage of employment after passing your Undergraduate Degree Examination.
		402071.4	APPRAISE how technologies have transformed people's lives and can be used to SOLVE challenges associated with climate change, efficient energy use, security, health, education and transport, which will be coming your ways in the coming future.
		402071.5	PRIORITIZE the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose.
		402071.6	INVENT yourself to face the challenges of future technologies and their associated Problems.



[Handwritten Signature]
Principal

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MBA

 INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University ACADEMIC YEAR 2023-24 COURSE OUTCOMES COURSE PATTERN 2019 (FY & 5Y)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
MBA Sem I(2019 Pattern)	101	Accounting for Business Decisions	CO1	To understand the basic concepts of financial accounting, cost accounting and management accounting.
			CO2	To know various tools from accounting and cost accounting this would facilitate the decision making.
			CO3	To develop analytical abilities to face the business situations
	102	Economic Analysis for Business Decisions (SEM I)	CO1	To equip the students of management with time tested tools and techniques of managerial economics to enable them to appreciate its relevance in decision making.
			CO2	To explore the economics of information and network industries and to equip students with an understanding of how economics affect the business strategy of companies in these industries.
			CO3	To develop economic way of thinking in dealing with practical business problems and challenges.
	103	Legal Aspects of Business (SEM I)	CO1	To acquaint students with general business law issues to help become more informed, sensitive and effective business leaders.
			CO2	To provide the students with an understanding of fundamental legal issues pertaining to the business world to enhance their ability to manage businesses effectively.
	105	Organizational Behaviour (SEM I)	CO1	To gain a solid understanding of human behavior in the workplace from an individual, group, and organizational perspective.
			CO2	To obtain frameworks and tools to effectively analyze and approach various Organizational situations.
	106	Basics of Marketing (SEM I)	CO1	To reflect upon your own beliefs, assumptions, and behaviors with respect to how individuals, groups, and organizations act in order to expand your options of approaches and increase your own effectiveness.
CO2			To introduce marketing as a business function and a philosophy	
CO3			To emphasize importance of understanding external environment in marketing decision making	
107	Management Fundamentals SEM I	CO1	To expose students to a systematic frame work of marketing & implementations and to highlight need for different marketing approaches for services, goods, and for household consumers, organizational buyers.	
		CO2	To explain the various concepts of management	
		CO3	To make the students understand the contemporary management practices	
		CO4	To highlight professional challenges that managers face in various organization	
108	Business Communication Lab (SEM I)	CO1	To enable the students to appreciate the emerging ideas and practices in the field of management.	
		CO2	To acquaint the students with fundamentals of communication and help them to transform their communication abilities.	
		CO3	To help the students to acquire some of the necessary skills to handle day-to-day managerial responsibilities, such as - making speeches, controlling one-to-one communication, enriching group activities and processes, giving effective presentations, writing letters, memos, minutes, reports and advertising, and maintaining one's poise in private and in public.	
110	Selling and Negotiating SkillsLab (SEM I)	CO1	To build the students' confidence and to enhance competitiveness by projecting a positive image of themselves and of their future.	
		CO2	To imbibe in the students, critical sales competencies that drives buying decisions.	
		CO3	To give insights into how to boost individual and organizational productivity through effective sales lead management.	
115	Enterprise Analysis - Desk Research (SEMI)	CO1	To introduce basic theoretical principles and practical steps in the negotiating process.	
		CO2	To acquaint students with basic aspects of an Enterprise.	
		CO3	To guide the students in analyzing an Enterprise w.r.t a set of basic parameters.	
MBA Sem II(2019 Pattern)	201	Marketing Management SEM II)	CO1	To help the students assimilate basic jargon and its meaning w.r.t. Enterprise Analysis.
			CO2	To introduce the concept of Marketing Mix as a framework for Marketing Decision making.
			CO3	To emphasize the need, importance and process of Marketing Planning and Control.
	202	Financial Management SEM II)	CO1	To sensitize the students to the dynamic nature of Marketing Function.
			CO2	To understand various concepts related to financial management.
			CO3	To study in detail, various tools and techniques in the area of finance.
	203	Human Resource Management SEM II)	CO1	To develop the analytical skills this would facilitate the decision making in Business situations.
			CO2	To understand the role of HRM in an organization
			CO3	To learn to gain competitive advantage through people
	204	Decision Science SEM II	CO1	To learn to study and design HRM system
			CO2	To understand role of quantitative techniques in managerial decision making.
CO3			To understand process of decision problem formulation.	
205	Operations and Supply Chain Management SEM II	CO1	To understand applications of various quantitative techniques in managerial settings.	
		CO2	To develop an understanding on the strategic importance of Operations & SCM and how it can provide a competitive advantage to the organization.	
		CO3	To understand the relationship between Operations & SCM and other business functions, such as Marketing, Finance, Accounting, and Human Resources.	
206	Management Information Systems II SEM	CO1	To develop knowledge of the issues related to designing and managing Operations & SCM and the techniques to do so.	
		CO2	To develop conceptual understanding about latest developments in the field of Information Technology and the impact of I.T. in managing a business	
		CO3	To learn to use Information Technology to gain competitive advantage in business	
207	Emotional Intelligence and Managerial Effectiveness Lab SEM II	CO1	To learn from, with a view to emulate, entrepreneurial ventures in e-Commerce and m-Commerce	
		CO2	To equip students with individual and group learning methods	
		CO3	To understand intelligence and develop emotional competence	
210	Life Skills SEM II	CO1	To develop understanding and competence for personal and managerial effectiveness.	
		CO2	To encourage students to develop and use balanced self-determined Behavior.	
		CO3	To help students in enhancing self, increasing life satisfaction and improving relationships with others.	
213	Computer Aided Personal Productivity Tools Lab SEM II	CO1	To develop new ability to practice new problem solving skills in group and use these skills in personal life.	
		CO2	To give students mastery of MS Office.	
		CO3	To enhance personal productivity through advanced features of MS Word, MS Excel & MS PowerPoint	
215	Industry Analysis - Desk Research SEM II	CO1	To impart skills of using MS Outlook and basic social networking tools.	
		CO2	To help the students understand the dynamics of a specific industry.	
		CO3	To acquaint students with various issues particular to an industry.	
301	Strategic Management (SEM III)	CO1	To provide a cross-functional perspective of the functioning of a business enterprise and an industry.	
		CO2	To expose participants to various perspectives and concepts in the field of Strategic Management	
		CO3	To help participants develop skills for applying these concepts to the solution of business problems	
302	Mobile Application Development	CO1	To help students master the analytical tools of strategic management.	
		CO2	To acquaint the students with a perspective of different facets of management of an enterprise	
		CO3	To provide inputs with reference to the Investment Decisions along with the techniques for those decisions	
		CO4	To inculcate the evaluation parameters of enterprise in terms of expenses, control systems and pricing	
				To develop the knowledge of the concept of auditing and its applicability as performance management tool



MBA Sem III(2019 Pattern)

303	Startup and New Venture Management (SEM III)	CO1	To instill a spirit of entrepreneurship among the student participants.
		CO2	To provide an overview of the competences needed to become an entrepreneur
		CO3	To give insights into the Management of Small Family Business
304	Summer Internship Project (SEM III)	CO1	To offer the opportunity for the young students to acquire on job the skills, knowledge, attitudes, and perceptions along with the experience needed to constitute a professional identity.
		CO2	To provide means to immerse students in actual supervised professional experiences.
		CO3	To give an insight into the working of the real organizations.
		CO4	To gain deeper understanding in specific functional areas.
		CO5	To appreciate the linkages among different functions and departments.
		CO6	To develop perspective about business organizations in their totality.
		CO7	To help the students in exploring career opportunities in their areas of interest.
305MKT	Contemporary Marketing Research (SEM III)	CO1	To give the students an understanding of marketing research from both user's (management) and doer's (the researchers)
		CO2	To design and produce, evaluate a research proposal & understand the quality of research studies.
		CO3	To learn the basic skills to conduct professional marketing research.
		CO4	To understand the applications of business research tools in Marketing decision making.
306MKT	Consumer Behaviour (SEM III)	CO1	To highlight the importance of understanding consumer behavior in Marketing.
		CO2	To study the environmental and individual influences on consumers
		CO3	To understand consumer behavior in Indian context.
307 MKT	Integrated Marketing Communications (SEM III)	CO1	To provide an overview of the range of tools available for Marketing Communications
		CO2	To provide an understanding of the basic principles of planning and execution in Marketing Communications
		CO3	To acquaint the students with concepts and techniques in the application for developing and designing an effective advertising and sales promotion program.
		CO4	To sensitize students to the various facets of advertising, public relation and promotion management.
		CO5	To develop a managerial perspective and an informed decision-making ability for effective and efficient tackling of promotional situations.
308MKT	Product Management project	CO1	To make the students appreciate the various facets of the job of a product manager.
		CO2	To highlight the strategic role of product management in organizational and functional context.
		CO3	To emphasize the financial and other metrics of effective product management.
313MKT	Marketing and the Law	CO1	To understand the pervasive impact of the Law and our legal system on marketing activities.
		CO2	To highlight how decisions of marketing executives raise issues which should be carefully evaluated as to their legal consequences before they are implemented?
		CO3	The underline that a failure to appreciate these legal implications can lead to seriously damaging, if not disastrous, results for a firm
		CO4	To address National Laws and court decisions that relate to the four main areas of marketing study, the so-called "four P's" of marketing: product, price, place and promotion.
317 MKT	Agricultural Marketing	CO1	The Agricultural sector, offers immense opportunities for the employment. This sector requires managerial talent for both input and produce side. The course will prepare the students to be employable in agricultural marketing
		CO2	Understand the functions performed by agricultural marketing system
		CO3	Develop strategies to manage the marketing of agriculture organizations.
305FIN	Direct Taxation SEM III	CO1	To understand the basic concepts in Income Tax Act, 1961.
		CO2	To Calculate Gross Total Income and Tax Liability of an Individual.
		CO3	To acquaint with online filling of various forms and Returns.
306FIN	Financial Systems of India, Markets & Services(SEM III)	CO1	To enlighten the students with the Concepts & Practical dynamics of the Indian Financial System, Markets, Institution and Financial Services.
307FIN	Strategic Cost Management	CO1	To acquaint students with various techniques used for Strategic Cost Management
		CO2	To develop an understanding of the adoption of various techniques of Strategic Cost Management for obtaining sustainable competitive advantage
		CO3	Management for obtaining sustainable competitive advantage
313 FIN	Banking Operations – I	CO1	To understand the basics of Banking and the emergence of Banking in India.
		CO2	To get acquainted with the functionality of the Banks.
		CO3	To know the meaning and use of commonly used technologies in Banking.
315 FIN	Futures and Options III	CO1	To develop an understanding of financial derivatives and the institutional structure of the markets on which they are traded.
		CO2	To have an understanding of the analytical tools necessary to price such instruments.
		CO3	To highlight the role of financial derivatives in the modern capital markets, in particular for risk management.
316FIN	Financial Instruments & Derivatives III	CO1	To provide students with an introduction to the theory and practice of financial instruments.
		CO2	To develop an understanding and importance of financial derivatives and institutional structure of the market.
305OPE	Planning & Control of Operations III	CO1	To give an overview of Planning & Control of Operations
		CO2	To explain the role of forecasting in the operations planning process.
		CO3	To explain the need for aggregate planning and the steps in aggregate planning.
		CO4	To explain how is capacity planning done in organizations and what is its relationship with MRP.
		CO5	To highlight the importance of scheduling in operations management.
306 OPE	Inventory Management III	CO1	To give an overview of various aspects of inventory.
		CO2	To explain the impact of types of inventory costs on inventory management decisions.
		CO3	To explain the principles of JIT
307 OPE	Productivity Management III	CO1	To understand and appreciate significance of productivity management
		CO2	To study various productivity management methods
		CO3	To learn applicability of popular productivity management tools
310 OPE	Manufacturing Resource Planning III	CO1	To understand role and importance of Manufacturing Resource Planning (MRP II)
		CO2	To know the inputs, processing and outputs of MRP II
313 OPE	Designing Operations Systems III	CO1	To give an overview of the various process options in Manufacturing and Services.
		CO2	To give insights into factors that influence process choice.
		CO3	To impart fundamental concepts in Job Design and Work Measurement.
315 OPE	Project Management III	CO1	To provide the students with a holistic, integrative view of Project Management.
		CO2	To highlight the role of projects in modern day business organizations.
		CO3	To sensitize the students to complexities of project management.
305 HR	Labour & Social Security Laws III	CO1	To make the students understand rationale behind labour laws
		CO2	To equip students with important provisions of various labour laws
		CO3	To give students insight into the implementation of labour laws.
306HR	Human Resource Accounting & Compensation Management III	CO1	To orient the students with the concepts related to human resource accounting & compensation management.
		CO2	To facilitate learning related to human resource accounting & compensation management for employees.
307 HR	Employee Health, Safety III	CO1	To learn the basic concepts of safety management
		CO2	To study the various provisions of employee health and safety.
314HR	Quality Management System III	CO1	To create an awareness of fundamental principles, significance and implementation of quality management



		CO2	To use new concepts of TQM in the process of continuous improvement and learning
315 HR	Lab in Job Design & Analysis III	CO1	To give hands of experience to the students of designing jobs at various levels
317HR	Lab in Labor Laws – I	CO1	To give students insight into the implementation of labour laws
		CO2	To acquaint students with calculation of due/ compensations/ contributions etc.
401	401 Managing for Sustainability SEM IV	CO1	Apply general ethical principles to particular cases or practices in business.
		CO2	Think independently and rationally about contemporary moral problems.
		CO3	Recognize the complexity of problems in practical ethics.
		CO4	Demonstrate how general concepts of governance apply in a given situation or given circumstances.
402	Dissertation SEM IV	CO1	To offer the opportunity for the young students to acquire on job the skills, knowledge, attitudes, and perceptions along with the experience needed to constitute a professional identity.
		CO2	To provide means to immerse students in actual supervised professional experiences
		CO3	To gain deeper understanding in specific areas.
403 MKT	Services Marketing	CO1	To emphasize the significance of services marketing in the global economy.
		CO2	To make the students understand the deeper aspects of successful services marketing.
		CO3	To provide insights to the challenges and opportunities in services marketing.
404 MKT	Sales & Distribution Management	CO1	To provide foundations in components of sales and distribution management.
		CO2	To introduce various facets of the job of a sales manager.
		CO3	To focus on decision making aspects and implementation of decisions in sales and distribution management.
405 MKT	Retail Marketing	CO1	To provide insights into all functional areas of retailing.
		CO2	To give an account of essential principles of retailing.
		CO3	To give a perspective of the Indian retailing scenario.
408 MKT	International Marketing	CO1	To make the students understand the concept and techniques of international marketing.
		CO2	To equip the students to develop plans and marketing strategies for entering international markets and managing
410 MKT	Marketing Strategy	CO1	To introduce a systematic understanding of marketing strategy and decision making in dynamic marketing environment.
		CO2	To understand and apply the STP of marketing (segmentation, targeting, positioning).
		CO3	To understand and appreciate the concept of marketing strategy formulation and implementation.
412MKT	Marketing of High Technology Products	CO1	To provide students with the concepts and tools necessary to effectively market a high technology product.
		CO2	To help the students learn the marketing mix aspect of marketing high technology products.
		CO3	To equip young managers with the knowledge of retail banking, corporate banking and investment banking practices in India.
415 MKT	Marketing of Financial Services	CO1	To familiarize the students to the requisite regulatory compliances in Wealth Management industry.
		CO2	To make the student understand the Risk-Return principle and its practical use in marketing of financial services.
403 FIN	Indirect Taxation	CO1	To understand the basic concepts in various Indirect Tax Acts.
		CO2	To understand procedural part of Indirect Taxes
		CO3	To acquaint with online filling of various Forms & Returns.
404FIN	International Finance	CO1	To make students familiar with the operations in foreign exchange markets.
		CO2	To sensitize students with complexities of managing finance of multinational firm.
		CO3	To highlight the importance of the regulatory framework within which international financial transactions can take place, with special reference to India.
407 FIN	Financial Risk Management	CO1	To understand what is risk and the basic concepts of modeling its application for measuring and managing financial risks
		CO2	To measure volatility in market prices, highlight Risk Management issues in investments.
409 FIN	Banking Operations – II	CO1	To get acquainted with the changed role of Banking post 1991 Reforms.
		CO2	To know the lending and borrowing rates along with the various mandatory reserves.
		CO3	To know the procedural compliances by bank's functionality.
410 FIN	Wealth and Portfolio Management	CO1	To understand the concept of Wealth Management.
		CO2	To understand the concept of Portfolio Management.
		CO3	To understand various tools and methods of evaluating the portfolio.
411 FIN	Fixed Income Securities & Technical Analysis	CO1	To analyze the fixed income securities markets and its implications for investments.
		CO2	To explain the market characteristics, instruments, selling techniques, pricing and valuation issues with money market instruments.
		CO3	To explain the specific features of the Indian Fixed Income Securities Markets.
403 OPE	Operations Strategy and Research IV	CO1	To emphasize the key role of operations in bringing about the growth and profitability of organizations.
		CO2	To impart ideas, concepts and principles in operations strategy.
		CO3	To understand use of quantitative tools in solving typical Operations Domain Problems
404 OPE	Total Quality Management IV	CO1	To give various perspectives on Quality and various contributors to Quality.
		CO2	To provide an in-depth understanding of the various QC tools.
		CO3	To introduce the frameworks of Global Quality Awards.
405 OPE	Quality Management Standards IV	CO1	To introduce various management system standards.
		CO2	To explain the implementation and role of MR for IMS.
		CO3	To help the students understand the implementation of IMS through cases in services and manufacturing.
406 OPE	World Class Manufacturing IV	CO1	To bring out the relevance and basics of World Class Manufacturing.
		CO2	To highlight the current state of Indian Manufacturing
		CO3	To provide a road map for World Class Manufacturing
408 OPE	Enterprise Resource Planning IV	CO1	To understand how a business works and how information systems fit into business operations.
		CO2	To understand the cross functional integration aspects of a business.
		CO3	To understand better managerial decision making through real time data integration and sharing.
		CO4	To understand the host of underlying technological tools of ERP.
413 OPE	Lean Manufacturing IV	CO1	To provide the concepts of Lean Manufacturing.
		CO2	To give a hands on – How To – series of steps in Lean Manufacturing Implementation.
		CO3	To highlight the role of company culture in transformation to Lean.
403 HR	Employment Relations IV	CO1	Give students insight into the IR scenario in India
		CO2	Make students understand important laws governing IR
		CO3	Create understanding about role of Govt., society and trade union in IR
404 HR	Strategic Human Resource Management IV	CO1	To make students understand HR implications of organizational strategies
		CO2	Understand the various terms used to define strategy & its process
		CO3	Understand HR strategies in Indian & global perspective
405 HR	Organizational Design & Development	CO1	To develop an understanding of the nature, functioning and design of organization
		CO2	Be able to understand the theory and practice relating to the processes of organization development and change
		CO3	Develop insight and competence in diagnostic and intervention processes and skills for initiating and facilitating organizational processes and change in organizations
407 HR	Employee Reward Management IV	CO1	To appraise students with reward management system practiced in organizations
		CO2	To make students understand the process of setting reward management system
		CO3	To give students exposure to the reward management practices followed various organizations
410 HR	LAB in CSR IV	CO1	To help students understand & design CSR initiatives
414 HR	Emerging Trends in HR IV	CO1	To expose students to organizations to know emerging trends in HR.

MBA Sem IV(2019 Pattern)





INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT
 Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University
ACADEMIC YEAR 2023-24
COURSE OUTCOMES

MCA

COURSE PATTERN 2020 (FY & SV) 2019(TY)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
FYMCA Sem I	IT-11	Java Programming	CO1	Understand Basic Concepts of OOPs, Java, Inheritance, Package. (Understand)
			CO2	Understand Exception handling, arrays and Strings and multi-threading in Java (Understand.
			CO3	Understand collection framework (Understand)
			CO4	Develop GUI using Abstract Windows Toolkit (AWT) and event handling (Apply)
			CO5	Develop Web application using JSP and Servlet, JDBC (Apply)
	IT-12	Data Structure and Algorithms	CO1	: demonstrate linear data structures linked list, stack and queue (apply)
			CO2	Implement tree, graph, hash table and heap data structures (apply)
			CO3	apply brute force and backtracking techniques (apply)
			CO4	demonstrate greedy and divide-conquer approaches (apply)
			CO5	implement dynamic programming technique (apply)
	IT-13	Object Oriented Software Engineering	CO1	: Distinguish different process model for a software development. (Understand)
			CO2	Design software requirements specification solution for a given problem definitions of a software system. (Analyze)
			CO3	: Apply software engineering analysis/design knowledge to suggest solutions for simulated problems (Analyze)
			CO4	Design user interface layout for different types of applications (Apply)
			CO5	Recognize and describe current trends in software engineering (Understand)
IT-14	Operating Systems Concepts	CO1	Understand structure of OS, process management and synchronization. (Understand)	
		CO2	Understand multicore and multiprocessing OS. (Understand)	
		CO3	explain Realtime and embedded OS (Understand)	
		CO4	understand Windows and Linux OS fundamentals and administration. (Understand)	
		CO5	solve shell scripting problems (Apply)	
IT-15	Network Technologies	CO1	Understand the basic concepts of Computer Network, and principle of layering (Understand)	
		CO2	Apply the error detection and correction techniques used in data transmission (Apply)	
		CO3	Apply IP addressing schemes and sub netting (Apply)	
		CO4	Understand the concept of routing protocols, Application layer protocols and Network Security (Understand)	
		CO5	Apply the socket programming basics to create a simple chat application (Apply)	
IT-11L	Practicals	CO1	Demonstrate Collection framework (Apply)	
		CO2	: Develop GUI using awt and swing (Apply)	
ITC11	Mini Project	CO1	Develop Web application using JSP and Servlet, JDBC (Apply)	
FYMCA Sem II	IT-21	Python Programming	CO1	Apply Data Structure to solve problems using JavaScript (Apply)
			CO2	Create working project using tools and techniques learnt in this semester (Create)
			CO3	Understand Demonstrate the concepts of python and modular programming. (Understand)
			CO4	Apply the concepts of concurrency control in python (Apply)
			CO5	Solve the real-life problems using object-oriented concepts and python libraries (Apply)
	IT-22	Software Project Management	CO1	Demonstrate the concept of IO, Exception Handling, database (Apply)
			CO2	Analyze the given dataset and apply the data analysis concepts and data visualization. (Analyze)
			CO3	Understand the process of Software Project Management Framework and Apply estimation techniques. (Apply)
			CO4	: Learn the philosophy, principles and lifecycle of an agile project. (Understand)
			CO5	Demonstrate Agile Teams and Tools and Apply agile project constraints and trade-offs for estimating project size and schedule (Apply)
	MT-21	Optimization Techniques	CO1	: Explain Project Tracking and Interpretation of Progress Report (Understand)
			CO2	Analyze Problem statement and evaluate User Stories (Analyze)
			CO3	Understand the role and principles of optimization techniques in business world (Understand)
			CO4	Demonstrate specific optimization technique for effective decision making (Apply)
			CO5	Apply the optimization techniques in business environments (Apply)
IT-23	Advanced Internet Technologies	CO1	Illustrate and infer for the business scenario (Analyze)	
		CO2	Analyze the optimization techniques in strategic planning for optimal gain. (Analyze)	
		CO3	Outline the basic concepts of Advance Internet Technologies (Understand)	
		CO4	Design appropriate user interfaces and implements webpage based on given problem Statement (Apply)	
		CO5	Implement concepts and methods of NodeJS (Apply)	
IT-24	Advanced DBMS	CO1	Implement concepts and methods of Angular (Apply)	
		CO2	Build Dynamic web pages using server-side PHP programming with Database Connectivity (Apply)	
		CO3	Describe the core concepts of DBMS and various databases used in real applications (Understand)	
		CO4	Design relational database using E-R model and normalization (Apply)	
		CO5	Demonstrate XML database and nonprocedural structural query languages for data access (Apply)	
IT-21L	Practicals	CO1	Explain concepts of Parallel, Distributed and Object-Oriented Databases and their applications (Understand)	
ITC21	Mini Project	CO2	Apply transaction management, recovery management, backup and security – privacy concepts for database applications (Apply)	
SYMCA Sem III	IT-31	Mobile Application Development	CO1	: implement python programming concepts for solving real life problems. (Apply)
			CO2	: Implement Advanced Internet Technologies (Apply)
			CO3	Create working project using tools and techniques learnt in this semester (Create)
			CO4	Understand Various Mobile Application Architectures. (Understand)
			CO5	Apply different types of widgets and Layouts. (Apply)
	IT-32	Data Warehousing and Data Mining	CO1	Describe Web Services and Web Views in mobile applications. (Understand)
			CO2	Implement data storing and retrieval methods in android. (Apply)
			CO3	Demonstrate Hybrid Mobile App Framework. (Apply)
			CO4	Understand Data warehouse concepts, architecture and models (Understand)
			CO5	: Learn and understand techniques of preprocessing on various kinds of data (Understand)
	IT-33	Software Testing and Quality Assurance	CO1	Apply association Mining and Classification Techniques on Data Sets (Apply)
			CO2	Apply Clustering Techniques and Web Mining on Data Sets (Apply)
			CO3	Understand other approaches of Data mining (Understand)
			CO4	Understand the role of software quality assurance in contributing to the efficient delivery of software solutions. (Understand)
			CO5	Demonstrate specific software tests with well-defined objectives and targets. (Apply)



IT-34	Knowledge Representation and Artificial Intelligence: ML, DL	CO1	Understand basic building block of Artificial Intelligence and Knowledge Representation. (Understand)	
		CO2	Apply Propositional Logic for knowledge representation. (Apply)	
		CO3	Design various models based on Machine Learning methodology (Apply)	
		CO4	Design various models based on Deep Learning methodology (Apply)	
		CO5	Understand various hardware and software aspect used for AI and its application. (Understand)	
IT-35	Cloud Computing	CO1	Describe the concepts of Cloud Computing and its Service Models & Deployment Models. (Understand)	
		CO2	Classify the types of Virtualization. (Understand)	
		CO3	Describe the Cloud Management and relate Cloud to SOA. (Understand)	
		CO4	Interpret Architecture and Pharell Programing of Cloud Computing. (Apply)	
		CO5	Demonstrate practical Implementation of Cloud computing. (Apply)	
IT-31L	Practicals	CO1	Develop mobile application. (Apply)	
		CO2	Develop ML, DL models using Python (Apply)	
ITC31	Mini Project	CO1	Create working project using tools and techniques learnt in this semester (Create)	
SYMCA Sem IV	BM-41	PPM and OB	CO1	Describe and analyze the interactions between multiple aspects of management. (Understand)
			CO2	Analyze the role of planning and decision making in Organization (Analyze)
			CO3	Justify the role of leadership qualities, Motivation and Team Building. (Analyze)
			CO4	Analyze stress management and conflict management (Analyze)
			CO5	Describe Personality and Individual Behavior (Understand)
	: IT-41	DevOps	CO1	describe the evolution of technology & timeline (Understand)
			CO2	explain Introduction to various Devops platforms (Remember)
			CO3	demonstrate the building components / blocks of Devops and gain an insight of the Devops Architecture. (Understand)
			CO4	apply the knowledge gain about Devops approach across various domains (Apply)
			CO5	: build DevOps application (Apply)
ITC41	Project	CO1	Create working project using tools and techniques learnt in the programme (Create)	
TYMCA Sem V	501	Social Media & Digital Marketing	CO1	Explain use of Social Media in Marketing (Understand)
			CO2	Demonstrate Digital Marketing Strategy (Apply)
			CO3	Summarize various tools of Social Media and Digital Marketing (Understand)
			CO4	Make use of SEO techniques for websites (Apply)
			CO5	Interpret SEM tools and techniques (Understand)
	IT 52	Mobile Application Development	CO1	Understand Various Mobile Application Architectures (Understand)
			CO2	Use different types of widgets and Layouts. (Apply)
			CO3	Describe Web Services and Web Views in mobile applications. (Understand)
			CO4	: Implement data storing and retrieval methods in android. (Apply)
			CO5	Demonstrate Hybrid Mobile App Framework. (Apply)
	IT 53	Software Project Management	CO1	Understand the process of Software Project Management Framework and Apply estimation techniques. (Understand)
			CO2	Learn the philosophy, principles and lifecycle of an Agile project. (Understand)
			CO3	Demonstrate Agile Teams and Tools. (Apply)
			CO4	Apply Agile project constraints and trade-offs for estimating project size and schedule (Apply)
			CO5	Explain Project Tracking and Interpretation of Progress Report. (Understand)
ITC51	Mini Project	CO1	Understand the real-world problem. (Understand)	
		CO2	Express the need of the project through feasibility analysis and literature review. (Understand)	
		CO3	Determine the project plan using appropriate methodology. (Apply)	
		CO4	Implement the project design pertaining to the problem. (Apply)	
		CO5	Demonstrate communication and team-work skills. (Apply)	
IT51L	Practical based on IT51 - Social Me	CO1	Create Marketing Strategy using various tools of Social Media and Digital Marketing. (Create)	



Dr.
Principal

Indira College of Engineering & Management
Parandwadi Pune-410506

Department of Civil Engineering

THANKA COLLEGE OF ENGINEERING & MANAGEMENT
WILSON ROAD, CHENNAI - 600 076

PROGRAMME OBJECTIVES

Course

- To provide a strong foundation in the basic sciences and engineering fundamentals.

Outcome

- Graduates will be able to apply their knowledge of basic sciences and engineering fundamentals to solve engineering problems.
- Graduates will be able to design and develop engineering systems.
- Graduates will be able to analyze and synthesize engineering systems.
- Graduates will be able to communicate effectively in written and oral forms.
- Graduates will be able to work in a team and take responsibility for their work.

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- Understand the basic principles of engineering.
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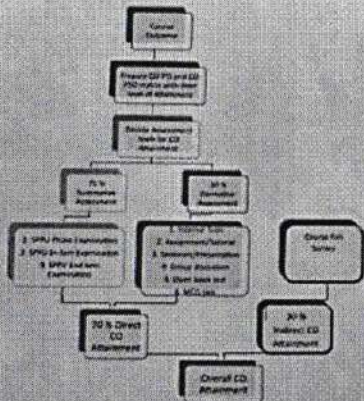
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Department of MBA

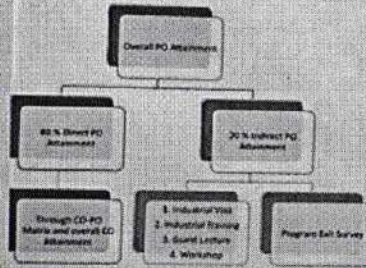
The image shows three notices pinned to a dark board. The first two notices are from Adam's College of Engineering and Management, with the text 'ADAM'S COLLEGE OF ENGINEERING AND MANAGEMENT' visible at the top of each. The third notice is a separate document with illegible text. The notices are arranged in a row, with the first two on the left and the third on the right.

**COMPUTER DEPARTMENT
Notice Board**

CO Attainment process



PO Attainment Process



INDIRA COLLEGE OF ENGINEERING & MANAGEMENT
Approved by AICTE No. 102/2002-2003, All India Council of Technical Education, New Delhi, India
DEPARTMENT OF COMPUTER

Program Educational Objectives

- To build graduates for successful careers in Computer Engineering those are able to serve state and regional industries, government agencies, in national and international industries.
- To build graduates that possesses the working knowledge, foundation of Computer Applications and also evaluate their effectiveness and efficiency.
- To build graduates who engage in self development activities through further professional studies and personal research that will allow them to adapt to the high-tech challenges in their careers like computer hardware and software design, cybernetics, systems, computer network design, system integration, data base design, automation etc.
- To build graduates in computer engineering who are applying knowledge of the discipline, teamwork, communication skills and an ability to work with a diverse set of clients.

Programme Specific Outcomes

A graduate of the Computer Science and Engineering Program will demonstrate:

- Professional skills:** The ability to understand, analyze and develop high-level applications to meet the current industrial requirements using varied algorithms, strategies, system software, multimedia, web design, database management, hardware troubleshooting and network administration.
- Problem-solving abilities:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business use.
- Successful Career and Entrepreneurship:** The ability to employ modern concepts, strategies, environments, and platforms to create innovative career paths for an entrepreneur and create responsibility for career building, and a need for higher studies.

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Program Outcomes

By the time of graduation, graduates will attain the following program outcomes:

- Apply knowledge of Mathematics, Science and Engineering Basics:** Apply fundamental knowledge of mathematics, science and engineering principles to real world problems.
- Problem Solving Ability:** Identify and formulate complex problems; analyze/evaluate/propose solutions with computing requirements.
- Design and Development of Algorithms:** Design, implement, and evaluate a computer-based solution applicable to public health, ecological safety, human resource management and structural modularity, cultural, societal and environmental considerations.
- Analytic design and modeling of complex problems:** Understand management and engineering principles, needs and/or identification of industry.
- Usage of latest open source tools and technologies:** Select & use current software, tools, and tools to solve societal, health, safety, cultural, societal and environmental issues and global impact of engineering on individual or society.
- Social contribution of Engineers:** Recognize a problem, design a solution for the benefit of the society in health, safety, public, cultural sectors applying relevant engineering practices.
- Self-control and Sustainability:** Understand the philosophy behind their various fields of engineering to the environment control, develop for individuals who is social independent Environment issues.
- Professional Development and Ethics:** Acquire ethical values amongst students to develop best engineering practices.
- Commitment at individual level and as a team:** Work effectively in multidisciplinary environment as individual & diverse team structure.
- Communication skills:** Learn to articulate, present, listen to feedback effectively and give, including oral, written and multimedia presentations.
- Project Planning & Management for Complex Solutions:** Use of modeling techniques to design experiences, to analyzing and interpreting data.
- Self-learning:** Recognize the need of continuous expanded development through lifelong learning.

INDIRA COLLEGE OF ENGINEERING & MANAGEMENT
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DEPARTMENT OF COMPUTER

DEPARTMENT VISION: INDIA'S SHORT TERM & LONG TERM GOAL

Vision

- To become an established center of excellence for training, research, teaching, academics and research for creating holistic, socio-economic performance with interdisciplinary practices.

Mission

- To foster strong fundamental concepts to students and inspire them to the creation of solutions with critical thinking and also follow their management commitment.
- To impart knowledge and skill based education in collaboration with industry, academia and research organizations.
- To develop a center of excellence and setup a research laboratory to develop software applications for the society with the awareness of industry.
- To enlighten students with the latest technologies through carefully designed teaching modules with the advice of alumni and industry as a part of career guided education.
- To impart and nurture effective communication, interpersonal skills and create awareness of ethical and social responsibilities.

Short Term Goal

- To achieve 100% results and placement.
- To encourage faculty members for PhD Registration.
- To achieve "A++" accreditation.
- To establish students' low cost entrepreneurship.
- To set up center of excellence.
- To conduct International Conference.

Long Term Goal

- To achieve ISO certification.
- To get International accreditation.
- To establish collaboration with foreign universities.
- To place more PhD Students in the department.
- To participate consistently in global research projects.





COMP

INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT
Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University

ACADEMIC YEAR 2023-24
COURSE OUTCOMES

SE(COMPUTER)(2019 Pat.)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
SE (SEM-III, TERM-I)	210241	Discrete Mathematics	210241.1	Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
			210241.2	Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
			210241.3	Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
			210241.4	Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.
			210241.5	Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.
			210241.6	Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
			210241.7	Analyze the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures.
	210242	Fundamentals of Data Structures	210242.1	Design and algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.
			210242.2	Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and identify the appropriate data structure in approaching the problem solution.
			210242.3	Demonstrate use of sequential data structures- Array and Linked lists to store and process data.
			210242.4	Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application.
			210242.5	Compare and contrast different implementations of data structures (dynamic and static).
			210242.6	Understand, implement and apply principles of data structures-stack and queue to solve computational problems.
	210243	Object Oriented Programming(OOP)	210243.1	Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software.
			210243.2	Design object-oriented solutions for small systems involving multiple objects.
			210243.3	Use virtual and pure virtual function and complex programming situations.
			210243.4	Apply object-oriented software principles in problem solving.
			210243.5	Analyze the strengths of object-oriented programming.
			210243.6	Develop the application using object oriented programming language(C++).
	210244	Computer Graphics	210244.1	Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.
			210244.2	Apply mathematics to develop Computer programs for elementary graphic operations.
			210244.3	Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
			210244.4	Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
			210244.5	Understand the concepts of color models, lighting, shading models and hidden surface elimination.
			210244.6	Create effective programs using concepts of curves, fractals, animation and gaming.
	210245	Digital Electronics & Logic Design	210245.1	Simplify Boolean Expression using K Map
			210245.2	Design and implement Combinational circuits
			210245.3	Design and implement Sequential circuits
			210245.4	Develop Simple real world application using ASM and PLD
			210245.5	Differentiate and choose appropriate logic families IC Packages as per the given design specification
210245.6			Explain organization and architecture of computer system.	
210246	Data Structures Laboratory	210246.1	Use algorithms on various linear data structure using sequential organization to solve real life problems.	
		210246.2	Analyze problems to apply suitable searching and sorting algorithm to various applications.	
		210246.3	Analyze problems to use variants of linked list and solve various real life problems.	
		210246.4	Designing and implement data structures and algorithms for solving different kinds of problems.	
210247	OOP and Computer Graphics Laboratory	210247.1	Understand and apply the concepts like inheritance, polymorphism, exception handling and generic structures for implementing reusable programming codes.	
		210247.2	Analyze the concept of file and apply it while storing and retrieving the data from secondary storages.	
		210247.3	Analyze and apply computer graphics algorithms for line-circle drawing, scan conversion and filling with the help of object oriented programming concepts.	
		210247.4	Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons.	
		210247.5	Apply logic to implement, curves, fractals, animation and gaming programs.	
210248	Digital Electronics Laboratory	210248.1	Understand the working of digital electronic circuits	
		210248.2	Apply the knowledge to appropriate IC as per the design specifications	
		210248.3	Design and implement Sequential and Combinational digital circuits as per the specifications	
		210249.1	Express effectively through verbal/oral communications and improve listening skills.	
		210249.2	Write precise briefs or reports and technical documents.	



210249	Business Communication Skills	210249.3	Prepare for group discussions / meetings / interviews and presentations.
		210249.4	Explore goal / target setting, self motivation and practicing creative thinking.
		210249.5	Operate effectively in multidisciplinary and heterogeneous teams through the knowledge of team work, interpersonal relationships, conflict management and leadership qualities.
210250	Humanity and Social Science	210250.1	Aware of the various issues concerning humans and society.
		210250.2	Aware about their responsibilities towards society.
		210250.3	Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.
		210250.4	Able to understand the nature of the individual and the relationship between self and the community.
		210250.5	Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures.
210251	AC3-I: Green Construction and Design	210251.1	Understand the importance of environment friendly society.
		210252.2	Apply primary measures to reduce carbon emissions from their surroundings.
		210253.3	Learn role of IT solutions in design of green buildings.
		210254.4	Understand the use of software systems to complete statutory compliances involved in the
	AC3-II: Social Awareness and Governance Program	210251.1	Understand social issues and responsibilities as member of society.
		210252.2	Apply social values and ethics in decision making at social or organizational level
		210253.3	Promote obstacles in national integration and role of youth for National integration
		210254.4	Demonstrate basic features of Indian Constitution.
	AC3-III: Environmental Studies	210251.1	Comprehend the importance of ecosystem and biodiversity
		210252.2	Correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevent
		210253.3	Identify different types of environmental pollution and control measures
		210254.4	Correlate the exploitation and utilization of conventional and non-conventional resources
	AC3-IV: Smart Cities	210251.1	Understand the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
		210252.2	Explore the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
		210253.3	Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
		210254.4	Knowledge about the latest research results in for the development and management of future cities
207003	Engineering Mathematics III	207003.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.
		207003.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
		207003.3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.
		207003.4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.
		207003.5	Obtain interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
210252	Data Structures and Algorithms	210252.1	Identify and articulate the complexity goals and benefits of a good hashing scheme for real world applications.
		210252.2	Apply non-linear data structures for solving problems of various domain.
		210252.3	Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.
		210252.4	Analyze the algorithmic solutions for resource requirements and optimization.
		210252.5	Use efficient indexing methods and multiway search techniques to store and maintain data.
		210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.
210253	Software Engineering	210253.1	Analyze software requirements and formulate design solution for a software.
		210253.2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
		210253.3	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.
		210253.4	Model and design User interface and component-level.
		210253.5	Identify and handle risk management and software configuration management.
		210253.6	Utilize knowledge of software testing approaches, approaches to verification and validation.
210254	Microprocessor	210253.7	Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.
		210254.1	Exhibit skill of assembly language programming for the application
		210254.2	Classify Processor architectures.
		210254.3	Illustrate advanced features of 80386 Microprocessor.
		210254.4	Compare and contrast different processor modes.
		210254.5	Use Interrupts mechanism in applications
		210254.6	Differentiate between Microprocessors and Microcontrollers.
210254.7	Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.		
210255	Principles of Programming Languages	210255.1	Make use of basic principles of programming languages.
		210255.2	Develop a program with Data representation and Computations.
		210255.3	Develop programs using Object Oriented Programming language : Java.
		210255.4	Develop application using inheritance, encapsulation, and polymorphism
		210255.5	Demonstrate Multithreading for robust application development.
		210255.6	Develop a simple program using basic concepts of Functional and Logical programming paradigm.



SE (SEM-IV, TERM-II)				
SE (SEM-IV, TERM-II)	210256	Data Structures and Algorithms Laboratory	210256.1	Understand the ADT/libraries, hash tables and dictionary to design algorithms for a specific problem.
			210256.2	Choose most appropriate data structures and apply algorithms for graphical solutions of the problems.
			210256.3	Apply and analyze non linear data structures to solve real world complex problems.
			210256.4	Apply and analyze algorithm design techniques for indexing, sorting, multi-way searching, file organization and compression.
			210256.5	Analyze the efficiency of most appropriate data structure for creating efficient
	210257	Microprocessor Laboratory	210257.1	Understand and apply various addressing modes and instruction set to implement assembly language programs
			210257.2	Apply logic to implement code conversion
			210257.3	Analyze and apply logic to demonstrate processor mode of operation
	210258	Project Based Learning II	210258.1	Identify the real life problem from societal need point of view
			210258.2	Choose and compare alternative approaches to select most feasible one
			210258.3	Analyze and synthesize the identified problem from technological perspective
			210258.4	Design the reliable and scalable solution to meet challenges
			210258.5	Evaluate the solution based on the criteria specified
			210258.6	Inculcate long life learning attitude towards the societal problems
	210259	Code of Conduct	210259.1	Understand the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
			210259.2	Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
			210259.3	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development
			210259.4	Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives
			210260.1	Understand the global water cycle and its various processes
	210260	AC4-I: Water Management	210260.2	Understand climate change and their effects on water systems
			210260.3	Understand Drinking treatment and quality of groundwater and surface water
			210260.4	Understand the Physical, chemical, and biological processes involved in water treatment and distribution.
		AC4-II: Intellectual Property Rights and Patents	210260.1	Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
			210260.2	Identify, apply and assess principles of law relating to each of these areas of intellectual property
			210260.3	Apply the appropriate ownership rules to intellectual property you have been involved in creating
		AC4-III: The Science of Happiness	210260.1	Understand what happiness is and why it matters to you
			210260.2	Learn how to increase your own happiness
210260.3			Understand of the power of social connections and the science of empathy	
210260.4			Understand what is mindfulness and its real world applications	
AC4-IV: Yoga and Meditation		210260.1	Understand philosophy and religion as well as daily life issues will be challenged and enhanced.	
		210260.2	Enhances the immune system.	
	210260.3	Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.		
	210260.4	Powers of concentration, focus, and awareness will be heightened.		
				TE (COMPUTER) (2019 Pat.)
YEAR	COURSE CODE	COURSE NAME	IRSE OUTCOME	COURSE OUTCOMES
	310241	Database Management System	310241.1	Analyze and design Database system using ER model
			310241.2	Implement database queries using database language
			310241.3	Normalize the database design using normal forms
			310241.4	Apply transaction management concept in real time situation
			310241.5	Use NOSQL database for processing unstructured data
			310241.6	Differentiate between complex datatypes and analyze the use of appropriate data types
	310242	Theory of Computation	310242.1	To Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants
			310242.2	To Construct regular expression to present regular language and understand pumping lemma
			310242.3	To Design Context Free Grammars and learn to simplify the grammar
			310242.4	To Construct Pushdown Automaton model for the Context Free Language
			310242.5	To Devise Turing Machine for the different requirements outlined by theoretical computer science
			310242.6	To Analyze different classes of problems, and study concepts of NP completeness
	310243	Systems Programming and Operating System	310243.1	Analyze and synthesize basic System Software and its functionality.
			310243.2	Identify suitable data structures and Design & Implement various System Software
			310243.3	Compare different loading schemes and analyze the performance of linker and loader
			310243.4	Implement and Analyze the performance of process scheduling algorithms
			310243.5	Identify the mechanism to deal with deadlock and concurrency issues
			310243.6	Demonstrate memory organization and memory management policies
	310244	Computer Networks and Security	310244.1	Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
			310244.2	Illustrate the working and functions of data link layer
			310244.3	Analyze the working of different routing protocols and mechanisms
			310244.4	Implement client-server applications using sockets
			310244.5	Illustrate role of application layer with its protocols, client-server architectures
			310244.6	Comprehend the basics of Network Security
			310245(A).1	Understand the fundamentals and need of Embedded Systems for the Internet of Things



TE (SEM-V, TERM-I)	310245	310245(A): Internet of Things and Embedded Systems	310245(A).2	Apply IoT enabling technologies for developing IoT systems
			310245(A).3	Apply design methodology for designing and implementing IoT applications
			310245(A).4	Analyze IoT protocols for making IoT devices communication
			310245(A).5	Design cloud based IoT systems
			310245(A).6	Design and Develop secured IoT applications
			310245(D).1	Comprehend Project Management Concepts
		310245(D): Software Project Management	310245(D).2	Use various tools of Software Project Management
			310245(D).3	Schedule various activities in software projects
			310245(D).4	Track a project and manage changes
			310245(D).5	Apply Agile Project Management
			310245(D).6	Analyze staffing process for team building and decision making in Software Projects and Management
			310246	Database Management System Lab
	310246.2	Design schema in appropriate normal form considering actual requirements		
	310246.3	Implement SQL queries for given requirement using different SQL concepts		
	310246.4	Implement PL/SQL code block for given requirements		
	310246.5	Implement NOSQL queries using MONGO DB		
	310246.6	Design and Develop application considering actual requirement and using database concepts		
	310247	Computer Networks and Security Laboratory	310247.1	Analyze the requirements of network types, topology and transmission media
			310247.2	Demonstrate error control, flow control techniques and protocols and analyze them
			310247.3	Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms
			310247.4	Develop Client-Server architectures and prototypes
			310247.5	Implement web applications and services using application layer protocols
			310247.6	Use network security services and mechanisms
	310248	Laboratory Practice I	310248.1	Implement language translators
			310248.2	Use tools like LEX and YACC
			310248.3	Implement internals and functionalities of Operating System
310248.4			Design IoT and Embedded Systems based application, Apply Software Project Management tools	
310248.5			Develop smart applications using IoT, Implement software project planning and scheduling	
310248.6			Develop IoT applications based on cloud environment, Analyse staffing in software project	
310249	Seminar and Technical Communication	310249.1	Analyze a latest topic of professional interest	
		310249.2	Enhance technical writing skills	
		310249.3	Identify an engineering problem, analyze it and propose a work plan to solve it	
		310249.4	Communicate with professional technical presentation skills	
310250(B)	Audit Course 5- Professional Ethics and Etiquettes	310250(B).1	Summarize the principles of proper courtesy as they are practiced in the workplace.	
		310250(B).2	Apply proper courtesy in different professional situations.	
		310250(B).3	Practice and apply appropriate etiquettes in the working environment and day to day life.	
		310250(B).4	Build proper practices personal and business communications of Ethics and Etiquettes	
310251	Data Science and Big Data Analytics	310251.1	Analyze needs and challenges for Data Science Big Data Analytics	
		310251.2	Apply statistics for Big Data Analytics	
		310251.3	Apply the lifecycle of Big Data analytics to real world problems	
		310251.4	Implement Big Data Analytics using Python programming	
		310251.5	Implement data visualization using visualization tools in Python programming	
		310251.6	Design and Implement Big Databases using the Hadoop ecosystem	
		310252.1	Implement and analyze behavior of web pages using HTML and CSS	
		310252.2	Apply the client side technologies for web development	



(Signature)
Principal

Indira College of Engineering & Management
Parandwadi Pune-410506

TE (SEM-VI, TERM-II)	310252	Web Technology	310252.3	Analyze the concepts of Servlet and JSP
			310252.4	Analyze the Web services and frameworks
			310252.5	Apply the server side technologies for web development
			310252.6	Create the effective web applications for business functionalities using latest web development platforms
	310253	Artificial Intelligence	310253.1	To Identify and apply suitable intelligent agents for various AI applications
			310253.2	To Build smart system using different informed search / uninformed search or heuristic approaches
			310253.3	To Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
			310253.4	To Apply the suitable algorithms to solve AI problems
			310253.5	To Implement ideas underlying modern logical inference systems
			310253.6	To Represent complex problems with expressive yet carefully constrained language of representation
	310254(C)	Cloud Computing	310254(C).1	Understand the different Cloud Computing environment
			310254(C).2	Use appropriate data storage technique on Cloud, based on Cloud application
			310254(C).3	Analyze virtualization technology and install virtualization software
			310254(C).4	Develop and deploy applications on Cloud
			310254(C).5	Apply security in cloud applications
			310254(C).6	Use advance techniques in Cloud Computing
	310255	Internship	310255.1	To demonstrate professional competence through industry Internship.
			310255.2	To apply knowledge gained through internships to complete academic activities in a professional manner.
			310255.3	To choose appropriate technology and tools to solve given problem.
			310255.4	To demonstrate abilities of a responsible professional and use ethical practices in day to day life.
			310255.5	To Create network and social circle, and developing relationships with industry people.
			310255.6	To analyze various career opportunities and decide carrier goals
	310256	Data Science and Big Data Analytics Laboratory	310256.1	Apply principles of Data Science for the analysis of real time problems
			310256.2	Implement data representation using statistical methods
		310256.3	Implement and evaluate data analytics algorithms	
		310256.4	Perform text preprocessing	
		310256.5	Implement data visualization techniques	
		310256.6	Use cutting edge tools and technologies to analyze Big Data	
310257	Web Technology Laboratory	310257.1	Understand the importance of website planning and website design issues	
		310257.2	Apply the client side and server side technologies for web application development	
		310257.3	Analyze the web technology languages, frameworks and services	
		310257.4	Create three tier web based applications	
310258	Lab Practice II	310258.1	To Design a system using different informed search / uninformed search or heuristic approaches	
		310258.2	To Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	
		310258.3	To Design and develop an interactive AI application	
310259(A)	Audit Course 6-Digital and Social Media Marketing	310259(A).1	Understand the fundamentals and importance of digital marketing	
		310259(A).2	Use the power of social media for business marketing	
		310259(A).3	Analyze the effectiveness of digital marketing and social media over traditional	
310503	Statistics and Machine Learning(Honours in Data Science)	310503.1	Apply appropriate statistical measure for machine learning applications	
		310503.2	Usage of appropriate descriptive statistics measures for statistical analysis	
		310503.3	Usage of appropriate statistics inference for data analysis	
		310503.4	Identify types of suitable machine learning techniques	
		310503.5	Apply regression techniques to machine learning problems	
		310503.6	Apply decision tree and Naive Bayes model to solve real time applications	

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
	410241	Design and Analysis of Algorithms	410241.1	CO1: Formulate the problem
			410241.2	CO2: Analyze the asymptotic performance of algorithms
			410241.3	CO3: Decide and apply algorithmic strategies to solve given problem
			410241.4	CO4: Find optimal solution by applying various methods
			410241.5	CO5: Analyze and Apply Scheduling and Sorting Algorithms
			410241.6	CO6: Solve problems for multi-core or distributed or concurrent environments
	410242	Machine Learning	410242.1	CO1: Identify the needs and challenges of machine learning for real time applications.
			410242.2	CO2: Apply various data pre-processing techniques to simplify and speed up machine learning algorithms.
			410242.3	CO3: Select and apply appropriately supervised machine learning algorithms for real time applications.
			410242.4	CO4: Implement variants of multi-class classifier and measure its performance.
			410242.5	CO5 :Compare and contrast different clustering algorithms.
			410242.6	CO6: Design a neural network for solving engineering problems.
	410243	Blockchain Technology	410243.1	CO1: Interpret the fundamentals and basic concepts in Blockchain
			410243.2	Compare the working of different blockchain platforms
			410243.3	Use Crypto wallet for cryptocurrency based transactions
			410243.4	CO4: Analyze the importance of blockchain in finding the solution to the real-world problems.
			410243.5	CO5: Illustrate the Ethereum public block chain platform
			410243.6	CO6: Identify relative application where block chain technology can be effectively used and implemented
	410444(A)	Pervasive Computing	410444A.1	CO1.Demonstrate fundamental concepts in pervasive computing.
			410444A.2	CO2.Explain pervasive devices and decide appropriate one as per the need of real time applications.
			410444A.3	CO3.Classify and analyze context aware systems for their efficiency in different ICT systems.
			410444A.4	CO4.Illustrate intelligent systems and generic intelligent interactive applications.



BE(SEM-VII,TERM-I)

		410444A.5	CO5.Design HCI systems in pervasive computing environment
		410444A.6	CO6.Explore the security challenges and know the role of ethics in the context of pervasivcomputing
		410444A.2	
410244(D)	Object oriented Modeling and Design	410244D.1	CO1: Describe the concepts of object-oriented and basic class modelling.
		410244D.2	CO2: Draw class diagrams, sequence diagrams and interaction diagrams to solve problems
		410244D.3	CO3: Choose and apply a befitting design pattern for the given problem
		410244D.4	CO4: To Analyze applications, architectural Styles & software control strategies
		410244D.5	CO5: To develop Class design Models & choose Legacy Systems.
		410244D.6	CO6:To Understand Design Patterns
410245(B)	GPU Programming and Architecture	410245(B).1	CO1: Describe GPU architecture
		410245(B).2	CO2: Write programs using CUDA, identify issues and debug them.
		410245(B).3	CO3: Implement efficient algorithms in GPUs for common application kernels, such as matrix multiplication
		410245(B).4	CO4: Write simple programs using OpenCL
		410245(B).5	CO5: Identify efficient parallel programming patterns to solve problems
		410245(B).6	CO6: Explore the modern GPUs architecture and it's Applications.
410245(D)	Software Testing and Quality Assurance	410245(D).1	Describe fundamental concepts in software testing such as manual testing, automation testingand software quality assurance
		410245(D).2	Design and Develop project test plan, design test cases, test data, and conduct test operations
		410245(D).3	Apply recent automation tool for various software testing for testing software
		410245(D).4	Apply different approaches of quality management, assurance, and quality standard to softwaresystem
		410245(D).5	Apply and analyze effectiveness Software Quality Tools
		410245(D).6	Apply tools necessary for efficient testing framework
410246	Laboratory Practice III	410246.1	CO1: Apply preprocessing techniques on datasets.
		410246.2	CO2: Implement and evaluate linear regression and random forest regression models.
		410246.3	CO3: Apply and evaluate classification and clustering techniques.
		410246.4	CO4: Analyze performance of an algorithm.
		410246.5	CO5: Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound.
		410246.6	CO6: Interpret the basic concepts in Blockchain technology and its applications
410247	Laboratory Practice IV	410247.1	CO1: Apply android application development for solving real life problems
		410247.2	CO2: Design and develop system using various multimedia components
		410247.3	CO3: Identify various vulnerabilities and demonstrate using various tools.
		410247.4	CO4: Apply information retrieval tools for natural language processing
		410247.5	CO5: Develop an application using open source GPU programming languages
		410247.6	CO6: Apply software testing tools to perform automated testing
410248	Project Work Stage I	410248.1	Solve real life problems by applying knowledge.
		410248.2	Analyze alternative approaches, apply and use most appropriate one for feasible solution.
		410248.3	Write precise reports and technical documents in a nutshell.
		410248.4	Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work
		410248.5	Inter-personal relationships, conflict management and leadership quality.
410249	Audit Course 7 - Entrepreneurship Development	410249.1	Understand the legalities in product development
		410249.2	Undertake the process of IPR, Trademarks, Copyright and patenting
		410249.3	Understand and apply functional plans
		410249.4	Manage Entrepreneurial Finance
		410249.5	Inculcate managerial skill as an entrepreneur
410250	High Performance Computing	410250.1	CO1: Understand various Parallel Paradigm
		410250.2	CO2: Design and Develop an efficient parallel algorithm to solve given problem
		410250.3	CO3: Illustrate data communication operations on various parallel architecture
		410250.4	CO4: Analyze and measure performance of modern parallel computing systems
		410250.5	CO5: Apply CUDA architecture for parallel programming
		410250.6	CO6: Analyze the performance of HPC applications
410251	Deep Learning	410251.1	CO1: Understand the basics of Deep Learning and apply the tools to implement deep learningapplications
		410251.2	CO2: Evaluate the performance of deep learning models (e.g., with respect to the bias-variance trade-off, overfitting and underfitting, estimation of test error).
		410251.3	CO3: To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) forimplementing Deep Learning models
		410251.4	CO4: To implement and apply deep generative models
		410251.5	CO5: Construct and apply on-policy reinforcement learning algorithms
		410251.6	CO6:To Understand Reinforcement Learning Process
410252(C)	Software Defined Networks	410252C.1	CO1: Interpret the need of Software Defined networking solutions.
		410252C.2	CO2: Analyze different methodologies for sustainable Software Defined Networking solutions.
		410252C.3	CO3: Select best practices for design, deploy and troubleshoot of next generation networks.
		410252C.4	CO4: Develop programmability of network elements
		410252C.5	CO5: Demonstrate virtualization and SDN Controllers using Open Flow protocol
		410252C.6	CO6: Design and develop various applications of SDN
410252(D)	Advanced Digital Signal Processing	410252D.1	CO1: Understand and apply different transforms for the design of DT/Digital systems
		410252D.2	CO2: Explore the knowledge of adaptive filtering and Multi-rate DSP
		410252D.3	CO3: Design DT systems in the field/area of adaptive filtering, spectral estimation and multi-rateDSP
		410252D.4	CO4: Explore use of DCT and WT in speech and image processing
		410252D.5	CO5: Develop algorithms in the field of speech , image processing and other DSP applications
		410252D.6	CO6:Identify Image Processing Techniques



BE (SEM-VIII, TERM-II)	410253(B)	Soft Computing	410253B.1	CO1: Understand requirement of soft computing and be aware of various soft computing techniques
			410253B.2	CO2: Understand Artificial Neural Network and its characteristics and implement ANN algorithms
			410253B.3	CO3: Understand and Implement Evolutionary Computing Techniques
			410253B.4	CO4: Understand the Fuzzy logic and Implement fuzzy algorithms for solving real life problems
			410253B.5	CO5: Apply knowledge of Genetic algorithms for problem solving.
			410253B.6	CO6: Develop hybrid systems for problem solving.
	410253(C)	Business Intelligence	410253C.1	CO1: Differentiate the concepts of Decision Support System & Business Intelligence
			410253C.2	CO2: Use Data Warehouse & Business Architecture to design a BI system.
			410253C.3	CO3: Build graphical reports
			410253C.4	CO4: Apply different data preprocessing techniques on dataset
			410253C.5	CO5: Implement machine learning algorithms as per business needs
			410253C.6	CO6: Identify role of BI in marketing, logistics, and finance and telecommunication sector
	410255	Laboratory Practice V	410255.1	CO1: Analyze and measure performance of sequential and parallel algorithms.
			410255.2	CO2: Design and Implement solutions for multicore/Distributed/parallel environment
			410255.3	CO3: Identify and apply the suitable algorithms to solve AI/ML problems
			410255.4	CO4: Apply the technique of Deep Neural network for implementing Linear regression and classification
			410255.5	CO5: Apply the technique of Convolution (CNN) for implementing Deep Learning models
			410255.6	CO6: Design and develop Recurrent Neural Network (RNN) for prediction
	410256	Project Work Stage II	410256.1	Show evidence of independent investigation
			410256.2	Critically analyze the results and their interpretation.
			410256.3	Report and present the original results in an orderly way and placing the open questions in the right perspective
			410256.4	Link techniques and results from literature as well as actual research and future research lines with the research.
			410256.5	Appreciate practical implications and constraints of the specialist subject
			410257.1	Develop a far deeper understanding of the changing digital landscape.
410257	Audit Course 8: Social Media And Analytics	410257.2	Identify some of the latest digital marketing trends and skill sets needed for today's marketer	
		410257.3	Successful planning, prediction, and management of digital marketing campaigns	
		410257.4	Assess user interfaces using different usability engineering techniques	
		410257.5	Implement smart management of different digital assets for marketing needs	
		410257.6	Assess digital marketing as a long term career opportunity	




Principal
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Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University

MECH.

ACADEMIC YEAR 2023-24

COURSE OUTCOMES

Course Pattern :				
SE(MECHANICAL)(2019)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
SE (SEM-III, TERM-I)	202041	Solid Mechanics	202041.1	DEFINE various types of stresses and strain developed on determinate and indeterminate members.
			202041.2	DRAW Shear force and bending moment diagram for various types of transverse loading and support.
			202041.3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam
			202041.4	CALCULATE torsional shear stress in shaft and buckling on the column
			202041.5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.
	202041.6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems		
	202042	Solid Modeling and Drafting	202042.1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle
			202042.2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
			202042.3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
			202042.4	APPLY geometric transformations to simple 2D geometries
			202042.5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
	202042.6	USE PMI & MBD approach for communication		
	202043	Engineering Thermodynamics	202043.1	DESCRIBE the basics of thermodynamics with heat and work interactions.
			202043.2	APPLY laws of thermodynamics to steady flow and non-flow processes.
			202043.3	APPLY entropy, available and non available energy for an Open and Closed System,
202043.4			DETERMINE the properties of steam and their effect on performance of vapour power cycle.	
202043.5			ANALYSE the fuel combustion process and products of combustion.	
202044	Engineering Materials and Metallurgy	202043.6	SELECT various instrumentations required for safe and efficient operation of steam generator.	
		202044.1	COMPARE crystal structures and ASSESS different lattice parameters.	
		202044.2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.	
		202044.3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials	
		202044.4	IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom, etc.	
202044.5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.			
202044.6	SELECT appropriate materials for various applications.			
203156	Microcontroller and Electronics Engineering	203156.1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems	
		203156.2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board	
		203156.3	UNDERSTAND the operation of DC motor, its speed control methods and braking	
		203156.4	DISTINGUISH between types of three phase induction motor and its characteristic features	
		203156.5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems	
203156.6	CHOOSE energy storage devices and electrical drives for EVs			
202045	Geometric Dimensioning and Tolerancing Lab	202045.1	SELECT appropriate IS and ASME standards for drawing	
		202045.2	READ & ANALYSE variety of Industrial drawings	
		202045.3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing	
		202045.4	EVALUATE dimensional tolerance based on type of fit, etc.	
		202045.5	SELECT an appropriate manufacturing process using DFM, DFA, etc.	
202046	Audit Course - III Developing soft skills and personality	202046.1	To know about various aspects of soft skills and learn ways to develop personality	
		202046.2	Understand the importance and type of communication in personal and professional environment	
		202046.3	To provide insight in to much needed technical and non-technical qualities in career planning.	
		202046.4	Learn about Leadership, team building, decision making and stress management	
		207002.1	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems	
207002	Engineering Mathematics - III	207002.2	APPLY integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved	
		207002.3	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability	
		207002.4	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems	
		207002.5	SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.	
		202047.1	APPLY kinematic analysis to simple mechanisms	
202047	Kinematics of Machinery	202047.2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method	
		202047.3	SYNTHESIZE a four bar mechanism with analytical and graphical methods	
		202047.4	APPLY fundamentals of gear theory as a prerequisite for gear design	
		202047.5	CONSTRUCT cam profile for given follower motion	
		202048.1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.	
202048	Applied Thermodynamics	202048.2	DISCUSS basics of engine terminology, air standard, fuel air and actual cycles.	
		202048.3	IDENTIFY factors affecting the combustion performance of SI and CI engines.	
		202048.4	DETERMINE performance parameters of IC Engines and emission control.	
		202048.5	EXPLAIN working of various IC Engine systems and use of alternative fuels	
		202048.6	CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors	
202049	Fluid Mechanics	202049.1	DETERMINE various properties of fluid	
		202049.2	APPLY the laws of fluid statics and concepts of buoyancy	
		202049.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics	
		202049.4	APPLY principles of fluid dynamics to laminar flow	
		202049.5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface	
202050	Manufacturing Processes	202049.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws	
		202050.1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process	
		202050.2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	
		202050.3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations	
		202050.4	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics	
202050.5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques			
202050.6	UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites			
SE (SEM-IV, TERM-II)	202051	Manufacturing Processes	202051.1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
			202051.2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques



	202051	Machine Shop	202051.3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
			202051.4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
			202051.5	PREPARE industry visit report
			202051.6	UNDERSTAND procedure of plastic processing
			202052.1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
			202052.2	ANALYZE the results and arrive at valid conclusions
	202052	Project Based Learning - II	202052.3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
			202052.4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
			202052.5	USE of technology in proposed work and demonstrate learning in oral and written form.
			202052.6	DEVELOP ability to work as an individual and as a team member.
			202053.1	Understand concept of human act and interact
			202053.2	Understand types of human behaviour
TE(MECHANICAL)(2019)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOMES	
TE (SEM-V,TERM-I)	302041	Numerical and Statistical Methods	302041.1	SOLVE system of equations using direct and iterative numerical methods
			302041.2	ESTIMATE solutions for differential equations using numerical techniques
			302041.3	DEVELOP solution for engineering applications with numerical integration.
			302041.4	DESIGN and CREATE a model using a curve fitting and regression analysis.
			302041.5	APPLY statistical Technique for quantitative data analysis
			302041.6	DEMONSTRATE the data, using the concepts of probability and linear algebra
	302042	Heat and Mass Transfer	302042.1	ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
			302042.2	DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
			302042.3	EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results
			302042.4	INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
			302042.5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
			302042.6	DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance
	302043	Design of Machine Elements	302043.1	DESIGN AND ANALYZE the cotter and knuckle joints, levers and components subjected to eccentric loading
			302043.2	DESIGN shafts, keys and couplings under static loading conditions.
			302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
			302043.4	EVALUATE dimensions of machine components under fluctuating loads.
			302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
			302043.6	APPLY the design and development procedure for different types of springs.
	302044	Mechatronics	302044.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.
			302044.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
			302044.3	DETERMINE the transfer function by using block diagram reduction technique.
			302044.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modelling for mechanical system
			302044.5	APPLY the concept of different controller modes to an industrial application.
			302044.6	DEVELOP the ladder programming for industrial application
	302045	Advanced Forming & Joining Processes	302045.1	ANALYZE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
			302045.2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
			302045.3	ANALYZE the effect of HAZ on microstructure and mechanical properties of materials
			302045.4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
			302045.5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.
			302045.6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.
	302046	Digital Manufacturing Laboratory	302046.1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
			302046.2	ANALYZE cutting tool parameters for machining given job.
			302046.3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.
			302046.4	SELECT and DESIGN jigs and Fixtures for a given component.
			302046.5	DEMONSTRATE different parameters for CNC retrofitting and reconditioning.
			302046.6	APPLY & DEMONSTRATE procedure of assembly & disassembly of various machines.
302047	Skill Development	302047.1	DESIGN & DEVELOP a working/model of machine parts or any new product.	
		302047.2	EVALUATE fault with diagnosis on the machines, machine tools and home appliances.	
		302047.3	IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.	
		302047.4		
302048	Audit Course V Entrepreneurship and IP strategy			
	302049	Artificial Intelligence & Machine Learning	302049.1	DEMONSTRATE fundamentals of artificial intelligence and machine learning
			302049.2	APPLY feature extraction and selection techniques
			302049.3	APPLY machine learning algorithms for classification and regression problems.
			302049.4	DEVISE AND DEVELOP a machine learning model using various steps.
			302049.5	EXPLAIN concepts of reinforced and deep learning.
			302049.6	SIMULATE machine learning model in mechanical engineering problems.
	302050	Computer Aided Engineering	302050.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
			302050.2	APPLY the various meshing techniques for better evaluation of approximate results.
			302050.3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution
			302050.4	ANALYZE and APPLY various numerical methods for different types of analysis.
			302050.5	EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
			302050.6	GENERATE the results in the form of contour plot by the USE of CAE tools.
302051	Design of Transmission Systems	302051.1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.	
		302051.2	EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.	
		302051.3	SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.	
		302051.4	DEFINE and DESIGN various types of Clutches, Brakes, used in automobile	
		302051.5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications	
		302051.6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.	



TE (SEM-VI, TERM-II)	302052	Composite Materials	302052.1	DEFINE & COMPARE composites with traditional materials
			302052.2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
			302052.3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
			302052.4	DETERMINE volume/weight fraction and strength of Composites.
			302052.5	SELECT appropriate testing and inspection method for composite materials.
			302052.6	SELECT composites materials for various applications
	302053	Measurement Laboratory	302053.1	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.
			302053.2	ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.
			302053.3	EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
			302053.4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
			302053.5	PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and reproducibility.
			302053.6	COMPILE the information of opportunities of entrepreneurship/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc. In an industry visit report.
	302054	Fluid Power & Control Laboratory	302054.1	DEFINE working principle of components used in hydraulic and pneumatic systems
			302054.2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
			302054.3	IDENTIFY an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
			302054.4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.
	302055	Internship/Mini project	302054.5	DESIGN a hydraulic and pneumatic system for the industrial applications
			302054.6	DESIGN & DEMONSTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.
302055.1			DEMONSTRATE professional competence through industry internship.	
302055.2			APPLY knowledge gained through internships to complete academic activities in a professional manner	
302055.3			CHOOSE appropriate technology and tools to solve given problem.	
302055.4			DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.	
302055.5			DEVELOP network and social circle, and DEVELOPING relationships with industry people.	
302055.6			ANALYZE various career opportunities and DECIDE career goals.	
302056	Audit Course VI			
BE(MECHANICAL)(2019)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOMES	
BE(SEM-VII, TERM-I)	402041	Heating Ventilation Air-Conditioning and Refrigeration	402041.1	ANALYSE different air-craft refrigeration systems and EXPLAIN the properties, applications and environmental issues of different refrigerants.
			402041.2	ANALYSE multi pressure refrigeration system used for refrigeration applications.
			402041.3	DISCUSS types of compressors, condensers, evaporators and expansion valves along with regulatory and safety controls and DESCRIBE Transcritical and ejector refrigeration systems.
			402041.4	ESTIMATE cooling load for air conditioning systems used with concern of design conditions and indoor quality of air.
			402041.5	DESIGN air distribution system along with consideration of ventilation and infiltration.
			402041.6	EXPLAIN the working of types of desiccants, evaporative, thermal storage, radiant cooling, clean room and heat pump systems.
	402042	Dynamics of Machinery	402042.1	APPLY balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
			402042.2	ANALYZE the gyroscopic couple or effect for stabilization of Ship, Airplane and Four wheeler vehicles.
			402042.3	ESTIMATE natural frequency for single DOF un-damped & damped free vibratory systems.
			402042.4	DETERMINE response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
			402042.5	ESTIMATE natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems.
			402042.6	DESCRIBE noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.
	402043	Turbomachinery	402043.1	VALIDATE impulse moment principle using flat, inclined and curved surfaces and INVESTIGATE performance characteristics of hydraulic turbines.
			402043.2	DETERMINE performance parameters of impulse and reaction steam turbine along with discussion of nozzles, governing mechanism & losses
			402043.3	MEASURE performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and selection.
			402043.4	EXPLAIN performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial compressor.
	402044 A	Elective – III Automobile Design	402044 A.1	COMPREHEND the steps involved in the design process of Principal Engine Components.
			402044 A.2	GAIN the knowledge and design of Engine Sub-Systems.
			402044 A.3	COMPUTE the critical dimensions of chassis components involved in the Steering System and Differential and final drive of a vehicle.
			402044 A.4	SELECT the tyres and wheels required for automobile vehicle and design the various types automotive brakes
			402044 A.5	UNDERSTAND the design concepts of Automotive Suspension system
			402044 A.6	POSSES the knowledge of Vehicle Packaging and System Integration, NVH.
	402044 B	Elective – III Design of Heat Transfer Equipments	402044B.1	EXPLAIN the design aspect of heat exchanger considering fouling factor for Heat Transfer Applications
			402044B.2	SELECT and DESIGN the double tube heat exchangers for process industry
402044B.3			DESIGN the Shell & Tube Heat Exchangers for specified conditions	
402044B.4			DESIGN the condensers and evaporators for refrigeration applications	
402044B.5			DESIGN the compact heat exchangers	
402044B.6			ANALYSE the performance of counter and cross flow cooling tower.	
402044 C	Elective – III Modern Machining Processes	402044 C.1	UNDERSTAND and ANALYZE the mechanism, process parameters of mechanical assisted modern machining processes	
		402044 C.2	UNDERSTAND the mechanism, construction and working of laser, plasma and electron beam assisted machining.	
		402044 C.3	CLASSIFY and ANALYZE the mechanism, process parameters of the chemical and electrochemical machining.	
		402044 C.4	RELATE and ANALYZE the mechanism and select process parameters Electrical Discharge Machining for an application.	
		402044 C.5	ILLUSTRATE the application of micromachining processes.	
		402044 C.6	SUGGEST appropriate nanomachining process for the specific application	
402044 D	Elective - III Industrial Engineering	402044 D.1	EVALUATE the productivity and IMPLEMENT various productivity improvement techniques.	
		402044 D.2	APPLY work study techniques and UNDERSTANDS its importance for better productivity	
		402044 D.3	DEMONSTRATE the ability to SELECT plant location, appropriate layout and material handling equipment.	
		402044 D.4	USE of Production planning and control tools for effective planning, scheduling and managing the shop floor control.	
		402044 D.5	PLAN inventory requirements and EXERCISE effective control on manufacturing requirements.	
		402044 D.6	APPLY Ergonomics and legislations for human comfort at work place and UNDERSTANDS the role of value engineering in improving productivity.	



BE(SEM-
VIII,TERM-II)

402044 E	Elective - III Internet of Things	402044 E.1	EXPLAIN the Applications/Devices, Protocols and Communication Models of IoT
		402044 E.2	DEMONSTRATE small Mechanical Engineering IoT oriented applications using Sensors, Actuators, Microcontrollers and Cloud
		402044 E.3	SELECT commonly used IoT Simulation Hardware platforms
		402044 E.4	APPLICATION of Interfacing and Communication Technologies for IoT
		402044 E.5	APPLICATION of Interfacing and Communication Technologies for IoT
		402044 E.6	EVALUATE Present and Future Domain specific Applications of IoT Ecosystem
402044 F	Elective - III Computational Fluid Dynamics	402044 F.1	DISTINGUISH and ANALYZE the governing equations of fluid mechanics and heat transfer in various formulations
		402044 F.2	ANALYZE and MODEL the conduction and advection problems
		402044 F.3	ANALYZE and MODEL the Convection-Diffusion problems
		402044 F.4	IDENTIFY and EVALUATE the External/Internal flow and its simulation
		402044 F.5	DISTINGUISH and COMPARE concepts of stability and turbulence.
		402044 F.6	USE and APPLY a CFD tool for effectively solving practical Fluid-Structure interaction problems
402046	Data Analytics Laboratory	402046.1	UNDERSTAND the basics of data analytics using concepts of statistics and probability.
		402046.2	APPLY various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.
		402046.3	EXPLORE the data analytics techniques using various tools
		402046.4	APPLY data science concept and methods to solve problems in real world context
		402046.5	SELECT advanced techniques to conduct thorough and insightful analysis and interpret the results
		402046.6	IMPLEMENT systems approach
402047	Project (Stage - I)	402047.1	CONCEPTUALIZE a novel idea / technique into a product
		402047.2	THINK in terms of a multi-disciplinary environment.
		402047.3	TAKE ON the challenges of teamwork, and DOCUMENT all aspects of design work
		402047.4	UNDERSTAND the management techniques of implementing a project.
		402047.5	DEMONSTRATE the final product for Functionality, Designability, and Manufacturability
		402047.6	EXPLAIN CIM and factory automation.
402048	Computer Integrated Manufacturing	402048.1	UNDERSTAND the integration of hardware and software elements for CIM
		402048.2	APPLY CNC program for appropriate manufacturing techniques.
		402048.3	ANALYZE processes planning, quality and MRP integrated with computers
		402048.4	INTERPRET flexible, cellular manufacturing and group technology.
		402048.5	ANALYZE the effect of IOT, Industry-4.0 and cloud base manufacturing
		402048.6	EXPLAIN the power generation scenario, the layout components of thermal power plant and ANALYZE the improved Rankine cycle
402049	Energy Engineering	402049.1	ANALYZE the performance of steam condensers, cooling tower system; RECOGNIZE an environmental impact of energy systems and methods to control the same.
		402049.2	EXPLAIN the layout, component details of diesel engine plant, hydel and nuclear energy systems
		402049.3	ANALYZE gas and improved power cycles
		402049.4	EXPLAIN the fundamentals of renewable energy systems
		402049.5	EXPLAIN basic principles of energy management, storage and economics of power generation
		402049.6	Classify and analyze special forming processes
402050 A	Elective-IV Advanced Manufacturing Processes	402050A.1	Analyze and identify applicability of advanced joining processes
		402050A.2	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
		402050A.3	Select appropriate micro and nano fabrication techniques for engineering applications
		402050A.4	Understand and apply various additive manufacturing technology for product development
		402050A.5	Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.
		402050A.6	Design of solar food drier for domestic purpose referring existing system
402050 B	Elective-IV Solar and Wind Energy	402050 B.1	Design of parabolic dish solar cooker for domestic purpose referring existing system
		402050 B.2	Design of solar photovoltaic system for domestic purpose referring existing system
		402050 B.3	Design of solar photovoltaic system for domestic purpose referring existing system
402050 C	Elective-IV Product Design and Development	402050 B.4	Design miniature wind mill for domestic purpose referring existing system
		402050 C.1	Understand essential factors for product design
		402050 C.2	Design product as per customer needs and satisfaction
		402050 C.3	Understand Processes and concepts during product development
		402050 C.4	Understand methods and processes of Forward and Reverse engineering
		402050 C.5	Carry various design processes as DFA, DFMEA, design for safety
402051	Project-II	402050 C.6	Understand the product life cycle and product data management
		402051.1	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
		402051.2	Learn about the literature review
		402051.3	Get the experience to handle various tools, tackles and machines.



Dr
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INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT
Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University
ACADEMIC YEAR 2023-24

F.E.

COURSE OUTCOMES				
COURSE PATTERN 2019 (FE)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
FE (SEM-I, TERM-I)	107001	Engineering Mathematics-I	107001.1	Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.
			107001.2	the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
			107001.3	to deal with derivative of functions of several variables that are essential in various branches of Engineering.
			107001.4	to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.
			107001.5	the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems
	107002	Engineering Physics	107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
			107002.2	Learn basics of lasers and optical fibers and their use in some applications.
			107002.3	Understand concepts and principles in quantum mechanics. Relate them to some applications.
			107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.
			107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.
			107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.
	107009	Engineering Chemistry	107009.1	Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
			107009.2	Select appropriate electro-technique and method of material analysis.
			107009.3	Demonstrate the knowledge of advanced engineering materials for various engineering applications.
			107009.4	Analyze fuel and suggest use of alternative fuels.
			107009.5	Identify chemical compounds based on their structure.
			107009.6	Explain causes of corrosion and methods for minimizing corrosion.
	110005.1	Programming and Program Solving	110005.1	Inculcate and apply various skills in problem solving.
			110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.
			110005.3	Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python.
			110005.4	Demonstrate significant experience with the Python program development environment.
	103004	Basic Electrical Engineering	103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
			103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
			103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
103004.4			Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions	
103004.5			Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.	
103004.6			Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.	
104010	Basic Electronics	104010.1	Explain the working of P-N junction diode and its circuits.	



FE (SEM-II, TERM-II)		Engineering	104010.2	Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET.
			104010.3	Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.
			104010.4	Use different electronics measuring instruments to measure various electrical parameters.
			104010.5	Select sensors for specific applications.
	111006	Workshop Practices	111006.1	Familiar with safety norms to prevent any mishap in workshop.
			111006.2	Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
			111006.3	Able to understand the construction, working and functions of machine tools and their parts.
			111006.4	Able to know simple operations (Turning and Facing) on a centre lathe.
	101007	Environmental Studies-I	101007.1	Demonstrate an integrative approach to environmental issues with a focus on sustainability.
			101007.2	Explain and identify the role of the organism in energy transfers in different ecosystems.
			101007.3	Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources.
			101007.4	Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings.
	107008	Engineering Mathematics-II	107008.1	the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
			107008.2	advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
			107008.3	to trace the curve for a given equation and measure arc length of various curves.
			107008.4	the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
			107008.5	evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.
	101011	Engineering Mechanics	101011.1	Determine resultant of various force systems
			101011.2	Determine centroid, moment of inertia and solve problems related to friction
			101011.3	Determine reactions of beams, calculate forces in cables using principles of equilibrium
			101011.4	Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space
			101011.5	Calculate position, velocity and acceleration of particle using principles of kinematics
			101011.6	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
	102003	Basic Mechanical Engineering	102003.1	Describe and compare the conversion of energy from renewable and non-renewable energy sources
		102003.2	Explain basic laws of thermodynamics, heat transfer and their applications	
		102003.3	List down the types of road vehicles and their specifications	
		102003.4	Illustrate various basic parts and transmission system of a road vehicle	
		102003.5	Discuss several manufacturing processes and identify the suitable process	
		102003.6	Explain various types of mechanism and its application	
102012	Engineering Graphics	102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.	
		102012.2	Construct the various engineering curves using the drawing instruments.	
		102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.	
		102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.	
		102012.5	Draw the development of lateral surfaces for cut section of geometrical solids.	
		102012.6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.	
11013	Project Based Learning	11013.1	Project based learning will increase their capacity and learning through shared cognition.	
		11013.2	Students able to draw on lessons from several disciplines and apply them in practical way.	



	101014	Environmental Studies-II	11013.3	Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.
			101014.1	Have an understanding of environmental pollution and the science behind those problems and potential solutions.
			101014.2	Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.
			101014.3	Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.
			101014.4	Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.



DM
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ACADEMIC YEAR 2023-24

CIVIL

COURSE OUTCOMES

COURSE PATTERN 2019 (SE)

SE(CIVIL)

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
SE (SEM-III,TERM-I)	201001	Building Technology and Architectural Planning	201001.1	Identify types of building and basic requirements of building components.
			201001.2	Make use of Architectural Principles and Building byelaws for building construction
			201001.3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.
			201001.4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code
			201001.5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.
			201001.6	Understand different services and safety aspects
	201002	Mechanics of Structures	201002.1	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.
			201002.2	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.
			201002.3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
			201002.4	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
			201002.5	Analyze axially loaded and eccentrically loaded column.
			201002.6	Determine the slopes and deflection of determinate beams and trusses.
	201003	Fluid Mechanics	201003.1	Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems.
			201003.2	Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow
			201003.3	Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow
			201003.4	Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method.
			201003.5	Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flow computation and design of most economical channel section.
			201003.6	Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile and calculate drag and lift force on fully submerged body.
	207001	Engineering Mathematics III	207001.1	Solve Higher order linear differential equations and its applications to modelling and analysing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.
			207001.2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems
			207001.3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
207001.4			Perform Vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.	
207001.5			Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.	
207009	Engineering Geology	207009.1	Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions.	
		207009.2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.	
		207009.3	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.	



			207009.4	Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/level free from geological defects	
			207009.5	Assess the importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.	
			207009.6	Explain geological hazards and importance of ground water and uses of common buildingstones.	
	Audit Course I			201007.1	Describe functioning/working of different types of industries/sectors in Civil Engineering.
				201007.2	Describe drawings and documents required and used in different Civil Engineering works
				201007.3	Understand the importance of Code of Ethics to be practiced by a Civil Engineer and also understand the duties and responsibilities as a Civil Engineer
				201007.4	Understand different health and safety practices on the site
SE (SEM-IV, TERM-II)	201008	Geotechnical Engineering	201008.1	Identify and classify the soil based on the index properties and its formation process	
			201008.2	Explain permeability and seepage analysis of soil by construction of flow net	
			201008.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.	
			201008.4	Express shear strength of soil and its measurement under various drainage conditions.	
			201008.5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.	
			201008.6	Analysis of stability of slopes for different types of soils.	
	201009	Survey	201009.1	Define and Explain basics of plane surveying and differentiate the instruments used for it.	
			201009.2	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.	
			201009.3	Describe different methods of surveying and find relative positions of points on the surface of earth.	
			201009.4	Execute curve setting for civil engineering projects such as roads, railways etc.	
			201009.5	Articulate advancements in surveying such as space based positioning systems.	
			201009.6	Differentiate map and aerial photographs, also interpret aerial photographs.	
	201010	Concrete Technology	201010.1	Able to select the various ingredients of concrete and its suitable proportion to achieve desired strength.	
			201010.2	Able to check the properties of concrete in fresh and hardened state.	
			201010.3	Get acquainted to concreting equipments, techniques and different types of special concrete.	
			201010.4	Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques	
	201011	Structural Analysis	201011.1	Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.	
			201011.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.	
			201011.3	Implement application of the slope deflection method to beams and portal frames	
			201011.4	Analyze beams and portal frames using moment distribution method.	
			201011.5	Determine response of beams and portal frames using structure approach of stiffness matrix method.	
			201011.6	Apply the concepts of plastic analysis in the analysis of steel structures.	
	201012	Project Management	201012.1	Describe project life cycle and the domains of Project Management.	
			201012.2	Explain networking methods and their applications in planning and management	
			201012.3	Categorize the materials as per their annual usage and also calculate production rate of construction equipment	
			201012.4	Demonstrates resource allocation techniques and apply it for manpower planning.	
			201012.5	Understand economical terms and different laws associated with project management	
201012.6			Apply the methods of project selection and recommend the best economical project.		
201017	Project Based Learning	201017.1	Identify the community/ practical/ societal needs and convert the idea into a product/ process/ service.		
		201017.2	Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.		
		201017.3	Create, work in team and applying the solution in practical way to specific problem.		



COURSE PATTERN 2019 (TE)				
TE(CIVIL)				
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
TE (SEM-V,TERM-I)	301001	Hydrology and Water Resource Engineering	301001.1	Understand government organizations, apply & analyze precipitation & its abstractions.
			301001.2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
			301001.3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
			301001.4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
			301001.5	Understand water logging & water management, apply & analyze ground water hydrology
			301001.6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.
	301002	Water Supply Engineering	301002.1	Define identify, describe reliability of water sources, estimate water requirement for various sectors
			301002.2	Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
			301002.3	Design various components of water treatment plant and distribution system.
			301002.4	Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
			301002.5	Design elevated service reservoir capacity and understand the rainwater harvesting.
			301002.6	Understand the requirement of water treatment plant for infrastructure and Government scheme.
	301003	Design of Steel Structures	301003.1	Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
			301003.2	Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
			301003.3	Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.
			301003.4	Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
			301003.5	Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.
			301003.6	Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.
	301004	Engineering Economics and Financial Management	301004.1	Understand basics of construction economics.
			301004.2	Develop an understanding of financial management in civil engineering projects.
			301004.3	Prepare and analyze the contract account.
			301004.4	Decide on right source of fund for construction projects.
			301004.5	Understand working capital and its estimation for civil engineering projects.
			301004.6	Illustrate the importance of tax planning & understand role of financial regulatory bodies
	301005 c	Elective I: Construction Management	301005 c.1	Understand the overview of construction sector.
			301005 c.2	Illustrate construction scheduling, work study and work measurement.
			301005 c.3	Acquaint various labor laws and financial aspects of construction projects.
			301005 c.4	Explain elements of risk management and value engineering.
301005 c.5			State material and human resource management techniques in construction.	
301005 c.6			Understand basics of artificial intelligence techniques in civil engineering.	
301011	Audit Course : Professional Ethics and Etiquettes/Sustainable Energy Systems	301011.1	Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories	
		301011.2	Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.	
		301011.3	Follow ethics as an engineering professional and adopt good standards and norms of engineering practice.	
		301011.4	Apply ethical principles to resolve situations that arise in their professional lives	
COURSE PATTERN 2019 (TE)				
TE(CIVIL)				
	301012	Waste Water Engineering	301012.1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
			301012.2	Design preliminary and primary unit operations in waste water treatment plant
			301012.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
			301012.4	Understand and design suspended and attached growth wastewater treatment systems



TE (SEM-VI,TERM-II)	301013	Design of Reinforced Concrete Structures	301012.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
			301012.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
			301013.1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
			301013.2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
			301013.3	Design & detailing of rectangular one way and two-way slab with different boundary conditions
			301013.4	Design & detailing of dog legged and open well staircase
	301014	Remote Sensing and GIS	301013.5	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion
			301013.6	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.
			301014.1	Articulate fundamentals and principles of RS techniques.
			301014.2	Demonstrate the knowledge of remote sensing and sensor characteristics
			301014.3	Distinguish working of various spaces-based positioning systems.
			301014.4	Analyze the RS data and image processing to utilize in civil engineering
	301015	Elective II Architecture and Town Planning	301014.5	Explain fundamentals and applications of RS and GIS
			301014.6	Acquire skills of data processing and its applications using GIS
			301015.1	Apply the principles of architectural planning and landscaping for improving quality of life
301015.2			Understand the confronting issues of the area and apply the acts.	
301021B	Audit Course- II	301015.3	Evaluate and defend the proposals.	
		301015.4	Appraise the existing condition and to develop the area for betterment.	
		301021B.1	Analyze the safety problem with its solution	

COURSE PATTERN 2019 (BE)

BE(CIVIL)

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.	COURSE OUTCOMES
BE(SEM-VII,TERM-I)	401001	Foundation Engineering	401001.1	Perform subsurface investigations for foundations using different methods.
			401001.2	Estimate the bearing capacity of shallow foundations.
			401001.3	Calculate immediate and primary consolidation settlement of shallow foundations.
			401001.4	Decide the capacity of a pile and pile group.
			401001.5	Understand the steps in geotechnical design of shallow foundations and well foundations.
			401001.6	Analyze problems related to expansive soil and overcome them using design principles, construction techniques in black cotton soil.
	401002	Transportation Engineering	401 002.1	Understand principles and practices of transportation planning.
			401 002.2	Demonstrate knowledge of traffic studies, analysis and their interpretation.
			401 002.3	Design Geometric Elements of road pavement.
			401 002.4	Evaluate properties of highway materials as a part of road pavement.
			401 002.5	Appraise different types of pavements and their design.
			401 002.6	Understand the fundamentals of Bridge Engineering and Railway Engineering
	401 003 (ELE-III)	Integrated Water Resources Planning and Management	401 003.1	Understand concerned organizations, IWRP & M objectives, principles, challenges, application & analysis of IWRP&M approaches & principles in a case study
			401 003.2	Understand PIM, WDS, WALMI, agriculture in the concept of integrated water resources, apply and analyse water requirements for food production
			401 003.3	Understand assessment of surface and ground water quality, EIA, CPCB regulations, application & analysis of effluent quality standards as per CPCB
			401 003.4	Understand water economics and funding, application & analysis of planning for a sustainable water future
			402 003.5	Understand legal regulatory settings of IWRP & M, application & analysis of inter-basin water transfers and IWRP & M
			401 003.6	Understand flood control & power generation for IWRP & M, application QGIS for analysis of a basin for IWRP & M
	401 004 (ELE-IV)	Air Pollution and Control	401 004.1	Recall air pollution, legislation and regulations.
			401 004.2	Evaluate air pollutant concentrations as a function of meteorology.
			401 004.3	Interpret sampling results with prescribed standards.
			401 004.4	Assess emission inventory and air quality models.
			401 004.5	Compare the air pollution control equipments.
			401 004.6	Infer indoor air pollution and its mitigation.
Design of Prestressed Concrete Structures		401 004.1	Know the prestressed members.	
		401 004.2	Determining the stresses and various losses in prestressed concrete members.	
		401 004.3	Design the prestressed concrete structures	
		401 004.4	Design the prestressed concrete slab	
		401 004.5	Design the prestressed concrete flat slab	
		401 004.6	Analysis and design the prestressed continuous beams.	
		401 005.1	Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas.	



BE (SEM-VIII,TERM-II)	401005	Project Stage I	401 005.2	Review and organize literature survey utilizing technical resources, journals etc.
			401 005.3	Evaluate and draw conclusions related to technical content studied.
			401 005.4	Demonstrate the ability to perform critical writing by preparing a technical report.
			401 005.5	Develop technical writing and presentation skills.
	401009	Computer Programming in Civil Engineering	401009.1	Understand basics of Python Programming
			401009.2	Write Python codes for variety of problems in civil Engineering
	401010	Audit Course I- Stress Management by Yoga	401010.1	Develop understanding of Yoga and its impact on human body and mind.
			401010.2	Learn different Yogasans
			401010.3	Develop an understanding of meditation through pranayama
			401010.4	Learn different techniques of Pranayam
	401011	Dams and Hydraulics Structures	401011.1	Understand types of dams and instrumentation working .
			401011.2	Execute stability analysis of Gravity Dam
			401011.3	Understand types of spillways & Design of Ogee spillway.
			401011.4	Illustrate the failures and analyze stability of earthen dam.
			401011.5	Design Canals and understand the canal structures.
			401011.6	Analysis of the Diversion headwork and Cross Drainage work.
	401 012	Quantity Surveying, Contracts and Tenders	401012.1	Understand concept of estimates and prepare approximate estimate for various for Civil Engineering works.
			401012.2	Describe tendering process, construction contracts, and aspects of Arbitration and prepare tender documents.
			401012.3	Prepare detailed estimate of various items of work by different methods and calculate quantity of steel from Bar bending schedule.
			401012.4	Apply engineering knowledge to prepare estimate for roads, culverts, and water tank (Elevated storage tank)
			401012.5	Apply concepts of specification to draft brief specification, detailed specification and prepare detailed rate analysis report.
			401012.6	Evaluate depreciation and valuation of property on the basis of present condition, specifications and market trend.
	401 013 (ELE-V)	Hydropower Engineering	401 013.1	Understand the classification of power resources & trends in energy use patterns.
			401 013.2	Identify the components of hydro power plant.
			401 013.3	Analyze the load assessment for turbines.
			401 013.4	Prepare the layout of power house based on the various structures need for it.
			401 013.5	Design the turbines and surge tanks.
401 013.6			Understand the laws and regulatory aspects of hydroelectric power.	
401 014 (ELE-IV)	Green Structures and Smart Cities	401 014.1	Students should be able to describe the importance of energy and minimization by altering the building materials.	
		401 014.2	Students should be able to understand the importance green construction and green rating system.	
		401 014.3	Students should be able to introduce the applications of energy conservation and efficiency practices in buildings.	
		401 014.4	Students should be able to understand phases and approval involved in smart city project.	
		401 014.5	Students should be able to assess the national and global experience of smart cities.	
		401 014.6	Students should be able to understand the importance of sustainable development and current protocol of sustainable development goals.	
401015	Project Stage II	401 015.1	Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas.	
		401 015.2	Review and organize literature survey utilizing technical resources, journals etc.	
		401 015.3	Evaluate and draw conclusions related to technical content studied.	
		401 015.4	Demonstrate the ability to perform critical writing by preparing a technical report.	
		401 015.5	Develop technical writing and presentation skills.	
401 019	Audit Course II Social Responsibility	401 019.1	Develop understanding of social responsibility.	
		401 019.2	Learn the International framework for Social Responsibility.	
		401 019.3	Know the drivers of social responsibility in India.	
		401 019.4	Identify the key stakeholders of social responsibility.	



[Signature]
Principal

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