



“EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE”

GENBA SOPANRAO MOZE TRUST’S

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

(Recognized by AICTE, New Delhi; Approved by Govt. of Maharashtra;
Affiliated to Pune University)

25/1/3, Balewadi, Pune – 411045. Ph: 020-27390500

Website: www.gsmozecoe.co.in Email: gsmoze@yahoo.co.in

Department of Civil Engineering

PROGRAM OUTCOME

Programme Outcomes describe what students are expected to know or be able to do by the time of graduation from the programme. The POs for Under Graduate Course in Electronics and Telecommunication Engineering are able to

1. Apply the knowledge of technical fundamentals, mathematics and applied science for solving the domain problems.
2. Identify, Analyse complex engineering problems and review the literature for the same.
3. Design the processes, implement the system for the welfare, safety, and environmental need of the society.
4. Perform experiment, and interpret results
5. Use technical skills and tools for electronic system development.
6. Understand the importance of electronics and telecommunication in modern era.
7. Identify the needs of society for development, growth and human values
8. Understand the legal, professional, ethical responsibilities
9. Work effectively in diversified, multidisciplinary environment to achieve common goal
10. Ability to communicate effectively and possess soft skills
11. Engage themselves in continuous educational, professional and entrepreneurship development
12. Apply effectively electronics and telecommunication engineering and management skills and act as a team leader to solve industrial and social problem.

PROGRAM SPECIFIC OUTCOMES (PSO’S)

PSO1 – Inculcating communicational skills, and leadership attributes towards the team work also developing critical thinking abilities with competence in use of computational tools for current research and industry needs

PSO2 – Understanding and applying the mathematical and scientific concepts for analytical and design skills concerned with civil engineering practice

PSO3 –Enrich the knowledge in various specializations of Civil engineering (Eg: Structural, Geotechnical, Transportation, Environmental Engineering) by means of research and innovative practices

Course Outcomes

SE

Course Code	Subject:
201001	Building Technology and Architectural Planning
	Identify types of building and basic requirements of building components.
	Make use of Architectural Principles and Building byelaws for building construction.
	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.
	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.
	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.
	Understand different services and safety aspects
201002	Mechanics of structure
	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.
	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.
	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
	Use theory of torsion to determine the stresses in circular shaft and understand the concept of Principal stresses and strains.
	5Analyze axially loaded and eccentrically loaded columns.
	Determine the slopes and deflection of determinate beams and trusses.

201003	Fluid Mechanics
	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.
	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
	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.
	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.
	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.
207009	Engineering Geology
	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.
	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.
	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.
	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.
	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
	Explain geological hazards and importance of ground water and uses of

	common building stones.
201008	Geotechnical Engineering
	1. Identify and classify the soil based on the index properties and its formation process
	2. Explain permeability and seepage analysis of soil by construction of flow net.
	3. Illustrate the effect of compaction on soil and understand the basics of stress distribution.
	4. Express shear strength of soil and its measurement under various drainage conditions.
	5. Evaluate the earth pressure due to backfill on retaining structures by using different theories.
	6. Analysis of stability of slopes for different types of soils.
201009	Surveying
	Define and Explain basics of plane surveying and differentiate the instruments used for it.
	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.
	Describe different methods of surveying and find relative positions of points on the surface of earth.
	Execute curve setting for civil engineering projects such as roads, railways etc.
	Articulate advancements in surveying such as space based positioning systems
	Differentiate map and aerial photographs, also interpret aerial photographs.
201010	Concrete Technology
	Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.
	Able to check the properties of concrete in fresh and hardened state.
	Get acquainted to concreting equipments, techniques and different types of special concrete.
	Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques.

201011	Structural Analysis
	Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
	Implement application of the slope deflection method to beams and portal frames.
	Analyze beams and portal frames using moment distribution method.
	Determine response of beams and portal frames using structure approach of stiffness matrix method.
	Apply the concepts of plastic analysis in the analysis of steel structures.
201012	Project Management
	Describe project life cycle and the domains of Project Management.
	Explain networking methods and their applications in planning and management
	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment
	Demonstrates resource allocation techniques and apply it for manpower planning.
	Understand economical terms and different laws associated with project management
	Apply the methods of project selection and recommend the best economical project.

TE

Course Code	Subject
301001	Hydrology and Water Resource Engineering
	Define and explain different components of Hydrological cycle and methods of its measurements
	Design irrigation scheme for dam and considering crop water requirements in nearby area
	Study of Aquifers and its types
	Study of the runoff from given rainfall, hydrograph and its types

	Understanding various aspects for planning of reservoir
	Students are able to design water management schemes and lift irrigation system
301002	Water Supply Engineering
	Define identify, describe reliability of water sources, estimate water requirement for various sectors
	Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
	Design various components of the water treatment plant and distribution system.
	Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants
	Design elevated service reservoir capacity and understand the rainwater harvesting
	Understand the requirement of a water treatment plant for infrastructure and Government schemes.
301003	Design of Steel Structures
	Ability to learn different method of design of steel structures and design of tension member
	Ability to design compression member and built up section used as column
	Ability to design eccentrically loaded column and its base.
	Ability to design laterally supported and laterally unsupported beam.
	Ability to study beam to beam connection, beam to column connection and design of welded plate girder.
	Ability to design roof truss and gantry girder.
301004	Engineering Economics and Financial Management
	Understand basics of construction economics
	Develop an understanding of financial management in civil engineering projects
	Prepare and analyze the contract account
	Decide on right source of fund for construction projects
	Understand working capital and its estimation for civil engineering projects
	06 Illustrate the importance of tax planning & understand role of financial regulatory bodies
301005 c	Elective I Construction Management

	Understand the overview of construction sector.
	Illustrate construction scheduling, work study and work measurement.
	Acquaint various labor laws and financial aspects of construction
	Explain elements of risk management and value engineering.
	State material and human resource management techniques in construction.
	Understand basics of artificial intelligence techniques in civil engineering.
301006	Seminar
	Identify technical / practical problems in the field of civil engineering.
	Inculcate the ability to describe, interpret and analyze technical content.
	Develop competence in preparing report which will enhance critical thinking and develop the skill of technical writing along with presentation.
301011	Audit Course - Sustainable Energy Systems
	To understand the impact of engineering solutions on a global, economic, environmental and societal context.
	To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
301012	Waste Water Engineering
	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
	Design preliminary and primary unit operations in waste water treatment plant

	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
	Understand and design suspended and attached growth wastewater treatment systems
	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
301013	Design of RC Structures
	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete
	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
	Design & detailing of rectangular one way and two-way slab with different boundary conditions
	Design & detailing of dog legged and open well staircase
	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.
301014	Remote Sensing and GIS
	To comprehend fundamentals and principles of RS and GIS techniques.
	To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
	To develop skills of Image processing and GIS
	To utilize RS and GIS techniques in Engineering Geology and civil engineering.
	To study satellite image processing, satellite image interpretation, digitization and generation of thematic maps in a GIS.
	To learn buffering and layer analysis for civil engineering applications

301015 e	Elective II Architecture and Town Planning
	To use principles of architectural planning and understand the futuristic needs of users.
	To discuss and demonstrate the concepts of landscaping, urban renewal and sustainable architecture
	To distinguish and relate planning levels and understand use of act and to develop neighborhood plan
	To interpret need of civic surveys for DP proposal and value planning agencies and ITS
	To understand and demonstrate planning strategy with reference to different acts, guidelines, norms.
	To appraise multifaceted zones like SEZ, CRZ and Special township, understand applications of modern Tools like GIS / GPS / RS in town planning and need of Rural Planning
301015f	Elective II Solid Waste Management
	To understand problems of solid waste, estimate and characterize the solid waste and apply the knowledge of laws for municipal solid waste management for handling of MSW.
	To understand government initiatives for management of solid waste, to apply the knowledge of mathematics, science, and engineering for effective solid waste collection systems, for waste collection route optimization and its economics.
	To understand processing of solid waste, material recovery facility and to design composting systems, maintain and operate composting process for effective organic waste recycling.
	To understand working of waste to energy system and to design of bio-methnation and incineration system.
	To design & manage construction and operations of landfill facilities and management of legacy solid waste.
	To understand management and legal requirements of special waste and reuse, recycle and material recovery from solid waste.

BE

Course Code	Subject
401 002	Transportation Engineering
	Describe the basic components of transport system and infrastructure, their role, importance and characteristics and conduct traffic surveys to collect traffic data and apply engineering principles

	to identify and investigate traffic problems and to devise and evaluate sustainable solutions.
	Prepare a horizontal and vertical highway alignment, including super elevation and design transport system components in particular geometric design of roads and intersections which complies with IRC standards.
	Measure and calculate different traffic parameters like speed, flow, travel time and delay
	Explains the properties, role and tests on of highway materials and
	Understand pavement design and its construction process as per IRC-37 and IRC-58
	Understand the advanced pavement construction process and materials
401 003	Structural Design and Drawing III
	Student need to understand the different types of materials used in the prestress structures and how it difference from materials used in the R.C.C. structures?
	An ability to calculate losses in prestress member and enlist the different types of losses occurs in the prestress. Explain all types of stress calculation method in the prestress. Student able to design prestress girder/ P.S.C slab.
	Students understand how to calculate earthquake forces in the structures and design of earthquake resisting frame. Explains ductile detailing.
	An ability to design retaining wall with different type of embankments.
	An understanding to design of water tank rest on ground with flexible/ rigid base either with IS code method or with approximate method.
	Student need to understand where combine footing is provided and combine footing designs (slab beam type, trapezoidal type, strap beam combine footing)
401 005	TQM and MIS in Civil Engineering

	Be able to understand basic concepts and factors affecting the quality
	Be able to gain basic knowledge about MIS.
	Be able to apply tools and techniques of quality management like six sigma and its impacts
	Be able to understand the various terms of quality and importance of ISO standards and developing quality manual.
	Students should be able to understand overall cost of quality including MIS and Benchmarking.
	Students should be capable to implement modern technology and software in TQM.
401007	Dams and Hydraulic Structures
	Understanding of dam its safety and behavioral aspects with instruments
	Analysis and design of Gravity Dam with different stability conditions.
	Undertake design and detailing of Ogee Spillway.
	Students are gained the knowledge of failure aspects of earthen dam and study of diversion headwork
	Design Canal structures for satisfying irrigation in nearby area.
	Suggest types of cross drainage work for available site conditions.
401 008	Quantity Surveying, Contracts & Tenders
	Understand Estimates and its types.
	Able to take Out Quantities of different Tasks for Load Bearing Structure
	Able to take Out Quantities of different Tasks for RCC frame Structure and valuation
	Able to do Rate Analysis for tasks by studying specifications
	Able to understand tending and work execution method
	Able to understand contracting and arbitration
401004	Advanced Concrete Technology
	Students will know recent aggregates and their compatibility in concrete making
	Understand different types of concrete

	Students will be able to design modern concrete
	Students will know basic of fiber reinforced concrete
	Able to Understand different properties of fresh and hardend fiber reinforced concrete
	Able to Understand precast elements and concept of ferrocement
401010	Construction Management
	To enrich the students with the concepts and applications of Management
	To make learners to understand planning, scheduling and controlling the different activities of construction projects
	To understand the importance of laws related to construction activity and financial aspects of construction projects
	To apply knowledge of advancement in risk management and value engineering of construction projects
	To identify and manage different sources in resource management
	To understand basic terminologies and applications of artificial intelligence in civil engineering



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Department of Computer Engineering

Course Outcomes

SE 2019 PAT	
Course Code	Subject: Sem-I
210241	Discrete Mathematics CO1: Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction CO2: Develop skill in expressing mathematical properties of relation and function CO3: Identify number of logical possibilities of events to design professional engineering Solutions CO4: Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure

	<p>CO5: Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions</p>
210242	<p>Fundamentals of Data Structure</p> <p>CO1: To demonstrate a detailed understanding of behavior of data structures like array, linked list, stack, and queue by developing programs.</p> <p>CO2: To use appropriate algorithmic strategy for better efficiency</p> <p>CO3: To summarize data searching and sorting techniques.</p> <p>CO4: To discriminate the usage of various structures in approaching the problem solution.</p> <p>CO5: To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems.</p> <p>CO6: To design the algorithms to solve the programming problems</p>
210243	<p>Object Oriented Programming</p> <p>Students will be able to–</p> <p>CO1: Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software.</p> <p>CO2: Design object-oriented solutions for small systems involving multiple objects.</p> <p>CO3: Use virtual and pure virtual functions and complex programming situations.</p> <p>CO4: Apply object-oriented software principles in problem solving.</p> <p>CO5: Analyze the strengths of object-oriented programming.</p> <p>CO6: Develop the application using object oriented programming language(C++).</p>
210244	<p>Computer Graphics</p>

	<p>CO1: Define basic terminologies of Computer Graphics, interpret the mathematical foundation of the concepts of computer graphics and apply mathematics to develop Computer programs for elementary graphic operations.</p> <p>CO2: Define the concept of windowing and clipping and apply various algorithms to fill and clip polygons.</p> <p>CO3: Explain the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.</p> <p>CO4: Explain the concepts of color models, lighting, shading models and hidden surface elimination.</p> <p>CO5: Describe the fundamentals of curves, fractals, animation and gaming.</p>
210245	<p>Digital Electronics & Logic Design</p> <p>CO1: Simplify Boolean Expressions using K Map.</p> <p>CO2: Design and implement combinational circuits.</p> <p>CO3: Design and implement sequential circuits.</p> <p>CO4: Develop simple real-world applications using ASM and PLD.</p> <p>CO5: Choose appropriate logic families IC packages as per the given design specifications.</p> <p>CO6: Explain organization and architecture of computer system</p>
Sem-II	Subjects

<p>207003</p>	<p>Engineering Mathematics III</p> <p>Students will able to-</p> <p>CO1: Solve Linear differential equations, essential in modeling and design of computer-based systems.</p> <p>CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.</p> <p>CO3: Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.</p> <p>CO4: Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.</p> <p>CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.</p>
<p>210252</p>	<p>Data Structure & Algorithms</p> <p>CO1: To identify & articulate the complexity goals and benefits of a good hashing scheme for real-world applications.</p> <p>CO2: To apply non-linear data structures for solving problems of various domains.</p> <p>CO3: To design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.</p> <p>CO4: To analyze the algorithmic solutions for resource requirements and optimization</p> <p>CO5: To use efficient indexing methods and multiway search techniques to store and maintain data.</p> <p>CO6: To use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.</p>

<p>210253</p>	<p>Software Engineering</p> <p>Students will be able to-</p> <p>CO1: Analyze software requirements and formulate design solutions for a software.</p> <p>CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.</p> <p>CO3: 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.</p> <p>CO4: Model and design User interface and component-level.</p> <p>CO5: Identify and handle risk management and software configuration management.</p> <p>CO6: Utilize knowledge of software testing approaches, approaches to verification and validation.</p> <p>CO7: 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.</p>
<p>210254</p>	<p>Microprocessor</p> <p>CO1: To apply assembly language programming to develop small real life embedded applications.</p> <p>CO2: To understand the architecture of the advanced processor thoroughly to use the resources for programming</p> <p>CO3: To understand the higher processor architectures descended from 80386 architecture</p>
<p>210255</p>	<p>Principles of Programming Languages</p> <p>Students will be able to–</p> <p>CO1: Make use of basic principles of programming languages.</p> <p>CO2: Develop a program with Data representation and Computations.</p> <p>CO3: Develop programs using Object Oriented Programming language : Java.</p> <p>CO4: Develop application using inheritance, encapsulation, and polymorphism.</p> <p>CO5: Demonstrate Multithreading for robust application</p>



	<p>development.</p> <p>CO6: Develop a simple program using basic concepts of Functional and Logical programming paradigm.</p>
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TE 2019 PAT	
Course Code	Subject: Sem-I
310241	<p>Database Management System</p> <p style="text-align: center;">Student will be able to–</p> <p>CO1:Analyze and Design Database Management System using ER Model</p> <p>CO2: Implement Database Queries using Database Language</p> <p>CO3: Normalize Database Design using Normal Forms</p> <p>CO4: Apply Transaction Management Concept in Real Time Situation</p> <p>CO5: Use NoSQL Database for processing Unstructured Data</p> <p>CO6: Differentiate between Complex Data Type and Analyze the use of appropriate data types</p>
310242	<p>Theory of Computation</p> <p style="text-align: center;">Student will be able to–</p> <p>CO1: Design deterministic Turing machine for all inputs and all outputs</p> <p>CO2: Subdivide problem space based on input subdivision using constraints</p> <p>CO3: Apply linguistic theory</p>
310243	<p>Systems Programming & Operating System</p> <p>Students will be able to -</p> <p>CO1: Analyze and synthesize basic System Software and its functionality.</p> <p>CO2: Identify suitable data structures and Design & Implement various System Software</p> <p>CO3: Compare different loading schemes and analyze the performance of linker and loader</p> <p>CO4: Implement and Analyze the performance of process scheduling algorithms</p>

	<p>CO5: Identify the mechanism to deal with deadlock and concurrency issues CO6: Demonstrate memory organization and memory management policies</p>
310244	<p>Computer Networks & Security</p> <p>Students should be able to</p> <p>CO1: Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies CO2: Illustrate the working and functions of data link layer CO3: Analyze the working of different routing protocols and mechanisms CO4: Implement client-server applications using sockets CO5: Illustrate role of application layer with its protocols, client-server architectures CO6: Comprehend the basics of Network Security</p>
310245D	<p>Ele-I Software Programming Management</p> <p>CO1: Comprehend Project Management Concepts CO2: Use various tools of Software Project Management CO3: Schedule various activities in software projects CO4: Track a project and manage changes CO5: Apply Agile Project Management CO6: Analyze staffing process for team building and decision making in Software Projects and Management</p>
Sem-II	Subjects
310251	<p>Data Science & Big Data Analytics</p> <p>Students should be able to</p> <p>CO1: Analyze needs and challenges for Data Science Big Data Analytics CO2: Apply statistics for Big Data Analytics CO3: Apply the lifecycle of Big Data analytics to real world problems CO4: Implement Big Data Analytics using Python programming CO5: Implement data visualization using visualization tools in Python programming CO6: Design and implement Big Databases using the Hadoop ecosystem</p>
310252	Web Technology

	<p>Students should be able to</p> <p>CO1: Implement and Analyze behavior of the web pages using HTML and CSS</p> <p>CO2: Apply the client side technologies for Web Development</p> <p>CO3: Analyze the concept of Servlet and JSP</p> <p>CO4: Analyze the Web Services and Framework</p> <p>CO5: Apply the server side technologies for Web Development</p> <p>CO6: Create Effective web application for business functionalities using latest web development</p>
<p>310253</p>	<p>Artificial Intelligence</p> <p>Students should be able to</p> <p>CO1: Identify and apply suitable Intelligent agents for various AI applications</p> <p>CO2: Build smart system using different informed search / uninformed search or heuristic approaches</p> <p>CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem</p> <p>CO4: Apply the suitable algorithms to solve AI problems</p> <p>CO5: Implement ideas underlying modern logical inference systems</p> <p>CO6: Represent complex problems with expressive yet carefully constrained language of representation</p>
<p>310254</p>	<p>Ele - II C -Cloud Computing</p> <p>Students should be able to</p> <p>CO1: Understand the different Cloud Computing environment</p> <p>CO2: Use appropriate data storage technique on Cloud, based on Cloud application</p> <p>CO3: Analyze virtualization technology and install virtualization software</p> <p>CO4: Develop and deploy applications on Cloud</p> <p>CO5: Apply security in cloud applications</p> <p>CO6: Use advance techniques in Cloud Computing</p>

BE 2015 PAT

Course Code	Subject: Sem-I
410241	High Performance Computing Student will be able to– <ul style="list-style-type: none">● Describe different parallel architectures, interconnect networks, programming models● Develop an efficient parallel algorithm to solve given problem● Analyze and measure performance of modern parallel computing systems Build the logic to parallelize the programming task
410242	Artificial Intelligence and Robotics Student will be able to– <ul style="list-style-type: none">● Identify and apply suitable Intelligent agents for various AI applications Design smart systems using different informed search / uninformed search or heuristic approaches.● Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve a given problem.● Apply the suitable algorithms to solve AI problems
410243	Data Analytics Student will be able to– <ul style="list-style-type: none">● To write case studies in Business Analytic and Intelligence using mathematical models.● To present a survey on applications for Business Analytic and Intelligence.● To write problem solutions for multi-core or distributed, concurrent/Parallel environments
410244(C):	Ele-I-Pervasive and Ubiquitous Computing Student will be able to <ul style="list-style-type: none">●  To understand the characteristics and principles of Pervasive computing●  To introduce to the enabling technologies of pervasive computing

	<ul style="list-style-type: none"> ● To understand the basic issues and performance requirements of pervasive computing applications ● To learn the trends of pervasive computing
410245(B):	<p>Ele-II-Software Testing and Quality Assurance</p> <p>Student will be able to–</p> <ul style="list-style-type: none"> ● Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance. ● Design and develop project test plan, design test cases, test data, and conduct test operations ● Apply recent automation tool for various software testing for testing software ● Apply different approaches of quality management, assurance, and quality standard to software system ● Apply and analyze effectiveness Software Quality Tools
Sem-II	Subjects
410250	<p>Machine Learning</p> <p>Student will be able to–</p> <ul style="list-style-type: none"> ● Distinguish different learning based applications ● Apply different preprocessing methods to prepare training data sets for machine learning. ● Design and implement supervised and unsupervised machine learning algorithms. ● Implement different learning models ● Learn Meta classifiers and deep learning concepts
410251	<p>Information and Cyber Security</p> <p>Student will be able to–</p> <ul style="list-style-type: none"> ● Gauge the security protections and limitations provided by today's technology. ● Identify information security and cyber security threats. ● Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.

	<ul style="list-style-type: none"> ● Build appropriate security solutions against cyber-attacks.
410252(C)	<p>Ele-III- Embedded and RTOS</p> <p>Student will be able to-</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recognize and classify embedded and real-time systems <input type="checkbox"/> Explain communication bus protocols used for embedded and real-time systems <input type="checkbox"/> Classify and exemplify scheduling algorithms <input type="checkbox"/> Apply software development process to a given RTOS application <input type="checkbox"/> Design a given RTOS based application
410253(C):	<p>Ele-IV-Cloud Computing</p> <p>Student will be able to–</p> <ul style="list-style-type: none"> <input type="checkbox"/> To install cloud computing environments. <input type="checkbox"/> To develop any one type of cloud <input type="checkbox"/> To explore future trends of cloud computing



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Department of ENTC

COURSE OUTCOME

Engineering Mathematics -III (207005)

Outcomes: On completion of the course, learner will be able to –

CO1: Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.

CO2: Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.

CO3: Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.

CO4: Perform vector differentiation & integration, analyze the vector fields and apply to electromagnetic fields & wave theory.

CO5: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.

Electronic Circuits (204181)

Outcomes: On completion of the course, learner will be able to -

CO1: Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.

CO2: Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.

CO3: Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.

CO4: Explain internal schematic of Op-Amp and define its performance parameters.

CO5: Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.

CO6: Understand and compare the principles of various data conversion techniques and PLL with their applications.

Digital Circuits (204182)

Outcomes:

- CO1: Identify and prevent various hazards and timing problems in a digital design.
- CO2: Use the basic logic gates and various reduction techniques of digital logic circuit.
- CO3: Analyze, design and implement combinational logic circuits.
- CO4: Analyze, design and implement sequential circuits.
- CO5: Differentiate between Mealy and Moore machines.
- CO6: Analyze digital system design using PLD.

Electrical Circuits (204183)

Outcomes:

- CO1: Analyze the simple DC and AC circuit with circuit simplification techniques.
- CO2: Formulate and analyze driven and source free RL and RC circuits.
- CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
- CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
- CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
- CO6: Analyze and select a suitable motor for different applications.

Data Structures (204184)

Outcomes:

- CO1: Solve mathematical problems using C programming language.
- CO2: Implement sorting and searching algorithms and calculate their complexity.
- CO3: Develop applications of stack and queue using array.
- CO4: Demonstrate applicability of Linked List.
- CO5: Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.
- CO6: Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.

Electronic Skill Development (204189)

Outcomes:

1. Understand fundamental of various Electronic Components and Connections.
2. Understand and describe specifications, features and applications using Arduino and micro python
3. Understand and designing layout of PCB using PCB design software
4. Carry out required measurement using various instruments under different setups.
5. Able to Calculate Power budget for an electronic circuit
6. Understand the use of Various types of Batteries and solar power generation system

Signal and Systems (204191)

Course Outcomes:

CO1: Identify, classify basic signals and perform operations on signals.

CO2: Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.

CO3: Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.

CO4: Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.

CO5: Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.

CO6: Compute the mean, mean square, variance and standard deviation for given random variables using PDF.

Control Systems (204192)

Outcomes:

CO1: Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.

CO2: Determine the (absolute) stability of a closed-loop control system.

CO3: Perform time domain analysis of control systems required for stability analysis.

CO4: Perform frequency domain analysis of control systems required for stability analysis.

CO5: Apply root-locus, Frequency Plots technique to analyze control systems.

CO6: Express and solve system equations in state variable form.

CO7: Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.

Principles of Communication Systems (204193)

Outcomes:

CO1: To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.

CO2: Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.

CO3: Explain generation and detection of FM systems and compare with AM systems.

CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).

CO5: Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).

CO6: Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.

Object Oriented Programming (204194)

Outcomes:

CO1: Describe the principles of object oriented programming.

CO2: Apply the concepts of data encapsulation, inheritance in C++.

CO3: Understand Operator overloading and friend functions in C++.

CO4: Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.

CO5: Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.

CO6: Describe and use of File handling in C++.

EMPLOYABILITY SKILL DEVELOPMENT (204199)

Course Outcomes:

- CO1: Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.
- CO2: Develop effective communication skills (listening, reading, writing, and speaking), self-management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.
- CO3: Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.
- CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.
- CO5: Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.

Project Based Learning (204200)

Course Outcomes: On completion of the course, learner will be able to -

- CO1: Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.
- CO2: Contribute to society through proposed solution by strictly following professional ethics and safety measures.
- CO3: Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
- CO4: Analyze the results and arrive at valid conclusion.
- CO5: Use of technology in proposed work and demonstrate learning in oral and written form.
- CO6: Develop ability to work as an individual and as a team member.

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Digital Communication(304181)

- CO1: Apply the statistical theory for describing various signals in a communication system.
- CO2: Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
- CO3: Describe and analyze the digital communication system with spread spectrum modulation.
- CO4: Analyze a communication system using information theoretic approach.
- CO5: Use error control coding techniques to improve performance of a digital communication system

Electromagnetic Field Theory (304182)

Course Outcomes:

CO1: Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.

CO2: Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.

CO3: State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.

CO4: Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.

CO5: Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, V_{max}/V_{min} , length of transmission line using Smith Chart.

CO6: Carry out a detailed study, interpret the relevance and applications of Electromagnetic

Database Management (304183)

Outcomes:

CO1: Ability to implement the underlying concepts of a database system.

CO2: Design and implement a database schema for a given problem-domain using data model.

CO3: Formulate, using SQL/DML/DDDL commands, solutions to a wide range of query and update problems.

CO4: Implement transactions, concurrency control, and be able to do Database recovery.

CO5: Able to understand various Parallel Database Architectures and its applications.

CO6: Able to understand various Distributed Databases and its applications.

Microcontrollers (304184)

Outcomes:

CO1: Understand the fundamentals of microcontroller and programming.

CO2: Interface various electronic components with microcontrollers.

CO3: Analyze the features of PIC 18F XXXX.

CO4: Describe the programming details in peripheral support.

CO5: Develop interfacing models according to applications.

CO6: Evaluate the serial communication details and interfaces.

Computer Networks (Elective - I) (304185)

Outcomes: CO1: Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices.

CO2: Understand the working of controlling techniques for flawless data communication using data link layer protocols.

CO3: Learn the functions of network layer, various switching techniques and internet protocol addressing.

CO4: Explore various interior and exterior, unicasting and multicasting protocols.

CO5: Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS.

CO6: Illustrate the use of protocols at application layer.

Skill Development (304190)

Course Outcomes:

CO1: Student should recognize the need to engage in independent and life-long learning in required skill sets

CO2: Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.

CO3: Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.

CO4: Student would be able to communicate effectively at different technical and administrative levels.

CO5: Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.

Power Devices & Circuits (304194)

Course Outcomes:

CO1: To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.

CO2: To design triggering / driver circuits for various power devices.

CO3: To evaluate and analyze various performance parameters of the different converters and its topologies.

CO4: To understand significance and design of various protection circuits for power devices.

CO5: To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.

CO6: To understand case studies of power electronics in applications like electric vehicles, solar systems etc.

Network Security (304195)

Outcomes

- CO1: Analyze attacks on computers and computer security.
- CO2: Demonstrate knowledge of cryptography techniques.
- CO3: Illustrate various Symmetric and Asymmetric keys for Ciphers
- CO4: Evaluate different Message Authentication Algorithms and Hash Functions
- CO5: Get acquainted with various aspects of E-Mail Security
- CO6: Assimilate various aspects of Web Security

(304192) Cellular Networks

Course Outcomes:

- CO1: Understand fundamentals of wireless communications.
- CO2: Discuss and study OFDM and MIMO concepts.
- CO3: Elaborate fundamentals mobile communication.
- CO4: Describes aspects of wireless system planning.
- CO5: Understand of modern and futuristic wireless networks architecture.
- CO6: Summarize different issues in performance analysis. .

(304193) Project Management

Course Outcomes:

- CO1: Apply the fundamental knowledge of project management for effectively handling the projects.
- CO2: Identify and select the appropriate project based on feasibility study and undertake its effective planning.
- CO3: Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
- CO4: Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
- CO5: Identify and assess the project risks and manage finances in line with Project Financial Management Process.
- CO6: Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.

Internship (304199)

Outcomes:

- CO1: To develop professional competence through internship.
- CO2: To apply academic knowledge in a personal and professional environment.
- CO3: To build the professional network and expose students to future employees.
- CO4: Apply professional and societal ethics in their day to day life.
- CO5: To become a responsible professional having social, economic and administrative considerations.
- CO6: To make own career goals and personal aspirations.

Mini Project (304200)

Course Outcomes:

- CO1: Understand, plan and execute a Mini Project with team.
- CO2: Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
- CO3: Prepare a technical report based on the Mini project.
- CO 4: Deliver technical seminar based on the Mini Project work carried out. .

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VLSI Design & Technology(404181)

Outcomes

- CO-1: Identify various system requirement and model digital circuit with HDL, simulate, synthesis and prototype in PLDs
- CO-2 : Conceptualize the system through design of PLD architecture
- CO-3: Analyze different factors of chip level issues and their interconnect
- CO-4 : Design CMOS based digital circuits and understand the design rules
- CO-5: Design analog CMOS circuits for specified applications
- CO-6 : Need of testability and detect fault on circuit

Computer Networks & Security (404182)

Outcomes:

Understand fundamental underlying principles of computer networking

1. Describe and analyze the hardware, software, components of a network and the interrelations.
2. Analyze the requirements for a given organizational structure and select the most appropriate Networking architecture and technologies;
3. Have a basic knowledge of the use of cryptography and network security;
4. Have a basic knowledge of installing and configuring networking applications.
5. Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.

Radiation & Microwave Techniques (404183)

Outcomes: After successfully completing the course student should be able to:

CO-1: Differentiate various performance parameters of radiating elements.

CO-2 Analyze various radiating elements and arrays.

CO-3 Apply the knowledge of waveguide fundamentals in design of transmission lines.

CO-4 Design and set up a system consisting of various passive microwave components.

CO-5 Analyze tube based and solid state active devices along with their applications.

CO-6 Measure various performance parameters of microwave components.

Digital Image and Video Processing (404184)

Course Outcomes:

CO-1: Develop and implement algorithms for digital image processing.

CO-2: Examine various types of images, intensity transformations and spatial filtering.

CO-3: Develop Fourier transform for image processing in frequency domain.

CO-4: Evaluate the methodologies for image segmentation, restoration etc.

CO-5: Implement image process and analysis algorithms.

CO-6: Apply image processing algorithms for practical object recognition applications

Electronic Product Design (404185)

Outcomes: After successfully completing the course students will be able to

- CO-1 : Understand various stages of hardware, software and PCB design
- CO-2 : Analyze the requirement of hardware design & test specifications
- CO-3 : Requirement and importance of software design & test specifications
- CO-4 : Need of PCB design in electronics
- CO-5 : Importance of product debugging and testing
- CO-6 : Special design considerations and importance of documentation

Mobile Communication(404189)

Outcomes:

- CO-1: Explain and apply the concepts telecommunication switching, traffic and networks
- CO-2: Analyze the telecommunication traffic.
- CO-3: Analyze radio channel and cellular capacity.
- CO-4: Comparative study of different generation of Mobile system like 1G,2G,3G
- CO-5: Explain and apply concepts of GSM .
- CO-6: Explain and apply concepts of CDMA system.

Broadband Communication Systems(404190)

Course Outcomes:

- CO-1: Understand the basic elements of optical fiber transmission link, fiber modes configurations, different kind of losses, optical sources and detectors
- CO-2: Carry out Link power budget and Rise Time Budget
- CO-3: Learn the fiber optical network components and optical amplifiers.
- CO-4: Understand the basic principle & terminologies of Satellite communication systems
- CO-5: Explain the principles, concepts and operation of satellite communication systems
- CO-6: Analyze the design requirements and the performance of satellite communication systems

Audio Video Engineering (Elective-III)

Outcomes: After successfully completing the course student should be able to:

CO-1: To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.

CO-2: To study the various Colour Television systems.

CO-3: Greater emphasis on television standards.

CO-4: To study the advanced topics in Digital Television and High Definition Television:

CO-5: To study audio recording systems such CD/DVD recording, Audio Standards,

CO-6: To Study Acoustics principles. application

404192 C Wireless Sensor Networks (Elective-IV)

Outcomes

CO-1: Explain various concepts and terminologies used in WSN

CO-2: Describe importance and use of radio communication and link management in WSN

CO-3: Explain various wireless standards and protocols associated with WSN

CO-4: Recognise importance of localisation and routing techniques used in WSN

CO-5: Understand techniques of data aggregation and importance of security in WSN

CO-6: Examine the issues involved in design and deployment of WSN

Prof. Sushma Patwardhan

HOD EITC

Head of the Department

Electronics & Telecommunication Engg.

Sopanrao Moze College of Engg.

Belawadi, Pune - 411 046

PRINCIPAL

Genba Sopanrao Moze College of Engg

25/1/3, Belawadi, Pune - 411 045





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GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

(Recognized by AICTE, New Delhi; Approved by Govt. of Maharashtra;
Affiliated to Pune University)

25/1/3, Balewadi, Pune – 411045. Ph: 020-27390500

Website: www.gsmozecoe.co.in Email: gsmoze@yahoo.co.in

Department of First Year Engineering

Course Outcomes

SUB CODE: 101011	Subject: Engineering Mechanics
CO 1	Students will acquire the knowledge of Basic Mathematics and Mechanics by understanding the concepts related to Resolution & Composition of various force systems
CO 2	Students will be able to solve the practical problems related to centroid, moment of inertia and also solve problems related to friction

CO 3	Students will be able to understand and apply the practical applications of equilibrium conditions for coplanar and non coplanar force systems.
CO 4	Students will be able to analyse the different structures such as trusses, frames, cables.
CO 5	Students will be able to calculate position, velocity and acceleration of particle using principles of kinematics
CO 6	Students will be able to correlate the concepts related to power; work and energy to solve practical problems.

SUB CODE: 107009	Subject: Engineering chemistry
CO 1	Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity
CO 2	Select appropriate electro-technique and method of material analysis
CO 3	Demonstrate the knowledge of advanced engineering materials for various engineering applications.

CO 4	Analyze fuel and suggest use of alternative fuels.
CO 5	Identify chemical compounds based on their structure.
CO 6	Explain causes of corrosion and methods for minimizing corrosion

SUB CODE: 104010	Subject: Basic Electronics Engineering
CO 1	Explain the working of P-N junction diode and its circuits.
CO 2	Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET
CO 3	Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops
CO 4	Use different electronics measuring instruments to measure various electrical parameters.
CO 5	Select sensors for specific applications

CO 6	Describe basic principles of communication systems.
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SUB CODE: 107002	Subject: Engineering Physics
CO 1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
CO 2	Learn basics of lasers and optical fibers and their use in some applications
CO 3	Understand concepts and principles in quantum mechanics. Relate them to some applications.
CO 4	Understand theory of semiconductors and their applications in some semiconductor devices.
CO 5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications
CO 6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.

SUB CODE: 102012	Subject: Engineering Graphics
CO 1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
CO 2	Construct the various engineering curves using the drawing instruments.
CO 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.
CO 4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.
CO 5	Draw the development of lateral surfaces for cut section of geometrical solids.
CO 6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.

SUB CODE: 107001	<p style="text-align: center;">Subject: Engineering Mathematics – I</p>
CO 1	Mean value theorems and its generalizations leading to Taylors and Maclaurin’s series useful in the analysis of engineering problems.
CO 2	The Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
CO 3	To deal with derivative of functions of several variables that are essential in various branches of Engineering
CO 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.
CO 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

SUB CODE: (107008)	Subject: Engineering Mathematics II
CO1	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.
CO2	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.
CO3	To trace the curve for a given equation and measure arc length of various curves.
CO4	the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
CO5	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.

SUB CODE: 102003	Systems in Mechanical Engineering
CO 1	Describe and compare the conversion of energy from renewable and non-renewable energy sources
CO 2	Explain basic laws of thermodynamics, heat transfer and their applications

CO 3	List down the types of road vehicles and their specifications
CO 4	Illustrate various basic parts and transmission system of a road vehicle
CO 5	Discuss several manufacturing processes and identify the suitable process
CO 6	Explain various types of mechanism and its application

SUB CODE: 11005	Programming and Problem Solving
CO 1	CO1: Inculcate and apply various skills in problem solving.
CO 2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.
CO 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.
CO 4	Demonstrate significant experience with the Python program development environment.

SUB CODE: 103004	Subject: Basic Electrical Engineering
CO 1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
CO 2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
CO 3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
CO 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
CO 5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
CO 6	Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.



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25/1/3, Balewadi, Pune – 411045. Ph: 020-27390500
Website: www.gsmozecoe.co.in Email: gsmoze@yahoo.co.in

Department of Information Technology

Course Outcomes

SE 2019 PAT

Course Code	Subject: Sem-I
214441	Discrete Mathematics CO1: Formulate and apply formal proof techniques and solve the problems with logical reasoning. CO2: Analyze and evaluate the combinatorial problems by using probability theory. CO3: Apply the concepts of graph theory to devise mathematical models. CO4: Analyze types of relations and functions to provide solution to computational problems. CO5: Identify techniques of number theory and its application. CO6: Identify fundamental algebraic structures.
214442	Logic Design & Computer Organization CO1: Perform basic binary arithmetic & simplify logic expressions. CO2: Grasp the operations of logic ICs and Implement

	<p>combinational logic functions using ICs.</p> <p>CO3: Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.</p> <p>CO4: Elucidate the functions & organization of various blocks of CPU.</p> <p>CO5: Understand CPU instruction characteristics, enhancement features of CPU.</p> <p>CO6: Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.</p>
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<p>214443</p>	<p>Data Structure & Algorithms</p> <p>CO1: Perform basic analysis of algorithms with respect to time and space complexity.</p> <p>CO2: Select appropriate searching and/or sorting techniques in the application development.</p> <p>CO3: Implement abstract data type (ADT) and data structures for given application.</p> <p>CO4: Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.</p> <p>CO5: Apply implement learned algorithm design techniques and data structures to solve problems.</p> <p>CO6: Design different hashing functions and use files organizations.</p>
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<p>214444</p>	<p>Object-Oriented Programming</p> <p>CO1: Differentiate various programming paradigms.</p> <p>CO2: Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems.</p> <p>CO3: Identify relationship among objects using inheritance and polymorphism principles.</p> <p>CO4: Handle different types of exceptions and perform generic programming.</p> <p>CO5: Use of files for persistent data storage for real world application.</p> <p>CO6: Apply appropriate design patterns to provide object-oriented solutions.</p>
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<p>214445</p>	<p>Basics of Computer Network</p> <p>CO1: Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.</p> <p>CO2: Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.</p> <p>CO3: Compare different access techniques, channelization and IEEE standards.</p> <p>CO4: Apply the skills of subnetting, supernetting and routing mechanisms.</p> <p>CO5: Differentiate IPv4 and IPv6.</p> <p>CO6: Illustrate services and protocols used at transport layer.</p>
<p>Sem-II</p> <p>207003</p>	<p>Subjects- Sem-II</p> <p>Engineering Mathematics III</p> <p>Students will able to</p> <p>CO1: Solve Linear differential equations, essential in modeling and design of computer-based systems.</p> <p>CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.</p> <p>CO3: Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.</p> <p>CO4: Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.</p> <p>CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.</p>
<p>214451</p>	<p>Processor Architecture</p> <p>CO1: Apprehend architecture and memory organization of PIC 18 microcontroller.</p> <p>CO2: Implement embedded C programming for PIC 18.</p> <p>CO3: Use concepts of timers and interrupts of PIC 18.</p> <p>CO4: Demonstrate real life applications using PIC 18.</p> <p>CO5: Analyze architectural details of ARM processor.</p>

<p>214452</p>	<p>Database Management System</p> <p>CO1: Apply fundamental elements of database management systems.</p> <p>CO2: Design ER-models to represent simple database application scenarios.</p> <p>CO3: Formulate SQL queries on data for relational databases.</p> <p>CO4: Improve the database design by normalization & to incorporate query processing.</p> <p>CO5: Apply ACID properties for transaction management and concurrency control.</p> <p>CO6: Analyze various database architectures and technologies.</p>
<p>214453</p>	<p>Computer Graphics</p> <p>CO1: Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.</p> <p>CO2: Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2 dimensional and 3-dimensional space respectively.</p> <p>CO3: Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.</p> <p>CO4: Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.</p> <p>CO5: Perceive the concepts of virtual reality.</p>

214454	<p>Software Engineering</p> <p>CO1: Classify various software application domains.</p> <p>CO2: Analyze software requirements by using various modeling techniques.</p> <p>CO3: Translate the requirement models into design models.</p> <p>CO4: Apply planning and estimation to any project.</p> <p>CO5: Use quality attributes and testing principles in software development life cycle.</p> <p>CO6: Discuss recent trends in Software engineering by using CASE and agile tools.</p>
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TE 2019 PAT	
Course Code	Subject: Sem-I
314441	<p>Theory of Computation</p> <p>CO1: Construct finite automata and its variants to solve computing problems.</p> <p>CO2: Write regular expressions for the regular languages and finite automata.</p> <p>CO3: Identify types of grammar, design and simplify Context Free Grammar.</p> <p>CO4: Construct Pushdown Automata machine for the Context Free Language.</p> <p>CO5: Design and analyze Turing machines for formal languages.</p> <p>CO6: Understand decidable and undecidable problems, analyze complexity classes.</p>
314442	<p>Operating Systems</p> <p>CO1: Explain the role of Modern Operating Systems.</p> <p>CO2: Apply the concepts of process and thread scheduling.</p> <p>CO3: Illustrate the concept of process synchronization, mutual exclusion and the deadlock.</p> <p>CO4: Implement the concepts of various memory management techniques.</p>

	<p>CO5: Make use of concept of I/O management and File system.</p> <p>CO6: Understand Importance of System software.</p>
314443	<p>Machine Learning</p> <p>CO1: Apply basic concepts of machine learning and different types of machine learning algorithms.</p> <p>CO2: Differentiate various regression techniques and evaluate their performance.</p> <p>CO3: Compare different types of classification models and their relevant application.</p> <p>CO4: Illustrate the tree-based and probabilistic machine learning algorithms.</p> <p>CO5: Identify different unsupervised learning algorithms for the related real-world problems.</p> <p>CO6: Apply fundamental concepts of ANN.</p>
314444	<p>Human Computer Interaction</p> <p>CO1: Explain importance of HCI study and principles of user-centered design (UCD) approach.</p> <p>CO2: Develop understanding of human factors in HCI design.</p> <p>CO3: Develop understanding of models, paradigms, and context of interactions.</p> <p>CO4: Design effective user-interfaces following a structured and organized UCD process.</p> <p>CO5: Evaluate usability of a user-interface design.</p> <p>CO6: Apply cognitive models for predicting human-computer-interactions.</p>

314445(A)	<p>Elective -I : Design and Analysis of Algorithm</p> <p>CO1: Calculate computational complexity using asymptotic notations for various algorithms.</p> <p>CO2: Apply Divide & Conquer as well as Greedy approach to design algorithms.</p> <p>CO3: Understand and analyze optimization problems using dynamic programming.</p> <p>CO4: Illustrate different problems using Backtracking.</p> <p>CO5: Compare different methods of Branch and Bound strategy.</p> <p>CO6: Classify P, NP, NP-complete, NP-Hard problems.</p>
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<p>314445(B)</p>	<p>Elective -I : Advanced Database Management System</p> <p>CO1: Differentiate relational and object-oriented databases.</p> <p>CO2: Illustrate parallel & distributed database architectures.</p> <p>CO3: Apply concepts of NoSQL Databases.</p> <p>CO4: Explain concepts of data warehouse and OLAP technologies.</p> <p>CO5: Apply data mining algorithms and various software tools.</p> <p>CO6: Comprehend emerging and enhanced data models for advanced applications.</p>
<p>314445(C)</p>	<p>Elective I : Design Thinking</p> <p>CO1: Identify need and features of design thinking.</p> <p>CO2: Identify the opportunities and challenges for design thinking innovation.</p> <p>CO3: Learn the process of design thinking using various tools.</p> <p>CO4: Summarize and learn the various prototyping techniques.</p> <p>CO5: Enlist the activities carried out in Test and reflect phase of design thinking.</p> <p>CO6: Interpret the design thinking disruptive innovations through case studies.</p>
<p>314445(D)</p>	<p>Elective I : Internet of Things</p> <p>CO1: Discuss fundamentals, architecture and framework of IoT.</p> <p>CO2: Select suitable sensors and actuators for real time scenarios.</p> <p>CO3: Justify the significance of protocol for wireless communication and IoT challenges</p> <p>CO4: Understand the Python programming for development of IoT applications.</p> <p>CO5: Understand the cloud interfacing technologies.</p> <p>CO6: Design and Implement realtime IoT applications.</p>

<p>Sem-II</p>	<p>Sem-II</p>
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<p>314451</p>	<p>Computer Network and Security CO1: Explain Responsibilities, services offered and protocol used at application layer of network CO2: Apply concepts of wireless network and different wireless standards. CO3: Recognize the Adhoc Network's MAC layer, routing protocol and Sensor network architecture. CO4: Implement the principal concepts of network security and Understand network security threats, security services, and countermeasures CO5: Apply basic cryptographic techniques in application development. CO6: Gain a good comprehension of the landscape of cyber security Vulnerabilities & describe typical threats to modern digital systems.</p>
<p>314452</p>	<p>Data Science and Big Data Analytics CO1: Understand Big Data primitives. CO2: Learn and apply different mathematical models for Big Data. CO3: Demonstrate Big Data learning skills by developing industry or research applications. CO4: Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets. CO5: Understand, apply and analyze needs, challenges and techniques for big data visualization. CO6: Learn different programming platforms for big data analytics.</p>
<p>314453</p>	<p>Web Application Development CO1: Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap. CO2: Demonstrate the use of web scripting languages. CO3: Develop web application with Front End & Back End Technologies. CO4: Develop mobile website using JQuery Mobile. CO5: Deploy web application on cloud using AWS.</p>

<p>314454 (A)</p>	<p>Elective II (Artificial Intelligence) CO1: Apply the fundamental concepts of Artificial Intelligence CO2: Choose appropriate search strategies for any AI problem CO3: Illustrate knowledge reasoning and knowledge representation methods (for solving real world problems) CO4: Analyze the suitable techniques of NLP to develop AI applications CO5: Correlate the appropriate methods of Game Theory to design AI applications CO6: Understand the concept of deep learning and AI applications</p>
<p>314454 (B)</p>	<p>Elective-II (Cyber Security) CO1: Develop basic understanding of cybersecurity. CO2: Differentiate among different types of cyber threats and cyber-crimes. CO3: Illustrate cyberforensic techniques to identify the criminal activities. CO4: Apply forensic analysis tools to recover important evidence for identifying computer crime CO5: Distinguish and classify the forms of cybercriminal activity and the technological and social engineering' methods used to undertake such crimes CO6: Evaluate the effectiveness of cyber-security, cyber-laws and other countermeasures against cybercrime</p>

<p>314454 (C)</p>	<p>Elective-II- (Cloud Computing) CO1: Articulate the main concepts, key technologies and fundamentals of cloud computing. CO2: Understand cloud enabling technologies and virtualization. CO3: Analyze various cloud programming models and apply them to solve problems on the cloud. CO4: Explain data storage and major security issues in the cloud. CO5: Understand trends in ubiquitous cloud and internet of things. CO6: Explore future trends of cloud computing.</p>
<p>314454 (D)</p>	<p>Elective –II (Software Modeling and Design) CO1: Understand basics of object oriented methodologies and Unified Modeling Language (UML). CO2: Apply analysis process, use case modeling, domain/class modeling CO3: Design and apply interaction and behavior modeling on a given system. CO4: Comprehend OO design process and business, access and view layer class design. CO5: Recognize the software design principles and patterns to be applied on system. CO6: Illustrate architectural design principles and guidelines in the various type of application development.</p>
<p>314455</p>	<p>Internship CO1: Develop professional competence through industry internship. CO2: Apply academic knowledge in a personal and professional environment CO3: Build the professional network and expose students to future employees. CO4: Apply professional and societal ethics in their day-to-day life. CO5: Become a responsible professional having social, economic and administrative considerations. CO6: Make own career goals and personal aspirations.</p>

BE 2015 PAT

Course Code

Subject: Sem-I

414453	<p>Information and Cyber Security</p> <ol style="list-style-type: none">1. Use basic cryptographic techniques in application development.2. Apply methods for authentication, access control, intrusion detection and prevention.3. To apply the scientific method to digital forensics and perform forensic investigations.4. To develop computer forensics awareness.5. Ability to use computer forensics tools.
414454	<p>Machine Learning and Applications</p> <ol style="list-style-type: none">1. Model the learning primitives.2. Build the learning model.3. Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.
414455	<p>Software Design and Modeling</p> <ol style="list-style-type: none">1. Understand object oriented methodologies, basics of Unified Modeling Language (UML).2. Understand analysis process, use case modeling, domain/class modeling3. Understand interaction and behavior modeling.4. Understand design process and business, access and view layer class design5. Get started on study of GRASP principles and GoF design patterns.6. Get started on study of architectural design principles and guidelines in the various type of application development.
414456A: Elective-I	<p>Wireless Communications</p>

	<ol style="list-style-type: none"> 1. Understand the basics of propagation of radio signals. 2. Understand the basic concepts of basic Cellular System and the design requirements. 3. Have an understanding of the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs. 4. Gain insights into various mobile radio propagation models and how the diversity can be exploited to improve performance. 5. Gain knowledge and awareness of the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc. 6. Have in-depth understanding of the design consideration and architecture for different Wireless Systems like GSM, CDMA, GPRS etc. 7. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges.
414456B: Elective-I	Natural Language Processing
	<ol style="list-style-type: none"> 1. Understand automatic processing of human languages using computers. 2. Understand various applications of natural language processing.

414456C: Elective-I	Usability Engineering
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	<ol style="list-style-type: none"> 1. Justify the theory and practice of usability evaluation approaches, methods and techniques. 2. Compare and evaluate strengths and weaknesses of various approaches, methods and techniques for evaluating usability. 3. Design and implement a usability test plan, based on modelling or requirements specification. 4. Choose appropriate approaches, methods and techniques to evaluate the usability of a specified interactive system.
414456D: Elective-I	Multicore and Concurrent Systems
	<ol style="list-style-type: none"> 1. Know types of parallel machine and to know multicore and concurrent systems in detail. 2. Know the ways to measure the performance of multicore systems. 3. Understand need of multicore and concurrent system programming. 4. Know the different approaches for multicore and concurrent programming. 5. Use and apply the approaches learned, for application development. 6. Understand and explore recent trends in multicore and concurrent system programming.
414456E: Elective-I	Business Analytics and Intelligence
	<ol style="list-style-type: none"> 1. Comprehend the Information Systems and development approaches of Intelligent Systems. 2. Evaluate and rethink business processes using information systems. 3. Propose the Framework for business intelligence. 4. Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence. 5. Align business intelligence with business strategy. 6. Apply the techniques for implementing business intelligence systems.

414457A: Elective-II	Software Defined Networks
	<ol style="list-style-type: none"> 1. Acquire fundamental knowledge of SDN exploring the need, characteristics, and architecture of SDN. 2. Recognize OpenFlow protocols and its forwarding, pipeline model. 3. Understand different methodologies for sustainable SDN. 4. Comprehend IT Infrastructure for SDN. 5. Acquiring knowledge of OpenFlow protocols, visualization.
414457B: Elective-II	Soft Computing
	<ol style="list-style-type: none"> 1. Tackle problems of interdisciplinary nature. 2. Find an alternate solution, which may offer more adaptability, resilience and optimization. 3. Gain knowledge of soft computing domain which opens up a whole new career option. 4. Tackle real world research problems.
414457C: Elective-II	Software Testing and Quality Assurance
	<ol style="list-style-type: none"> 1. Test the software by applying testing techniques to deliver a product free from bugs. 2. Investigate the scenario and to select the proper testing technique. 3. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics. 4. Understand how to detect, classify, prevent and remove defects. 5. Choose appropriate quality assurance models and develop quality. 6. Ability to conduct formal inspections, record and evaluate results of inspections.

414457D: Elective-II	Compiler Construction
	<ol style="list-style-type: none"> 1. Understand the structure of compilers. 2. Understand the basic and advanced techniques used in compiler construction.

	<ol style="list-style-type: none"> 3. Understand the basic data structures used in compiler construction such as abstract syntax. 4. Cognitive skills (thinking and analysis)- Design and implement a compiler using a software engineering approach. 5. Communication skills (personal and academic). 6. Practical and subject specific skills (Transferable Skills) - Use generators (e.g. Lex and Yacc).
414457E: Elective-II	Gamification
	<ol style="list-style-type: none"> 1. Write programs to solve problems using gamification and open source tools. 2. Apply gamification for Mobile and Web Applications. 3. Solve problems for multi-core or distributed, concurrent/Parallel environments
414458:	Computer Laboratory VII
	<ol style="list-style-type: none"> 1. The students will be able to implement and port controlled and secured access to software systems and networks. 2. The students will be able to build learning software in various domains.
414459:	Computer Laboratory VIII

	<ol style="list-style-type: none"> 1. Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects. 2. Identify different software artifacts used to develop analysis and design model from requirements. 3. Develop use case model. 4. Develop, implement analysis model and design model. 5. Develop, implement Interaction and behavior Model. 6. Implement an appropriate design pattern to solve a design problem.
414460:	Project Phase-I
	<ol style="list-style-type: none"> 1. To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios. 2. To function effectively as a team to accomplish a desired goal. 3. An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.

414461:	Audit Course-V
414461A:	Audit Course-V Emotional Intelligence
	<ol style="list-style-type: none"> 1) Expand your knowledge of emotional patterns in yourself and others. 2) Discover how you can manage your emotions, and positively influence yourself and others. 3) Build more effective relationships with people at work and at home. 4) Positively influence and motivate colleagues, team members, and managers. 5) Increase your leadership effectiveness by creating an atmosphere that engages others. 6) Apply EI behaviours and supports high performance

414461B:	Audit Course-V Green Computing
	<ol style="list-style-type: none"> 1) Understand the concept of green IT and relate it to sustainable development. 2) Apply the green computing practices to save energy. 3) Discuss how the choice of hardware and software can facilitate a more sustainable operation. 4) Use methods and tools to measure energy consumption
414461C:	Audit Course-V Critical Thinking
	<ol style="list-style-type: none"> 1) If students whole-heartedly participate in the course, they can expect to be smarter, stronger and more confident thinkers. 2) They can embark on a life-long journey of “self-directed learning”.
414461D:	Audit Course-V Statistical Learning Model using
	<ol style="list-style-type: none"> 1) Students will be familiar with concepts related to “data science”, ”analytics”, “machine learning”, etc. These are important topics, and will enable students to embark on highly rewarding careers. 2) Students will capable of learning “big data” concepts on their own

414462:	Distributed Computing System
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	<ol style="list-style-type: none"> 1. Understand the principles and desired properties of distributed systems based on different application areas. 2. Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving. 3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources. 4. Identify the challenges in developing distributed applications
414463:	Ubiquitous Computing
	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of design of Ubicomp and its applications. 2. Explain smart devices and services used Ubicomp. 3. Describe the significance of actuators and controllers in real time application design. 4. Use the concept of HCI to understand the design of automation applications. 5. Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy. 6. Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.
414464A:	Elective III
	Internet of Things (IoT)
	<ol style="list-style-type: none"> 1. Explain what is internet of things. 2. Explain architecture and design of IoT. 3. Describe the objects connected in IoT. 4. Understand the underlying Technologies. 5. Understand the platforms in IoT. 6. Understand cloud interface to IoT.
414464A:	Elective III
	Internet of Things Laboratory

	<ol style="list-style-type: none"> 1. To understand IoT platforms such as Raspberry-Pi/Beagle board/Arduino. 2. To understand operating systems for platforms such as Raspberry Pi/Beagle board/Arduino. 3. To communicate with objects using IoT platforms such as Raspberry Pi/Beagle board/Arduino. 4. To interface cloud environment for IoT application. 5. To implement IoT related protocols such as MQTT / CoAP etc. 6. To implement the web interface for IoT
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414464B:	<p>Elective III</p> <p>Information Storage and Retrieval</p>
	<ol style="list-style-type: none"> 1. Understand the concept of Information retrieval. 2. Deal with storage and retrieval process of text and multimedia data. 3. Evaluate performance of any information retrieval system. 4. Design user interfaces. 5. Understand importance of recommender system. 6. Understand concept of multimedia and distributed information retrieval.
414464B:	<p>Information Storage and Retrieval Laboratory</p>
	<ol style="list-style-type: none"> 1. Understand the concept, data structure and preprocessing algorithms of Information retrieval. 2. Deal with storage and retrieval process of text and multimedia data. 3. Evaluate performance of any information retrieval system. 4. Design user interfaces. 5. Understand importance of recommender system (Take decision on design parameters of recommender system). 6. Understand concept of multimedia and distributed information retrieval. 7. Map the concepts of the subject on recent developments in the Information retrieval field.
414464C:	<p>Elective III</p> <p>Multimedia Techniques</p>

	<ol style="list-style-type: none"> 1. To create own file formats for specific application. 2. To do some projects based on current trends in multimedia. 3. To use open sources for authoring tool for animation and presentations. 4. Understand some research areas of current multimedia techniques.
414464C:	Multimedia Techniques Laboratory
	<ol style="list-style-type: none"> 1. To create own file formats for specific application. 2. To do some projects based on current trends in multimedia. 3. To use open sources for authoring tool for animation and presentations
414464D:	Elective III Internet and Web Programming

	<ol style="list-style-type: none"> 1. Demonstrate static website using basic tools. 2. Develop client side programming skills. 3. Develop server side programming skills. 4. Understand web services and handle content management tools. 5. Develop mobile website using mobile web development tools. 6. Understand aspects of web security and cyber ethics.
414464D:	Internet and Web Programming Laboratory
	<ol style="list-style-type: none"> 1. Use fundamental skills to develop and maintain website and web application. 2. Apply scripting skills for Server side and Client-side Programming. 3. Develop web services to transfer data and add interactive components to website. 4. Combine multiple web technologies to create advanced web components.
414464E:	Elective III Computational Optimization

	<ol style="list-style-type: none"> 1. Learn and implement various optimization techniques. 2. Learn model real-world problems in optimization framework. 3. Apply various optimization models to solve optimization problems in computer-science & IT Engineering.
414464E:	Computational Optimization Laboratory
	<ol style="list-style-type: none"> 1. Understand Transportation problem. 2. Learn different measures in shortest path algorithms. 3. Understand and learn Queuing Model.
414465A:	Elective IV Rural Technologies and Community Development
	<ol style="list-style-type: none"> 1. Understand rural development model. 2. Learn different measures in rural development and its impact on overall economy. 3. Understand and learn importance of technologies in rural and community development. 4. Understand challenges and opportunities in rural development.
414465B:	Elective IV Parallel Computing
	<ol style="list-style-type: none"> 1. Understand fundamentals in parallel computing. 2. Understand and learn importance of technologies including different hardware structures used in parallel computing. 3. Understand challenges and opportunities in parallel computing

414464C:	Elective IV Computer Vision
	<ol style="list-style-type: none"> 1. Implement fundamental image processing techniques required for computer vision. 2. Implement boundary tracking techniques. 3. Apply Hough Transform for line, circle, and ellipse detections. 4. Implement motion related techniques. 5. Develop skills to develop applications using computer vision techniques.

414464D:	<p>Elective IV</p> <p>Social Media Analytics</p>
	<ol style="list-style-type: none"> 1. Understand the basics of Social Media Analytics. 2. Explain the significance of Data mining in Social media. 3. Demonstrate the algorithms used for text mining. 4. Apply network measures for social media data. 5. Explain Behavior Analytics techniques used for social media data. 6. Apply social media analytics for Face book and Twitter kind of applications.
414465E:	<p>Elective IV</p> <p>Open Elective</p>
414466	<p>COMPUTER LABORATORY-IX</p>
	<ol style="list-style-type: none"> 1. Demonstrate knowledge of the core concepts and techniques in distributed systems. 2. Learn how to apply principles of state-of-the-Art Distributed systems in practical application. 3. Design, build and test application programs on distributed systems.
414467:	<p>COMPUTER LABORATORY-X</p>
	<ol style="list-style-type: none"> 1. Set up the Android environment and explain the Evolution of cellular networks. 2. Develop the User Interfaces using pre-built Android UI components. 3. Create applications for performing CURD SQLite database operations using Android. 4. Create the smart android applications using the data captured through sensors. 5. Implement the authentication protocols between two mobile devices for providing Security.

	6. Analyze the data collected through android sensors using any machine learning algorithm.
414468:	Project Work
	<ol style="list-style-type: none"> 1. Learn teamwork. 2. Be well aware about Implementation phase. 3. Get exposure of various types of testing methods and tools. 4. Understand the importance of documentation.
414461:	Audit Course-VI
414469A:	<p>Audit Course-VI</p> <p>IoT Applications in Engineering Field.</p>
	<p>By the end of the course, students should be able to</p> <ol style="list-style-type: none"> 1. Expand your knowledge of Internet of Things. 2. Discover how you can use IoT in your Engineering applications. 3. Build more effective hands on with IoT elements. 4. Expand the practical knowledge of using IoT components like sensors, processors. 5. Expand the understanding of using different protocols.
414469B:	<p>Audit Course-VI</p> <p>Entrepreneurship</p>
	<ol style="list-style-type: none"> 1. Expand your knowledge of Entrepreneurship & Startups. 2. Discover how you can use Entrepreneur Qualities. 3. Expand the practical knowledge of Finance, Legal-Patents, Intellectual Property, and Business Associations. 4. Expand the understanding of Deliverables & Achieving Target.
414469C:	<p>Audit Course-VI</p> <p>Cognitive computing</p>

	<ol style="list-style-type: none">1. Understand and discuss what cognitive computing is, and how it differs from traditional approaches.2. Plan and use the primary tools associated with cognitive computing.3. Plan and execute a project that leverages cognitive computing.4. Understand and discuss the business implications of cognitive computing.
414469D:	<p>Audit Course-VI</p> <p>AI and Robotics</p> <ol style="list-style-type: none">1. The goal of this course is to familiarize the students with the basic concepts of robotics, artificial intelligence and intelligent machines.2. It will help students to understand and apply principles, methodology and techniques of intelligent systems to robotics.



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GENBA SOPANRAO MOZE TRUST’S
GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING
25/1/3, Balewadi, Pune – 411045. Ph: 020-27390500

Website: www.gsmozecoe.co.in Email: gsmoze@yahoo.co.in

Department of MBA

PROGRAM EDUCATION OUTCOME

1. **Core Competency:** To make students familiarize with the concepts of various managerial competencies and approaches to management.
2. **Problem Solving & Innovation:** To prepare the students with ability to identify, formulate and provide innovative solution frameworks to real world complex business and social problems by systematically applying modern quantitative and qualitative problem-solving tools and techniques.
3. **Managerial Skills:** To prepare the students to work in group using moral, ethical practice, managerial, entrepreneurial skills for the welfare of the society.
4. **Effective Communication** – To prepare students to become professionals and have ability to effectively communicate in cross-cultural settings, in technology mediated environments, especially in the business context and with society at large.
5. **Global Orientation and Cross-Cultural Appreciation:** Empower students with ability to approach any relevant business issues from a global perspective and exhibit an appreciation of Cross Cultural aspects of business and management.
6. **Social Responsiveness and Ethics** – Empower students of MBA with ability to exhibit a broad appreciation of the ethical and value underpinnings of managerial choices in a political, cross-cultural, globalized, digitized, socio-economic environment and distinguish between ethical and unethical behaviors & act with integrity.

PROGRAM SPECIFIC OUTCOME

- 1) Students will be able to apply subject knowledge to develop Managerial competence for the industrial need.
- 2) Students will be able to reflect the learnings through Proficiency in Communication, Collaboration, Teamwork and Leadership
- 3) Students will be able to evaluate and create a list of the decision-making criteria used by practicing managers, leaders, and entrepreneurs in routine and non-routine decision-making situations in a real-life business, startup and not-for-profit organizational context.

PROGRAM OUTCOME

Students after completion of the MBA programme the learner will be able to:

1. Successfully integrate core, cross-functional and inter-disciplinary aspects of management theories, models and frameworks with the real world practices and the sector specific nuances to provide solutions to real world business, policy and social issues in a dynamic and complex world.
2. Identify Analyse complex managerial problems and review the literature for the same.
3. Articulate, illustrate, analyze, synthesize and apply the knowledge of principles and frameworks of management and allied domains to the solutions of real-world complex business issues.
4. Identify, formulate and provide innovative solution frameworks to real world complex business and social problems by systematically applying modern quantitative and qualitative problem solving tools and techniques.
5. Conduct investigation of multidimensional business problems using research based knowledge and research methods to arrive at data driven decisions
6. Work effectively in diversified, multidisciplinary environment to achieve common goal
7. Effectively communicate in cross-cultural settings, in technology mediated environments, especially in the business context and with society at large
8. Collaborate in an organizational context and across organizational boundaries and lead themselves and others in the achievement of organizational goals and optimize outcomes for all stakeholders.
9. Approach any relevant business issues from a global perspective and exhibit an appreciation of Cross Cultural aspects of business and management
10. Demonstrate knowledge of and need for sustainable development and assess the impact of managerial decisions and business priorities on the societal, economic and environmental aspects
11. Operate independently in new environment, acquire new knowledge and skills and assimilate them into the internalized knowledge and skills

HOD MBA

Prof. Sambhaji Dorge





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25/1/3, Balewadi, Pune – 411045. Ph: 020-27390500

Website: www.gsmozecoe.co.in Email: gsmoze@yahoo.co.in

Department of MBA

Course Outcomes

I-Term

Course No	Course Code	Subject:
101	GC – 01	Managerial Accounting
102	GC – 02	Organizational Behaviour
103	GC – 03	Economic Analysis for Business Decisions
104	GC – 04	Business Research Methods
105	GC – 05	Basics of Marketing
106	GC – 06	Digital Business
107	GE - UL - 01	Management Fundamentals
109	GE - UL - 03	Entrepreneurship Development
111	GE - UL - 05	Legal Aspects of Business
113	GE - IL - 01	Legal Aspects of Business
115	GE - IL - 03	Selling & Negotiation Skills Lab
117	GE - IL - 05	Business Systems & Procedures

Course Outcomes

II-Term

Course No	Course Code	Subject:
207	207 GE - UL - 07	Contemporary Frameworks in Management
209	209 GE - UL - 09	Start Up and New Venture Management
211	211 GE - UL - 11	Business, Government & Society
201	201 GC – 07	Marketing Management
202	202 GC – 08	Financial Management
203	203 GC – 09	Human Resources Management
204	204 GC – 10	Operations & Supply Chain Management
215	215 GE – IL - 10	Entrepreneurship Lab
205 MKT	205 MKT SC – MKT-01	Marketing Research
206 MKT	206 MKT SC – MKT-02	Consumer Behaviour
217 MKT	SE-IL - MKT- 01	Integrated Marketing Communications
220 MKT	SE – IL - MKT- 04	Digital Marketing - I
205 FIN	205 FIN SC – FIN - 01	Financial Markets and Banking Operations
206 FIN	SC – FIN - 02	Personal Financial Planning
219 FIN	SE – IL - FIN - 03	Direct Taxation
222 FIN	SE – IL - FIN - 06	Banking Laws & Regulations
205 HR	SC – HRM – 01	Competency Based Human Resource Management
206 HR	SC – HRM – 02	Employee Relations & Labour Legislation
217 HRM	SE – IL - HRM - 01	Labour Welfare
218 HRM	SE – IL - HRM - 02	Lab in Recruitment and Selection
205 BA	SC – BA - 01	Basic Business Analytics using R
206 BA	SC – BA - 02	Data Mining
217 BA	SE – IL - BA - 01	Marketing Analytics
218 BA	SE – IL - BA - 02	Retailing Analytics
205 OSCM	SC – OSCM - 01	Services Operations Management - I
206 OSCM	SC – OSCM - 02	Supply Chain Management
219 OSCM	SE – IL - OSCM - 03	Inventory Management
222 OSCM	SE – IL - OSCM - 06	Service Value Chain Management

<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Managerial Accounting</u> Course Code: GC – 01 Teaching Scheme: LTP: 2:1:1 Examination Scheme:50 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the basic concepts related to Accounting, Financial Statements, Cost Accounting, Marginal Costing, Budgetary Control and Standard Costing</p> <p>CO2: EXPLAIN in detail, all the theoretical concepts of and terms used in accounting, Capital & Revenue Expenditure, Capital & Revenue Receipts, Users of Accounting Information. Accounting Concepts and Conventions, Fundamental Accounting Equation, Journal, Ledger and Trial Balance.</p> <p>CO3: PERFORM all the necessary calculations through the relevant numerical Problems on Preparation of Cost Sheet, P/V Ratio, Break-Even Point (BEP), Cost Volume Profit (CVP) Analysis, Marginal Costing and Short-Term Business Decisions, Raw Material Purchase & Procurement Budget, Cash Budget, Flexible Budget, Material Variances and Labour Variances</p> <p>CO4: ANALYSE the situation and decide the key financial as well as non-financial elements involved in the situation of Accounting in Business Organization, Accept or Reject Special Order Decisions, Shutting Down Decisions</p> <p>CO5: EVALUATE the financial impact of the decision during preparation of Financial Statements, Preparation of Final Accounts, Relevant and Irrelevant Costs, Differential Costs, Sunk Cost, Opportunity Cost incurred and Exercising Control – Budgetary Control</p>
<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Organizational Behaviour</u> Course Code: GC – 02 Teaching Scheme: LTP: 2:1:1 Examination Scheme:50 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the major theories, concepts, terms, models, frameworks of Models of OB (Autocratic, Custodial, Supportive, Collegial & SOBC), personality indicators, models, perception-based frameworks, leadership theories and motivational theories and research findings in the field of organizational behavior.</p> <p>CO2: EXPLAIN the implications of organizational behavior from the perspectives of employees, managers, leaders and the organization.</p>

	<p>CO3: MAKE USE OF the Theories, Models, Principles and Frameworks of organizational behavior in specific organizational settings under individual interactions, group dynamics and culture dynamics.</p> <p>CO4: DECONSTRUCT the role of individual, groups, managers and leaders in influencing how people behave and in influencing organizational culture, Functions, Types, Creating and Maintaining Organization Culture, Managing Cultural Diversity at large.</p> <p>CO5: FORMULATE approaches to reorient individual, team, managerial and leadership behaviour in order to achieve organizational goals.</p> <p>CO6: ELABORATE UPON the challenges in shaping organizational behavior, organizational culture and organizational change.</p>
<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Economic Analysis for Business Decisions</u> Course Code: GC – 03 Teaching Scheme: LTP: 2:1:1 Examination Scheme:50 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DEFINE the key terms in micro-economics.</p> <p>CO2: EXPLAIN the key terms in micro-economics, from a managerial perspective.</p> <p>CO3: IDENTIFY the various issues in an economics context and DEMONSTRATE their significance from the perspective of business decision making.</p> <p>CO4: EXAMINE the inter-relationships between various facets of micro-economics from the perspective of a consumer, firm, industry, market, competition and business cycles</p> <p>CO5: DEVELOP critical thinking based on principles of micro-economics for informed business decision making.</p> <p>CO6: ANTICIPATE how other firms in an industry and consumers will respond to economic decisions made by a business, and how to incorporate these responses into their own decisions</p>

<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Business Research Methods</u> Course Code: GC – 04 Teaching Scheme: LTP: 2:1:1 Examination Scheme:50 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DEFINE various concepts & terms associated with scientific business research.</p> <p>CO2: EXPLAIN the terms and concepts used in all aspects of scientific business research.</p> <p>CO3: MAKE USE OF scientific principles of research to SOLVE contemporary business research problems.</p> <p>CO4: EXAMINE the various facets of a research problem and ILLUSTRATE the relevant aspects of the research process from a data driven decision perspective.</p> <p>CO5: JUDGE the suitability of alternative research designs, sampling designs, data collection instruments and data analysis options in the context of a given real-life business research problem from a data driven decision perspective</p> <p>CO6: FORMULATE alternative research designs, sampling designs, data collection instruments, testable hypotheses, data analysis strategies and research reports to address real-life business research problems.</p>
<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Basics of Marketing</u> Course Code: GC – 05 Teaching Scheme: LTP: 2:1:1 Examination Scheme:50 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: RECALL and REPRODUCE the various concepts, principles, frameworks and terms related to the function and role of marketing</p> <p>CO2: DEMONSTRATE the relevance of marketing management concepts and frameworks to a new or existing business across wide variety of sectors and ILLUSTRATE the role that marketing plays in the ‘tool kit’ of every organizational leader and manager</p> <p>CO3: APPLY marketing principles and theories to the demands of marketing function and practice in contemporary real world scenarios</p>

	<p>CO4: EXAMINE and LIST marketing issues pertaining to segmentation, targeting and positioning, marketing environmental forces, consumer buying behavior, marketing mix and Product Life Cycle in the context of real world marketing offering (commodities, goods, services, e-products/ e-services)</p> <p>CO5: EXPLAIN the interrelationships between segmentation, targeting and positioning, marketing environment, consumer buying behavior, marketing mix and Product Life Cycle with real world examples.</p> <p>CO6: DISCUSS alternative approaches to segmentation, targeting and positioning, the marketing environment, consumer buying behavior, marketing mix and Product Life Cycle in the context of real world marketing offering (commodities, goods, services, e-products/ e-services.).</p>
<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Digital Business</u> Course Code: GC – 06 Teaching Scheme: LTP: 2:1:1 Examination Scheme:50 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the conceptual framework of e commerce, mobile commerce and social commerce</p> <p>CO2: SUMMARIZE the impact of information, mobile, social, digital, IOT and related technologies on society, markets & commerce.</p> <p>CO3: ILLUSTRATE value creation & competitive advantage in a digital Business environment.</p> <p>CO4: EXAMINE the changing role of intermediaries, changing nature of supply chain and payment systems in the online and offline world.</p> <p>CO5: ELABORATE upon the various types of digital business models and OUTLINE their benefits and limitations.</p> <p>CO6: DISCUSS the various applications of Digital Business in the present day world</p>

<p>GENERIC ELECTIVES UNIVERSITY LEVEL (GE – UL) COURSES – 2 Credits</p>	<p><u>Management Fundamentals</u> Course Code: GE - UL - 01 Teaching Scheme: LTP: 2:0:0 Examination Scheme: 00 Marks CCE , 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: ENUMERATE various managerial competencies and approaches to management</p> <p>CO2: EXPLAIN the role and need of Planning, Organizing, Decision Making and Controlling</p> <p>CO3: MAKE USE OF the principles of goal setting and planning for simple as well as complex tasks and small projects</p> <p>CO4: COMPARE and CONTRAST various organizational structures of variety of business and not-for-profit entities in a real-world context.</p> <p>CO5: BUILD a list of the decision making criteria used by practicing managers, leaders and entrepreneurs in routine and non-routine decision making situations and EVALUATE and EXPLAIN the same</p> <p>CO6: FORMULATE and DISCUSS a basic controlling model in a real life business, startup and not-for-profit organizational context</p>
<p>GENERIC ELECTIVES UNIVERSITY LEVEL (GE – UL) COURSES – 2 Credits</p>	<p><u>Entrepreneurship Development</u> Course Code: GE - UL - 03 Teaching Scheme: LTP: 2:0:0 Examination Scheme:00 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DEFINE the key terms, LIST the Attributes and Characteristics of Entrepreneurs features and ENUMERATE the Factors influencing Entrepreneurship Growth</p> <p>CO2: DISCUSS various theories of entrepreneurship and the entrepreneurship development ecosystem in Indian context</p> <p>CO3: APPLY the theories of entrepreneurship and entrepreneurship development framework to analyze and identify entrepreneurial opportunities</p>

	<p>CO4: DISCRIMINATE between potential options available for entrepreneur for embarking on establishing a Start Up</p> <p>CO5: EVALUATE the start up ecosystem and the entrepreneurial opportunities in light of requirements of a business plan</p> <p>CO6: CREATE a business plan that captures entrepreneurs and variety of entrepreneur motivations, entrepreneur culture and sectoral opportunities and financing options.</p>
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<p>GENERIC ELECTIVES INSTITUTE LEVEL (GE – IL) COURSES – 2 Credits</p>	<p><u>Legal Aspects of Business</u> Course Code: GE - UL - 05 Teaching Scheme: LTP: 2:0:0 Examination Scheme:00 Marks CCE, 50 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the key terms involved in each Act of Business and Corporate Laws</p> <p>CO2: SUMMARIZE the key legal provisions of each Act</p> <p>CO3: ILLUSTRATE the use of the Acts in common business situations</p> <p>CO4: OUTLINE the various facets of basic case laws of each Act from a legal and managerial perspective.</p> <p>CO5: DEVELOP critical thinking by making judgments related to use of various provisions of the Acts in business situations</p>
<p>GENERIC ELECTIVES INSTITUTE LEVEL (GE – IL) COURSES – 2 Credits</p>	<p><u>Verbal Communication Lab</u> Course Code: GE - IL - 01 Teaching Scheme: LTP: 0:3:1 Examination Scheme:50 Marks CCE, 00 Marks ESE</p>

	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: RECOGNIZE the various elements of communication, channels of communication and barriers to effective communication</p> <p>CO2: EXPRESS themselves effectively in routine and special real world business interactions</p> <p>CO3 DEMONSTRATE appropriate use of body language</p> <p>CO4: TAKE PART IN professional meetings, group discussions, telephonic calls, elementary interviews and public speaking activities.</p> <p>CO5: APPRAISE the pros and cons of sample recorded verbal communications in a business context</p> <p>CO6: CREATE and DELIVER effective business presentations, using appropriate technology tools, for common business situations.</p>
<p>GENERIC ELECTIVES INSTITUTE LEVEL (GE – IL) COURSES – 2 Credits</p>	<p><u>Selling & Negotiation Skills Lab</u> Course Code: GE - IL - 03 Teaching Scheme: LTP: 0:3:1 Examination Scheme:50 Marks CCE, 00 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the various selling situations and selling types, selling situations, New business versus service selling</p> <p>CO2: OUTLINE the pre-sales work to be carried out by a professional salesperson</p> <p>CO3: IDENTIFY the key individuals involved in a real world sales process for a real world product/ service / e-product / e-service.</p> <p>CO4: FORMULATE a sales script for a real world sales call for a product/ service / e-product / e-service</p> <p>CO5: DECONSTRUCT the pros and cons of sample real world sales calls for a product/ service / e-product / e-service.</p> <p>CO6: DEVELOP a sales proposal for a real world product/ service / e-product / e-service and for a real world selling situation</p>

<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Business Systems & Procedures</u> Course Code: GE - IL - 05 Teaching Scheme: LTP: 0:3:1 Examination Scheme:50 Marks CCE, 00 Marks ESE</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: TABULATE the key elements of a typical business system and related work flow procedures.</p> <p>CO2: EXPLAIN a business system and related procedures</p> <p>CO3: PREDICT the fail points / bottle necks in a typical business process</p> <p>CO4: BREAK DOWN a business system into simpler components and explain the inter-relationship</p> <p>CO5: DEVELOP a process-based thinking approach</p> <p>CO6: CREATE standard operating procedures and flow charts / other visual representations for typical business systems and processes</p>

Term II-

GENERIC CORE (GC) COURSES – 3 Credits	<u>Marketing Management</u> Course Code: GC – 07 Teaching Scheme: LTP: 2:1:1
	Outcomes: On completion of the course, learner will be able to – CO1: DESCRIBE the key terms associated with the 4 Ps of marketing. CO2: COMPARE and CONTRAST various approaches to pricing for a real world marketing offering (commodities, goods, services, e-products/ e-services). CO3: DEMONSTRATE an understanding of various channel options for a real world marketing offering (commodities, goods, services, e-products/ eservices.) CO4: EXAMINE the product line of a real world marketing offering (commodities, goods, services, e-products/ e-services.) CO5: EXPLAIN the role of various communication mix elements for a real world marketing offering (commodities, goods, services, e-products/ e-services.) CO6: DESIGN a marketing plan for a real world marketing offering (commodities, goods, services, e-products/ e-services.)
GENERIC CORE (GC) COURSES – 3 Credits	<u>Financial Management</u> Course Code: GC – 08 Teaching Scheme: LTP: 2:1:1
	Outcomes: On completion of the course, learner will be able to – CO1: DESCRIBE the basic concepts related to Financial Management, Various techniques of Financial Statement Analysis, Working Capital, Capital Structure, Leverages and Capital Budgeting. CO2: EXPLAIN in detail all theoretical concepts throughout the syllabus CO3: PERFORM all the required calculations through relevant numerical problems

	<p>CO4: ANALYZE the situation and • comment on financial position of the firm • estimate working capital required • decide ideal capital structure • evaluate various project proposals</p> <p>CO5: EVALUATE impact of business decisions on Financial Statements, Working Capital, Capital Structure and Capital Budgeting of the firm</p>
<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Human Resources Management</u> Course Code: GC – 09 Teaching Scheme: LTP: 2:1:1</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the role of Human Resource Function in an Organization.</p> <p>CO2: ENUMERATE the emerging trends and practices in HRM.</p> <p>CO3: ILLUSTRATE the different methods of HR Acquisition and retention</p> <p>CO4: DEMONSTRATE the use of different appraisal and training methods in an Organization</p> <p>CO5: OUTLINE the compensation strategies of an organization</p> <p>CO6: INTERPRET the sample job descriptions and job specifications for contemporary entry level roles in real world organizations</p>
<p>GENERIC CORE (GC) COURSES – 3 Credits</p>	<p><u>Operations & Supply Chain Management</u> Course Code: GC – 10 Teaching Scheme: LTP: 2:1:1</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DEFINE basic terms and concepts related to Production, Operations, Services, Supply Chain and Quality Management</p> <p>CO2: EXPLAIN the process characteristics and their linkages with process-product matrix in a real world context.</p> <p>CO3: DESCRIBE the various dimensions of production planning and control and their inter-linkages with forecasting.</p> <p>CO4: CALCULATE inventory levels and order quantities and MAKE USE OF various inventory classification methods.</p>

	<p>CO5: OUTLINE a typical Supply Chain Model for a product / service and ILLUSTRATE the linkages with Customer Issues, Logistic and Business Issues in a real world context.</p> <p>CO6: ELABORATE upon different operational issues in manufacturing and services organisations where the decision-making element is emphasized.</p>
<p>GENERIC ELECTIVES UNIVERSITY LEVEL (GE – UL) COURSES – 2 Credits</p>	<p><u>Contemporary Frameworks in Management</u> Course Code: GE - UL - 07 Teaching Scheme: LTP: 2:0:0</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DEFINE Emotional Intelligence (EQ), IDENTIFY the benefits of emotional intelligence and RELATE the 5 Dimensions of Trait EI Model to the practice of emotional intelligence.</p> <p>CO2: DESCRIBE how companies achieve transition from being good companies to great companies, and DISCUSS why and how most companies fail to make the transition.</p> <p>CO3: APPLY the 21 laws that make leadership work successfully to improve your leadership ability and ILLUSTRATE its positive impact on the whole organization.</p> <p>CO4: EXAMINE the fundamental causes of organizational politics and team failure.</p> <p>CO5: EXPLAIN the approach to being effective in attaining goals by aligning oneself to the "true north" principles based on a universal and timeless character ethic</p>
<p>GENERIC ELECTIVES UNIVERSITY LEVEL (GE – UL) COURSES – 2 Credits</p>	<p><u>Start Up and New Venture Management</u> Course Code: GE - UL - 09 Teaching Scheme: LTP: 2:0:0</p>

	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the strategic decisions involved in establishing a startup. CO2: EXPLAIN the decision-making matrix of entrepreneur in establishing a startup CO3: IDENTIFY the issues in developing a team to establish and grow a startup</p> <p>CO4: FORMULATE a go to market strategy for a startup.</p> <p>CO5: DESIGN a workable funding model for a proposed startup.</p> <p>CO6: DEVELOP a convincing business plan description to communicate value of the new venture to customers, investors and other stakeholders.</p>
<p>GENERIC ELECTIVES UNIVERSITY LEVEL (GE – UL) COURSES – 2 Credits</p>	<p><u>Business, Government & Society</u> Course Code: GE - UL - 11 Teaching Scheme: LTP: 2:0:0</p>
	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: DESCRIBE the economic roles of government in the Indian context. CO2: EXPLAIN the macroeconomic crises around the world. CO3: ILLUSTRATE the interlinkages between economic growth , poverty and inequality. CO4: EXAMINE the rationale, success and failures of Public Private Partnerships in the Indian context. CO5: ASSESS the forces for and against Globalization and the socio-economic impact of Globalization. CO6: DISCUSS the interplay between technology, business and society</p>
<p>GENERIC ELECTIVES INSTITUTE LEVEL (GE – IL) COURSES – 2 Credits</p>	<p><u>Entrepreneurship Lab</u> Course Code: 215 GE – IL - 10 Teaching Scheme: LTP: 0:3:1</p>

	<p>Outcomes: On completion of the course, learner will be able to –</p> <p>CO1: IDENTIFY a basket of potential business opportunities in the local, regional or national context</p> <p>CO2: COMPARE and CONTRAST the shortlisted business opportunities to SELECT the most suitable / promising opportunity</p> <p>CO3: DEVELOP a business model around the shortlisted business opportunity</p> <p>CO4: FORMULATE the organization structure for the proposed start up</p> <p>CO5: EVALUATE the market potential and ESTIMATE the financing requirements for the initial 1 to 3 years after launch.</p> <p>CO6: CREATE a proposal for funding the start up</p>
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Specialization-Subject Core (SC) Courses - Semester II

Semester II		205MKT: Marketing Research
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Marketing Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO205MKT.1	REMEMBERING	IDENTIFY and DESCRIBE the key steps involved in the marketing research process.
CO205MKT.2	UNDERSTANDING	COMPARE and CONTRAST various research designs, data sources, data collection instruments, sampling methods and analytical tools and SUMMARIZE their strengths & weaknesses.
CO205MKT.3	APPLYING	DEMONSTRATE an understanding of the ethical framework that market research needs to operate within.
CO205MKT.4	ANALYSING	ANALYSE quantitative data and draw appropriate Inferences to address a real life marketing issue.
CO205MKT.5	EVALUATING	DESIGN a market research proposal for a real life marketing research problem and EVALUATE a market research proposal.
CO205MKT.6	CREATING	PLAN and UNDERTAKE qualitative or quantitative Market Research and demonstrate the ability to appropriately analyse data to resolve a real life marketing issue.

Semester II		206MKT: Consumer Behavior
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Marketing Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO206MKT.1	REMEMBERING	ENUMERATE social and psychological factors and their influence his/her behavior as a consumer.
CO206MKT.2	UNDERSTANDING	EXPLAIN fundamental concepts associated with consumer and organizational buying behavior.
CO206MKT.3	APPLYING	APPLY consumer behavior concepts to real world strategic marketing management decision making.
CO206MKT.4	ANALYSING	ANALYSE the dynamics of human behavior and the basic factors that influence the consumer's decision process.
CO206MKT.5	EVALUATING	EXPLAIN the consumer and organizational buying behavior process for a variety of products (goods/services).

Semester II		217MKT: Integrated Marketing Communications
2 Credits	LTP: 1:1:1	Subject Elective (SE) Course – Marketing Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO217MKT.1	REMEMBERING	DESCRIBE the IMC mix and the IMC planning process.
CO217MKT.2	UNDERSTANDING	EXAMINE the role of integrated marketing communications in building brand identity, brand equity, and customer franchise.
CO217MKT.3	APPLYING	CONSTRUCT a marketing communications mix to achieve the communications and behavioural objectives of the IMC campaign plan.
CO217MKT.4	ANALYSING	ANALYZE and critically evaluate the communications effects and results of an IMC campaign to determine its success for a variety of brands.
CO217MKT.5	EVALUATING	DESIGN a sales promotion campaign and CHOOSE the avenues for Public Relations, Publicity and Corporate Advertising for a consumer and a business-to-business product.
CO217MKT.6	CREATING	DEVELOP an integrated cross-media strategy and creative message and concept to reach the target audience and deliver the brand promise through an IMC campaign for a variety of brands.

Semester II		220MKT: Digital Marketing - I
2 Credits	LTP: 0:3:1	Subject Elective (SE) Course – Marketing Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO220MKT.1	REMEMBERING	DEFINE various concepts related to Digital Marketing.
CO220MKT.2	UNDERSTANDING	EXPLAIN the role of Facebook, Google Ad words, Youtube and Email in digital marketing.
CO220MKT.3	APPLYING	MAKE USE OF Facebook, Google Ad words, Youtube and Email for carrying out digital marketing of real life products.
CO220MKT.4	ANALYSING	ILLUSTRATE the use of Facebook, Google Ad words, Youtube and Email in various contexts of Digital Marketing.
CO220MKT.5	EVALUATING	DESIGN digital media campaign using appropriate mix of Facebook, Google Ad words, Youtube and Email.
CO220MKT.6	CREATING	CREATE appropriate content for Facebook, Google Ad words, Youtube and Email campaigns.

Semester II		205FIN: Financial Markets and Banking Operations
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Financial Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO205FIN.1	REMEMBERING	RECALL the structure and components of Indian financial system through banking operations & Financial Markets.
CO205FIN.2	UNDERSTANDING	UNDERSTAND the concepts of financial markets, their working and importance.
CO205FIN.3	APPLYING	ILLUSTRATE the working and contribution of Banks and NBFCs to the Indian Economy.
CO205FIN.4	ANALYSING	ANALYZE the linkages in the Financial Markets.
CO205FIN.5	EVALUATING	EXPLAIN the various banking and accounting transactions.
CO205FIN.6	CREATING	DEVELOP necessary competencies expected of a finance professional.

Semester II		206FIN: Personal Financial Planning
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Financial Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO206FIN.1	REMEMBERING	UNDERSTAND the need and aspects of personal financial planning
CO206FIN.2	UNDERSTANDING	Describe the investment options available to an individual
CO206FIN.3	APPLYING	IDENTIFY types of risk and means of managing it
CO206FIN.4	ANALYSING	DETERMINE the ways of personal tax planning
CO206FIN.5	EVALUATING	EXPLAIN retirement and estate planning for an individual and design a financial plan.
CO206FIN.6	CREATING	CREATE a financial plan for a variety of individuals.

Semester II		219FIN: Direct Taxation
2 Credits	LTP: 0:3:1	Subject Elective (SE) Course – Financial Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO219FIN.1	REMEMBERING	UNDERSTAND various basic concepts/ terminologies related Direct Taxation
CO219FIN.2	UNDERSTANDING	EXPLAIN how tax planning can be done.
CO219FIN.3	UNDERSTANDING	ILLUSTRATE how online filling of various forms and returns can be done.
CO219FIN.4	APPLYING	CALCULATE Gross Total Income and Income Tax Liability of an individual assessee.
CO219FIN.5	ANALYSING	ANALYZE and DISCOVER intrinsic value of a security.
	EVALUATING	DESIGN/ DEVELOP / CREATE tax saving plan.

Semester II		222FIN: Banking Laws & Regulations
2 Credits	LTP: 0:3:1	Subject Elective (SE) Course – Financial Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO222FIN.1	REMEMBERING	REMEMBER various concepts taught in the syllabus.
CO222FIN.2	UNDERSTANDING	EXPLAIN the Regulatory Framework in the Indian Banking system.
CO222FIN.3	UNDERSTANDING	DESCRIBE the various legal aspects which need to be followed during daily banking operations.
CO222FIN.4	UNDERSTANDING	DISCUSS the various laws related to banking.
CO222FIN.5	APPLYING	APPLY the various commercial laws for the smooth functioning of banking operations.

Semester II		205HRM: Competency Based Human Resource Management System
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Human Resource Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO205HRM.1	REMEMBERING	DEFINE the key terms related to performance management and competency development.
CO205HRM.2	UNDERSTANDING	EXPLAIN various models of competency development.
CO205HRM.3	APPLYING	PRACTICE competency mapping.
CO205HRM.4	ANALYSING	ANALYSE competencies required for present and potential future job roles at various levels and across variety of organizations.
CO205HRM.5	EVALUATING	DESIGN and MAP their own competency and plan better and appropriate career for themselves.
CO205HRM.6	CREATING	DEVELOP a customized competency model in accordance with the corporate requirements.

Semester II		206HRM: Employee Relations and Labour Legislations
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Human Resource Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO206HRM.1	REMEMBERING	SHOW awareness of important and critical issues in Employee Relations
CO206HRM.2	UNDERSTANDING	INTERPRET and relate legislations governing employee relations.
CO206HRM.3	APPLYING	DEMONSTRATE an understanding of legislations relating to working environment.
CO206HRM.4	ANALYSING	OUTLINE the role of government, society and trade union in ER.
CO206HRM.5	EVALUATING	EXPLAIN aspects of collective bargaining and grievance handling.
CO206HRM.6	CREATING	DISCUSS the relevant provisions of various Labour Legislations.

Semester II		217HRM: Labour Welfare
2 Credits	LTP: 0:3:1	Subject Elective (SE) Course – Human Resource Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO217HRM.1	REMEMBERING	ENUMERATE the key concepts of the subject matter.
CO217HRM.2	UNDERSTANDING	DESCRIBE the key aspects of the labour policy regulation in the country.
CO217HRM.3	APPLYING	IDENTIFY the applicability of various legislations to variety of real world organizations.
CO217HRM.4	ANALYSING	EXAMINE the traditional concept of labour welfare in the industry.
CO217HRM.5	EVALUATING	EXPLAIN the conditions of labour and their welfare and social security needs in the country.
CO217HRM.6	CREATING	ELABORATE upon the perspective of labour problems and remedial measures in the country.

Semester II		218HRM: Lab in Recruitment and Selection
2 Credits	LTP: 0:3:1	Subject Elective (SE) Course – Human Resource Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO218HRM.1	REMEMBERING	DESCRIBE the key concepts such as Job Specification, Job description, Recruitment and Selection.
CO218HRM.2	UNDERSTANDING	COMPARE and CONTRAST various methods of Recruitment and Selection.
CO218HRM.3	APPLYING	DEVELOP Job Specifications and Job descriptions in a variety of context.
CO218HRM.4	ANALYSING	ANALYZE various Personality types.
CO218HRM.5	EVALUATING	EXPLAIN the profiling techniques used to test Personality, Aptitude, Competency.
CO218HRM.6	CREATING	COMPILE a list of questions for Recruitment and Selection interviews.

Semester II		205OSCM: Service Operations Management – I
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Operations & Supply Chain Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO205OSCM.1	REMEMBERING	DESCRIBE the nature and CHARACTERISTICS of services and the services economy.
CO205OSCM .2	UNDERSTANDING	DESCRIBE the service design elements of variety of services.
CO205OSCM .3	APPLYING	USE service blueprinting for mapping variety of real life service processes.
CO205OSCM .4	ANALYSING	ANALYSE alternative locations and sites for variety of service facilities.
CO205OSCM .5	EVALUATING	JUDGE and EXPLAIN the service orientation at variety of service facilities / organizations.
CO205OSCM .6	CREATING	CREATE flow process layouts for variety of services.

Semester II		206OSCM: Supply Chain Management
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Operations & Supply Chain Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO206OSCM.1	REMEMBERING	DESCRIBE the key concepts of Supply Chain Management and the – driving forces in contemporary Supply Chain Management.
CO206OSCM.2	UNDERSTANDING	EXPLAIN the structure of modern day supply chains.
CO206OSCM.3	APPLYING	IDENTIFY the various flows in real world supply chains.
CO206OSCM.4	ANALYSING	COMPARE and CONTRAST push and pull strategies in Supply Chain Management.
CO206OSCM.5	EVALUATING	EXPLAIN the key Operational Aspects in Supply Chain Management.
CO206OSCM.6	CREATING	DISCUSS the relationship between Customer Value and Supply Chain Management.

Semester II		219OSCM: Inventory Management
2 Credits	LTP: 1:1:1	Subject Elective (SE) Course – Operations & Supply Chain Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO219OSCM.1	REMEMBERING	DEFINE the key terms associated with Inventory Management.
CO219OSCM.2	UNDERSTANDING	CLASSIFY various types of inventory, and inventory costs.
CO219OSCM.3	APPLYING	CALCULATE Economic Order Quantity and stock levels under various conditions.
CO219OSCM.4	ANALYSING	COMPARE and CONTRAST various methods of inventory control.
CO219OSCM.5	EVALUATING	ASSESS various factors influencing Make or Buy decisions.
CO219OSCM.6	CREATING	SOLVE problems based on ABC classification of inventory.

Semester II		222OSCM: Service Value Management
2 Credits	LTP: 1:1:1	Subject Elective (SE) Course – Operations & Supply Chain Management

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO222OSCM.1	REMEMBERING	DEFINE the core concepts related to Service Value Chain, Service Profit Chain, Innovation, CRM, networks.
CO222OSCM.2	UNDERSTANDING	ILLUSTRATE managing the service process through service value chain.
CO222OSCM.3	APPLYING	IDENTIFY factors influencing Innovation and service organizational design.
CO222OSCM.4	ANALYSING	EXAMINE the inter-relationships between the Focal firm, Supplier Networks, Distribution Networks, etc.
CO222OSCM.5	EVALUATING	EVALUATE the role of Business Networks as partners in value creation.
CO222OSCM.6	CREATING	DEVELOP strategies built on Principles of Service Value Chain & Service Profit Chain for various types of organizations.

Semester II		205BA: Basic Business Analytics using R
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Business Analytics

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO205BA.1	REMEMBERING	IDENTIFY opportunities for creating value using business analytics and DESCRIBE the basic concepts in Business Analytics, DATA Science and Business Intelligence.
CO205BA.2	UNDERSTANDING	EXPLAIN the applications of Business Analytics in multiple business domains and scenarios.
CO205BA.3	APPLYING	DEVELOP a thought process to think like a data scientist/business analyst.
CO205BA.4	ANALYSING	ANALYZE data graphically by creating a variety of plots using the appropriate visualization tools of R.
CO205BA.5	EVALUATING	SELECT the right functions of R for the given analytics task.
CO205BA.6	CREATING	COMBINE various tools and functions of R programming language and use them in live analytical projects in multiple business domains and scenarios.

Semester II		206BA: Data Mining
3 Credits	LTP: 2:1:1	Subject Core (SC) Course – Business Analytics

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO206BA.1	REMEMBERING	DEFINE the key terms associated with Data Mining
CO206BA.2	UNDERSTANDING	EXPLAIN the various aspects of Data
CO206BA.3	APPLYING	APPLY classification models
CO206BA.4	ANALYSING	ANALYSE using clustering models
CO206BA.5	EVALUATING	SELECT appropriate association analysis and anomaly detection tools.
CO206BA.6	CREATING	COMBINE various data mining tools and use them in live analytical projects in business scenarios.

Semester II		217BA: Marketing Analytics
2 Credits	LTP: 1:1:1	Subject Elective (SE) Course – Business Analytics

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO217BA.1	REMEMBERING	DESCRIBE the use of Voice of the Customer data in making data driven marketing decisions.
CO217BA.2	UNDERSTANDING	DEMONSTRATE an understanding of utility theory to measure customer preferences and choices.
CO217BA.3	APPLYING	IDENTIFY what customers' value in a product, and assess what they are willing to pay for it.
CO217BA.4	ANALYSING	ILLUSTRATE the use of various tools and frameworks to solve strategic marketing problems using marketing data.
CO217BA.5	EVALUATING	DETERMINE the most effective target markets.
CO217BA.6	CREATING	DESIGN a study that incorporates the key tools of Marketing Analytics.

Semester II		218BA: Retailing Analytics
2 Credits	LTP: 1:1:1	Subject Elective (SE) Course – Business Analytics

Course Outcomes: On successful completion of the course the learner will be able to

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO2018BA.1	REMEMBERING	ENUMERATE the characteristics, opportunities and challenges of New Age Retailing and Digital Consumers.
CO2018BA.2	UNDERSTANDING	UNDERSTAND Consumer Buying Behavior and Trends in new age retailing.
CO2018BA.3	APPLYING	USE various kinds of data for performing Retailing Analytics.
CO2018BA.4	ANALYSING	ILLUSTRATE the use of various tools and frameworks for predictive retail analytics.
CO2018BA.5	EVALUATING	DERIVE a variety of metrics and quantify key outcomes in multiple areas of Retail.
CO2018BA.6	CREATING	BUILD value for Retail and Marketing by deriving Marketing ROI metrics..

HOD MBA

Prof. Sambhaji Dorge





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Balewadi Pune-411045

Program Outcomes: -

1. **Engineering Knowledge:** An ability to apply knowledge of computing, mathematics, science and engineering fundamentals in understanding complex mechanical systems.
2. **Problem Analysis:** An ability to identify and analyzed the complex engineering problems and provide solutions by using principles of engineering science, mathematics and computational / numerical methods.
3. **Design/ Development of solutions:** An ability to design solutions for thermal, hydraulic & machining systems and design components and processes that meet the specified needs with appropriate consideration for safety, societal and environmental aspects.
4. **Conduct investigation of complex problems:** An ability to investigate solutions of complex problems by conducting experiments, simulating, computing and analyzing data to provide valid findings and conclusions.
5. **Modern tool usage:**An ability to use modern engineering tools and technologies necessary for obtaining quick, economical and accurate solutions of engineering problems and understanding their limitations.
6. **The engineer and society:** An ability to analyze the local and global impact of mechanical systems on individuals, organizations and society.
7. **Environment and sustainability:** An ability to understand the environmental issues and provide the solutions for sustainable development of the system.
8. **Ethics:**An ability to understand professional and ethical responsibility through soft skill development.
9. **Individual and team work:** An ability to function effectively as an individual or as a team member to accomplish the goal.
10. **Communication:** An ability to communicate effectively at technical and management levels using both written and oral communication.
11. **Project management and finance:** An ability to apply technical and management skills to develop one’s own work as a member and leader in a team to manage projects and in multidisciplinary environments.
12. **Lifelong learning:** Recognize the need of industry and develop ability to keep up-to-date with contemporary technologies through lifelong learning.



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Program Specific Outcomes:

1. An ability to apply the principle to fabrication, test and documentation of mechanical system and process
2. To develop ability to design, development, implementation of more advanced mechanical systems or process
3. Be prepared to work professionally in either thermal or mechanical system areas.



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SE (2019 Pattern)

Course Title: Solid Mechanics

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE various types of stresses and strain developed on determinate and indeterminate members. .
CO2	DRAW Shear force and bending moment diagram for various types of transverse loading and support.
CO3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.
CO4	CALCULATE torsional shear stress in shaft and buckling on the column.
CO5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.
CO6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.

Course Title: Solid Modeling and Drafting

Course Outcomes (CO's):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management.
CO2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry.
CO3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system.
CO4	APPLY geometric transformations to simple 2D geometries.
CO5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc..
CO6	USE PMI & MBD approach for communication.

Course Title: Engineering Thermodynamics

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DESCRIBE the basics of thermodynamics with heat and work interactions.
CO2	APPLY laws of thermodynamics to steady flow and non-flow processes.
CO3	APPLY entropy, available and non available energy for an Open and Closed System.
CO4	DETERMINE the properties of steam and their effect on performance of vapour power cycle.
CO5	ANALYSE the fuel combustion process and products of combustion.
CO6	SELECT various instrumentations required for safe and efficient operation of steam generator.



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Course Title: Engineering Materials and Metallurgy

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	COMPARE crystal structures and ASSESS different lattice parameters.
CO2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.
CO3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials.
CO4	IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
CO5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
CO6	SELECT appropriate materials for various applications.

Course Title: Electrical and Electronics Engineering

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems.
CO2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board.
CO3	UNDERSTAND the operation of DC motor, its speed control methods and braking.
CO4	DISTINGUISH between types of three phase induction motor and its characteristic features.
CO5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems.
CO6	CHOOSE energy storage devices and electrical drives for EVs.

Course Title: Geometric Dimensioning and Tolerancing Lab

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	SELECT appropriate IS and ASME standards for drawing.
CO2	READ & ANALYSE variety of industrial drawings.
CO3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing.
CO4	EVALUATE dimensional tolerance based on type of fit, etc..
CO5	SELECT an appropriate manufacturing process using DFM, DFA, etc.



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Course Title: Engineering Mathematics - III

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.
CO2	APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications.
CO3	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.
CO4	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems.
CO5	SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.

Course Title: Kinematics of Machinery

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	APPLY kinematic analysis to simple mechanisms
CO2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method
CO3	SYNTHESIZE a four bar mechanism with analytical and graphical methods
CO4	APPLY fundamentals of gear theory as a prerequisite for gear design
CO5	CONSTRUCT cam profile for given follower motion

Course Title: Applied Thermodynamics

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.
CO2	DISCUSS basics of engine terminology, air standard, fuel air and actual cycles.
CO3	IDENTIFY factors affecting the combustion performance of SI and CI engines.
CO4	DETERMINE performance parameters of IC Engines and emission control.
CO5	EXPLAIN working of various IC Engine systems and use of alternative fuels.
CO6	CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors.



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Course Title: Fluid Mechanics

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO 1	DETERMINE various properties of fluid
CO 2	APPLY the laws of fluid statics and concepts of buoyancy
CO 3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
CO 4	APPLY principles of fluid dynamics to laminar flow
CO 5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
CO 6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws

Course Title: Manufacturing Processes

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process
CO2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
CO3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
CO4	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
CO5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques
CO6	UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites

Course Title: Machine Shop

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
CO2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques
CO3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
CO4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
CO5	PREPARE industry visit report
CO6	UNDERSTAND procedure of plastic processing



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Course Title: Project Based Learning - II

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
CO2	ANALYZE the results and arrive at valid conclusions.
CO3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
CO4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
CO5	USE of technology in proposed work and demonstrate learning in oral and written form.
CO6	DEVELOP ability to work as an individual and as a team member.



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TE (2019 Pattern)

Course Title: Numerical and Statistical Methods

Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	SOLVE system of equations using direct and iterative numerical methods.
CO2	ESTIMATE solutions for differential equations using numerical techniques.
CO3	DEVELOP solution for engineering applications with numerical integration.
CO4	DESIGN and CREATE a model using a curve fitting and regression analysis.
CO5	APPLY statistical Technique for quantitative data analysis.
CO6	DEMONSTRATE the data, using the concepts of probability and linear algebra.

Course Title: Heat and Mass Transfer

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
CO2	DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
CO3	EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results.
CO4	INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
CO5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
CO6	DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance.

Course Title: Design of Machine Elements

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.
CO2	DESIGN shafts, keys and couplings under static loading conditions.
CO3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
CO4	EVALUATE dimensions of machine components under fluctuating loads.
CO5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
CO6	APPLY the design and development procedure for different types of springs.



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Course Title: **Mechatronics**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.
CO2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
CO3	DETERMINE the transfer function by using block diagram reduction technique.
CO4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system.
CO5	APPLY the concept of different controller modes to an industrial application.
CO6	DEVELOP the ladder programming for industrial application.

Course Title: Elective A: **Advanced Forming & Joining Processes**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
CO2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
CO3	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
CO4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
CO5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.
CO6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.

Course Title: Elective B: **Machining Science & Technology**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE metal cutting principles and mechanics of metal cutting and tool life.
CO2	DESCRIBE features of gear and thread manufacturing processes.
CO3	SELECT appropriate grinding wheel and demonstrate the various surface finishing processes.
CO4	SELECT appropriate jigs/fixtures and to draw the process plan for a given component.
CO5	SELECT & EVALUATE various parameters of process planning.



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CO6

GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software.



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Course Title: **Digital Manufacturing Laboratory**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
CO2	ANALYZE cutting tool parameters for machining given job.
CO3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.
CO4	SELECT and DESIGN jigs and Fixtures for a given component.
CO5	SELECT and DESIGN jigs and Fixtures for a given component
CO6	DEMONESTRATE different parameters for CNC retrofitting and reconditioning.

Course Title: **Skill Development**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	APPLY & DEMONSTRATE procedure of assembly & disassembly of various machines.
CO2	DESIGN & DEVELOP a working/model of machine parts or any new product.
CO3	EVALUATE fault with diagnosis on the machines, machine tools and home appliances.
CO4	IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.

Course Title: **Artificial Intelligence & Machine Learning**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEMONSTRATE fundamentals of artificial intelligence and machine learning.
CO2	APPLY feature extraction and selection techniques.
CO3	APPLY machine learning algorithms for classification and regression problems.
CO4	DEVISE AND DEVELOP a machine learning model using various steps.
CO5	EXPLAIN concepts of reinforced and deep learning.
CO6	SIMULATE machine learning model in mechanical engineering problems.



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Course Title: Computer Aided Engineering

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
CO2	APPLY the various meshing techniques for better evaluation of approximate results.
CO3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
CO4	ANALYZE and APPLY various numerical methods for different types of analysis.
CO5	EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
CO6	GENERATE the results in the form of contour plot by the USE of CAE tools.

Course Title: Design of Transmission Systems

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
CO2	EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.
CO3	SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.
CO4	DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.
CO5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications
CO6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.

Course Title: Elective A: Composite Materials

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE & COMPARE composites with traditional materials.
CO2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
CO3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
CO4	DETERMINE volume/weight fraction and strength of Composites.
CO5	SELECT appropriate testing and inspection method for composite materials.
CO6	SELECT composites materials for various applications.



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Course Title: Elective **B: Surface Engineering**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE the basic's principle & mechanism of surface degradation.
CO2	ANALYSE & SELECT correct corrosion prevention techniques for a different service condition.
CO3	DEMONSTRATE the role of surface engineering of materials to modify/improve the surface properties.
CO4	SELECT the suitable surface heat treatments to improve the surface properties.
CO5	APPLY the surface modification technique to modify surface properties.
CO6	ANALYSE & EVALUTE various surface coating defects using various testing/characterization method.

Course Title: **Measurement Laboratory**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	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.
CO2	ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.
CO3	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.
CO4	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.
CO5	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.
CO6	COMPILE the information of opportunities of entrepreneurs/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.



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Course Title: **Fluid Power & Control Laboratory**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEFINE working principle of components used in hydraulic and pneumatic systems.
CO2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
CO3	SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
CO4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.
CO5	DESIGN a hydraulic and pneumatic system for the industrial applications.
CO6	DESIGN & DEMONSTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.

Course Title: **Internship/Mini project**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	DEMONSTRATE professional competence through industry internship.
CO2	APPLY knowledge gained through internships to complete academic activities in a professional manner.
CO3	CHOOSE appropriate technology and tools to solve given problem.
CO4	DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.
CO5	DEVELOP network and social circle, and DEVELOPING relationships with industry people.
CO6	ANALYZE various career opportunities and DECIDE career goals.

Course Title: **Mini project**

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	EXPLAIN plan and execute a Mini Project with team.
CO2	IMPLEMENT hardware/software/analytical/numerical techniques, etc
CO3	DEVELOP a technical report based on the Mini project.
CO4	DELIVER technical seminar based on the Mini Project work carried out.



“EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE”

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Balewadi Pune-411045

BE (2015 Pattern)

Course Title: Hydraulics and Pneumatics (2015 Pattern)

Course Outcomes (CO's):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Describe the basic principles of fluid power and positive displacement hydraulic pumps
CO2	Illustrate the working principles, applications of hydraulic actuators, power units and accessories
CO3	Explain the working principles, applications of fluid power control devices
CO4	Interpret the working of industrial hydraulics circuits, methods of contamination control
CO5	Describe the Components, Control Valves and Circuits of Pneumatics
CO6	Select the appropriate components required for hydraulic and pneumatic systems

Course Title: CAD CAM & Automation

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Apply homogeneous transformation to 2D/3D dimensional CAD entities.
CO2	Analyze analytical & synthetic curves, surfaces and solid.
CO3	Understand fundamentals of finite element method, & determine stress, strain, and displacement in simple mechanical components like spring, bar, truss.
CO4	Develop CNC part program for turning/milling.
CO5	Explain suitable rapid prototyping methods for engineering problems.
CO6	Understand different automation strategies and fundamentals of robotics.

Course Title: Dynamics of Machinery

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Estimate natural frequency for single DOF undamped & damped free vibratory systems.
CO2	Determine response to forced vibrations due to harmonic excitation.
CO3	Estimate natural frequencies, mode shapes for 2 DOF undamped free vibratory systems.
CO4	Apply balancing techniques for static and dynamic balancing of multi cylinder engines.
CO5	Describe vibration measuring instruments along with vibration control methods.
CO6	Explain noise, its measurement & noise reduction techniques.



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Course Title: Elective I- COMPUTATIONAL FLUID DYNAMICS

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Analyse and model fluid flow and heat transfer problem
CO2	Apply numerical technique to discretize and solve governing differential equation for two dimension heat conduction equation
CO3	Solve basic advection and convection diffusion equations and understands the role in fluid flow and heat transfer
CO4	Evaluate flow parameters in internal and external flow using simple algorithm
CO5	Discuss basic introduction to turbulent flow model

Course Title: Elective I- Heating, Ventilation, Air Conditioning and Refrigeration Engineering

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Determine the performance parameters of trans-critical & ejector refrigeration systems
CO2	Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
CO3	Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
CO4	Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
CO5	Estimate heat transmission through building walls using CLTD and decrement factor & time lag methods with energy-efficient and cost-effective measures for building envelope.
CO6	Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.

Course Title: Elective II- Automobile Engineering

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	To compare and select the proper automotive system for the vehicle.
CO2	To analyse the performance of the vehicle.
CO3	To diagnose the faults of automobile vehicles.
CO4	To apply the knowledge of EVs, HEVs and solar vehicles



Course Title: Elective II- Operations Research

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Execute the LLP using Two Phase Method and Decision Theory to solve problems.
CO2	Evaluate the existing utilization of the resources and propose a better solution using transportation models.
CO3	Analyze the conflicting situations and evaluate the optimal strategy using Game Theory and replacement analysis.
CO4	Implement the project management techniques like CPM, PERT, Crashing Analysis and Monte-Carlo Simulation method.
CO5	Evaluate the waiting time, idle time and process time using Queuing and Sequencing Models.
CO6	Optimize multi stage decision making problems using Integer Programming and Dynamic Programming.

Course Title: Elective II- ENERGY AUDIT AND MANAGEMENT

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Carry out energy audit of their residence/ society / college.
CO2	Carry out electric tariff calculation for any installation.
CO3	Manage the peak load and power factor of any installation.
CO4	Suggest different methods to optimize the energy consumption for any process and develop ecofriendly methods.
CO5	Adopt new methods to improve overall efficiency of system e.g. co-generation, non-conventional methods of energy production.

Course Title: Energy Engineering

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	To study the power generation scenario, the components of thermal power plant, improved Rankin cycle, Cogeneration cycle
CO2	To understand details of steam condensing plant, analysis of condenser, the an environmental impacts of thermal power plant, method to reduce various pollution from thermal power plant
CO3	To study layout, component details of hydroelectric power plant, hydrology and elements, types of nuclear power plant
CO4	To understand components; layout of diesel power plant , components; different cycles; methods to improve thermal efficiency of gas power plant
CO5	To study the working principle , construction of power generation from non-conventional sources of energy
CO6	To learn the different instrumentation in power plant and basics of economics of power generation.



PES's
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Department of Mechanical Engineering

Course Title: Mechanical System Design

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Understand the difference between component level design and system level design.
CO2	Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
CO3	Learn optimum design principles and apply it to mechanical components.
CO4	Handle system level projects from concept to product.

Course Title: Elective III- Tribology

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	The course will enable the students to know the importance of Tribology in Industry
CO2	The course will enable the students to know the basic concepts of Friction, Wear, Lubrications and their measurements.
CO3	Identify the performance of different types of bearings and analytical analysis thereof.
CO4	Apply the principles of surface engineering for different applications of tribology.

Course Title: Elective III- Industrial Engineering

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Apply the Industrial Engineering concept.
CO2	Understand, analyze and implement different concepts involved in method study.
CO3	Design and Develop different aspects of work system and facilities.
CO4	Understand and Apply Industrial safety standards, financial management practices.
CO5	Undertake project work based on modeling & simulation area.

Course Title: Elective III- Robotics

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Identify different type of robot configuration with relevant terminology.
CO2	Select suitable sensors, actuators and drives for robotic systems.
CO3	Understand kinematics in robotic systems.
CO4	Design robot with desired motion with suitable trajectory planning.
CO5	Select appropriate robot programming for given application.
CO6	Understand need of IoT, machine learning, simulation in robotics.



Course Title: Elective IV- Advanced Manufacturing Processes

Course Outcomes (CO's):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Classify and understand various special forming processes.
CO2	Understand and identify applicability of advanced joining processes.
CO3	Understand and identify applicability of hybrid non-conventional machining techniques.
CO4	Select appropriate micro and nano fabrication techniques for engineering applications.
CO5	Understand and apply various additive manufacturing technology for product development
CO6	Identify material characterization techniques to by using Microscopy and Spectroscopy

Course Title: Elective IV- Solar and Wind Energy

Course Outcomes (CO):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Design of solar food drier for domestic purpose referring existing system
CO2	Design of parabolic dish solar cooker for domestic purpose referring existing system
CO3	Design of solar photovoltaic system for domestic purpose referring existing system
CO4	Design miniature wind mill for domestic purpose referring existing system

Course Title: Elective IV- Product Design and Development

Course Outcomes (CO's):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Understand essential factors for product design
CO2	Design product as per customer needs and satisfaction
CO3	Understand Processes and concepts during product development
CO4	Understand methods and processes of Forward and Reverse engineering
CO5	Carry various design processes as DFA, DFMEA, design for safety
CO6	Understand the product life cycle and product data management

Course Title:Project

Course Outcomes (CO's):

Course outcome (CO)	Statement
	At the end of the course, student will be able to
CO1	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
CO2	Learn about the literature review.
CO3	Get the experience to handle various tools, tackles and machines.