UG Mechanical Engineering Automobile / Automobile Engineering

- **Department Name: - Automobile Engineering**
- **UG Program Name: -B. Tech.Mechanical Engineering Automobile / Automobile Engineering**
- **Vision and Mission: -**

Vision: - To offer programs of global repute with an emphasis on academics, research and innovation to provide competent and efficient human resources in the field of automotive engineering to fulfill the needs of the society.

Mission: -

1. To design and enrich the curricula based on changing needs of industry and society.
2. To develop a center of excellence to promote automotive research and attract industry assignments.
3. To provide an excellent academic environment for development of competent automotive professionals to meet industry expectations.
4. To ensure participation of every stakeholder to enhance effectiveness of the programs being offered.

Sr. No.	Program Outcomes
1.	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2.	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
3.	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
4.	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems
5.	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6.	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7.	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
8.	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9.	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10.	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11.	Demonstrate knowledge and understanding of the engineering and management

	principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12.	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change

Sr. No.	Program Specific Outcomes
1.	Diagnose the automotive system failures and repair / replace the components / systems so as to bring the vehicle in original condition.
2.	Perform the role of motor claim approver and loss assessor with confidence and competence.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SH1054	Engineering Mathematics 1	CO1: Solve problems on improper and multiple integrals.
2.				CO2: Sketch the curve and use it to solve the problems on rectification and multiple integral.
3.				CO3: Prove the results of partial differentiation.
4.	I	SH1133	Engineering Graphics	CO1: Determine the location and orientation of point, line, and plane with respect to reference planes to draw their projection.
5.				CO2: Develop the projection of various types of solids in various conditions.
6.				CO3: Develop section views and true shape section of various types of solids
7.				CO4: Identify the need of development of lateral surfaces and apply the same in engineering drawing.
8.				CO5: Develop orthographic views of an object to convert pictorial view into two-dimension (2d) view.
9.				CO6: Develop isometric view to convert two-dimension (2d) view to pictorial view.
10.	I	SH1311	Engineering Physics	CO1: Use the principles of interference, diffraction and polarization in thin reflecting films, diffraction gratings and polarimeter respectively.
11.				CO2: Apply the knowledge of architectural acoustics for acoustically good halls and principle of magnetostriction and piezoelectric methods for production of ultrasound
12.				CO3: Apply the newton's laws of motion to calculate forces acting on objects
13.				CO4: Describe the behavior of a damped and driven harmonic oscillator
14.				CO5: Use the knowledge of semiconducting materials in semiconductor devices
15.				CO6: Explain the basics of laser production and its applications

Sr. No.	Semester	Course Code	Course Name	Course Outcome
16.	I	SH1513	Engineering Physics Lab	CO1: Apply the theory of semiconductors to calculate band gap energy and carrier concentration.
17.				CO2: Apply theory of newton's rings and diffraction grating to calculate radius of curvature of plano convex lens and wavelength of given source of light respectively.
18.				CO3: Compare b-h curve for different ferromagnetic materials and measure hysteresis loss in it.
19.				CO4: Determine the numerical aperture of optical fiber
20.				CO5: Use ultrasonic interferometer to calculate velocity of ultrasound in given liquid
21.				CO6: Use Laurent's half shade polarimeter to calculate specific rotation of optically active solution.
22.				CO7: Illustrate the phenomena of resonance in forced oscillations
23.	I	SH1553	Engineering Graphics Lab	CO1: Determine the location and orientation of point, line, and plane with respect to reference planes to draw their projection.
24.				CO2: Develop the projection of various types of solids in various conditions.
25.				CO3: Develop section views and true shape section of various types of solids
26.				CO4: Identify the need of development of lateral surfaces and apply the same in engineering drawing.
27.				CO5: Develop orthographic views of an object to convert pictorial view into two-dimension (2D) view.
28.				CO6: Develop isometric view to convert two-dimension (2D) view to pictorial view.
29.	I	SH1832	English Proficiency Lab - I	CO1: Demonstrate active listening through listening comprehension exercises
30.				CO2: Make use of English language meaningfully and effectively in oral modes.
31.				CO3: Apply reading strategies to comprehend the given text.
32.	I	SH1891	Engineering Explorations and Design Project	CO1: Explain the role of an engineer as a problem solver
33.				CO2: Design engineering solutions to complex problems utilizing multi-disciplinary systems approach.
34.				CO3: Examine a given problem using process of engineering problem analysis.
35.				CO4: Build simple systems/prototypes using engineering design and development process.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
36.				CO5: Analyze engineering solutions from ethical and sustainability perspectives.
37.				CO6: Apply basics of engineering project management skills in project development.
38.	I	SH1851	Engineering practice Lab I	CO1: Acquire skills in basic engineering practice.
39.				CO2: Use hand tools and power tools.
40.				CO3: Develop sheet metal model for specific application.
41.				CO4: Understand the various operations performed in machine shop.
42.				CO5: Perform different joining operations
43.				CO6: Perform pipe fittings operations.
44.	I	SE1431	Basics of Mechanical Engineering	CO1: Explain different power generation systems.
45.				CO2: Select appropriate energy conversion device for the given application.
46.				CO3: Classify vehicles on the basis of different parameters.
47.				CO4: Compare two stroke and four stroke IC engines.
48.				CO5: Describe different transmission devices in a given system.
49.				CO6: Choose suitable materials and manufacturing processes for a given application.
50.	I	SE1651	Basics of Mechanical Engineering Lab	CO1: Explain the different components of power generation systems.
51.				CO2: Identify the systems and components of vehicle.
52.				CO3: Distinguish between two stroke and four stroke engines.
53.				CO4: Carry out day to day life maintenance of machines.
54.				CO5: Explain the different components of power generation systems.
55.	II	SH1331	Programming for Problem Solving	CO1: Explain the basic terminologies and concepts of C programming language.
56.				CO2. Construct the algorithm and flow chart to solve the given problem
57.				CO3. Write a C program for given problem statement
58.				CO4. Examine the given C program to remove the logical & syntax errors and predict the correct output
59.	II	SH1792	Electrical Engineering Lab	CO1. Acquaint with the basic concepts and properties of electrical circuits and awareness about safety precautions.
60.				CO2. Select proper meter/s for measuring electrical quantities during experiments.
61.				CO3. Explain various electrical circuits (DC, AC)

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				and magnetic circuits through laboratory practices.
62.				CO4. Demonstrate various power converter for desired application.
63.				CO5. Choose circuit breakers for specific application.
64.	II	SH1911	Programming for Problem Solving Lab	CO1. Describe various terminologies and concepts of C programming language
65.				CO2. Construct the algorithm and flow chart to solve the given problem.
66.				CO3. Implement a 'C' program for given problem statement
67.				CO4. Test the implemented 'C' programs by removing syntax & logical errors for getting expected output on various input.
68.	II	SH1641	Engineering practice- Lab II	CO1. Make wooden job.
69.				CO2. Make Sheet metal job.
70.				CO3. Make job by various machining processes.
71.				CO4. Make job by joining processes
72.	II	SH1024	Engineering Mathematics II	CO1: Use the concepts of matrices that serve as an essential basis for several computational techniques
73.				CO2: Solve the problems on ordinary differential equations analytically and numerically.
74.				CO3: Make use of different methods to solve simultaneous algebraic linear equations.
75.				CO4: Apply the relevant numerical method for interpolating the polynomial.
76.	II	SH1034	Engineering Chemistry	CO1: Relate to the basic concepts of chemistry in engineering.
77.				CO2: Select the correct instrumental techniques for the examination of materials.
78.				CO3: Examine water quality for industrial and domestic sector and suggest remedial measures.
79.				CO4: Describe construction, working and applications of batteries and fuel cells.
80.				CO5: Identify causes of corrosion and its remedial measures.
81.				CO6: Compare types and quality of fuels by different instruments and select the proper lubricant and lubrication method.
82.	II	SH1292	Electrical Engineering	CO1: Solve DC. and AC electric circuits.
83.				CO2: Explain construction, working and application of transformers.
84.				CO3: Explain construction, working and application of different types of commonly used rotating machines.
85.				CO4: Classify power converters on the basis of their applications.
86.				CO5: Select suitable capacity of wires, cables

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				switch gear and illumination system for low voltage electrical installations.
87.	II	SH1533	Engineering Chemistry Lab	CO1: Examine the materials by using analytical instruments.
88.				CO2: Measure quality of water on different parameters for industrial and domestic purposes.
89.				CO3: Select proper lubricant for different machines according to working condition.
90.				CO4: Inspect the quality of fuel using proximate analysis.
91.				CO5: Improve written and oral communication and cooperative learning skills.
92.	II	SH1621	English Proficiency Lab	CO1: Communicate through letters, circulars, notices, memos, and emails
93.				CO2: Draft academic and professional reports.
94.				CO3: Apply English as a language for technical purpose.
95.				CO4: Prepare job application addressing requirements of the post.
96.	III	MA201	Applied Thermodynamics	CO1: Explain energy, heat and work interaction.
97.				CO2: Use the steam table and mollier chart to compute thermodynamics interactions
98.				CO3: Apply the laws of thermodynamics to various flow and non-flow thermodynamic processes.
99.				CO4: Analyze the performance of various power cycles
100.				CO5: Describe various methods of refrigeration and air-conditioning
101.	III	MA203	Engineering Mechanics	CO1: Classify various forces and their effects to analyze real life problems.
102.				CO2: Analyze engineering problems applying conditions of equilibrium
103.				CO3: Apply fundamental concepts of kinematics and kinetics to the analysis of practical problems
104.				CO4: Determine centroid & moment of inertia of the geometrical plane lamina.
105.	III	MA205	Manufacturing Technology	CO1: Select material, types, allowances of pattern in the casting process
106.				CO2: Explain casting equipment and casting defects
107.				CO3: Explain various machine tools and machining operations
108.				CO4: Develop part programing for CNC machine
109.	III	MA207	Material Science & Metallurgy	CO1: Classify engineering materials based on properties.
110.				CO2: Describe crystalline characteristics of engineering materials.
111.				CO3: Illustrate different phases of materials.
112.				CO4: Select suitable heat treatment or mechanical

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				testing for desired material properties.
113.				CO5: Select appropriate material for a particular application.
114.	III	MA209	Workshop Practice - I	CO1: Describe single point cutting tool geometry and grinding.
115.				CO2: Explain various machine tool operations performed using lathe machine.
116.				CO3: Explain the working of drilling, shaping. milling, and grinding machines.
117.	III	MA213	Machine Drawing lab.	CO1: Represent the automotive and mechanical components and materials with their conventions
118.				CO2: Develop an ability to prepare free hand sketches with proportionate dimensions.
119.				CO3: Apply AutoCAD or similar software for drawing machine components and assemblies.
120.				CO4: Develop an ability to prepare details and assembly drawings as per standard procedure.
121.				CO5: Prepare the production drawing of the given system before it is given to manufacturing.
122.	III	SH2032	Engineering Mathematics – III	CO1: Solve differential equations using various properties.
123.				CO2: Apply appropriate method of solution to the given differential equation.
124.				CO3: Apply techniques of solution of higher order linear ordinary and partial differential equation to solve specific engineering problems.
125.				CO4: Solve engineering problems using Laplace transform.
126.				CO5: Apply rules of vector differential calculus to evaluate gradient, divergence and conservative vector field.
127.				CO6: Apply fourier transforms to solve the differential equations in engineering problems.
128.	III	SH2172	Environmental Science	CO1: Explain the importance and sensitivity of environment.
129.				CO2: Analyze over exploitation of natural resources and follow environmental ethics
130.				CO3: Explain methods to protect environment and prevent environmental pollution
131.				CO4: Apply their knowledge and skills to solve their environment related problems
132.	III	SH2612	Environmental Project	CO1: Utilize scientific methods to solve environmental problems.
133.				CO2: Evaluate technologies for restoration of degraded environment
134.				CO3: Develop presentation and report writing skills
135.				CO4: Develop as an individual and in group leadership quality

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136.	III	MA211	Engineering Mechanics Lab	CO1: Verify law of polygon of forces, law of triangle of forces and principle of movement.
137.				CO2: Compare coefficient of friction of various surfaces in contact.
138.				CO3: Corelate theoretical and practical results of support reactions and centroid of plane lamina.
139.				CO4: Analyze a simple truss.
140.	III	MA215	Comprehensive Exam- I	CO1: Comprehend the knowledge gained in the course work.
141.				CO2: Demonstrate problem solving ability
142.	IV	MA202	Kinematics Of Machines	CO1: Design suitable mechanism for different applications in a machine
143.				CO2: Determine velocity and acceleration of linkages in mechanisms using graphical and analytical methods.
144.				CO3: Develop profile of the cam to get required follower motion for given application..
145.				CO4: Analyze characteristic curves of mechanical governors for their stability.
146.				CO5: Select the lower pair mechanisms for a given application.
147.				CO6: Use principles of friction in designing automotive components such as clutch, brake, and bearing.
148.	IV	MA204	Fluid Mechanics & Machinery	CO1: Compare various properties of fluids at rest and in transit
149.				CO2: Analyze fluid systems using equations such as Bernoulli's equation and continuity equation
150.				CO3: Examine energy losses in pipes to enable drawing energy gradient lines
151.				CO4: Solve viscous and boundary layer flow problems
152.				CO5: Evaluate the performance characteristics of hydraulic turbines and hydraulic pumps
153.	IV	MA206	Electric Drives and Controls	CO1: Explain the importance and working of electric drives.
154.				CO2: Analyze performance of dc & ac machines.
155.				CO3: Explain conventional & static dc & ac drives for speed control.
156.				CO4: Describe steeper & servo motor and its drive system along with applications.
157.	IV	MA208	Mechanics Of Materials	CO1: Apply knowledge of stresses and strains for structural analysis.
158.				CO2: Analyse suitability of appropriate section for mechanical applications
159.				CO3: Compare different columns on the basis of end conditions.
160.				CO4: Analyze the circular shaft subjected to pure

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				torsion.
161.				CO5: Apply energy method for structural analysis of solid body.
162.	IV	MA210	Industrial Organisation and Management	CO1: Explain the basic functions of management.
163.				CO2: Describe the basic concepts of functional areas of management.
164.				CO3: Apply basic concepts of management in an industry.
165.				CO4: Acquaint with entrepreneurship management.
166.	IV	MA212	Metrology & Measurement Lab.	CO1: Measure surface finish by using autocollimator
167.				CO2: Measure the angle of tapered components, template, and thread form using tool makers microscope, sine bar, and with standard balls and rollers.
168.				CO3: Measure, pressure, force, velocity etc. using various instruments.
169.				CO4: Calibrate the measuring instrument.
170.	IV	MA214	Fluid Mechanics & Machines Lab.	CO1: Verify and apply Bernoulli's theorem
171.				CO2: Determine coefficient of discharge of fluid flow measuring devices.
172.				CO3: Calculate various types of losess through pipe flow.
173.				CO4: Draw performance characteristic curves for pumps and compressors.
174.				CO5: Evaluate various efficiencies of pumps and compressors.
175.	IV	MA216	Solid Modeling Lab	CO1: Develop base feature for modeling of parts.
176.				CO2: Develop 3d model of automotive components.
177.				CO3: Assemble components using functional constraints.
178.	IV	MA218	Workshop Practice - II	CO1: Develop the given job using advance welding process
179.				CO2: Describe various features of a CNC machine
180.				CO3: Explain working of electrical discharge machining (EDM) and 3d printing
181.	IV	MA220	Object Oriented Programming Lab	CO1: 1. identify elements and features of object oriented programming.
182.				CO2: 2. implement various object oriented concepts with the help of programs.
183.				CO3: 3. apply the object oriented concepts in real time problem solving.
184.				CO4: 4. apply template and exception handling techniques in dealing with variety of programs.
185.	IV	MA222	Comprehensive Exam- II	CO1: Comprehend the knowledge gained in the course work.
186.				CO2: Demonstrate problem solving ability
187.	V	AE3012	Internal	CO1: Perform a primary thermodynamic analysis of

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			Combustion Engines	otto and diesel cycle engines.
188.				CO2: Select appropriate engine for specific application.
189.				CO3: Select proper fuel system and subsystems for i c engine.
190.				CO4: Conduct performance testing of the IC engine and portray operating characteristics of IC engines.
191.				CO5: Select proper lubricant and lubrication system for engine.
192.				CO6: Identify abnormal combustion in engine and remedy over it.
193.	V	AE3032	Automotive Systems	CO1: Classify different automotive systems.
194.				CO2: Interpret underlying mechanics of the automotive systems.
195.				CO3: Compare different chassis and transmission systems.
196.				CO4: Select an automotive system for diverse automotive applications.
197.	V	AE3052	Automotive Electrical & Electronics	CO1: Select automotive electrical systems like battery, alternator, starting systems, ignition systems for particular application
198.				CO2: Interface automotive sensors and actuators with microcontrollers
199.				CO3: Apply the concepts of battery management system and design the battery pack
200.				CO4: Develop and integrate control algorithms for ecus with hardware
201.				CO5: Illustrate advanced electronic systems used in modern road vehicles
202.	V	AE3072	Manufacturing Technology	CO1: Select suitable joining and metal forming processes for particular operation
203.				CO2: Select appropriate sheet metal operation for particular application.
204.				CO3: Compare different plastic manufacturing processes.
205.				CO4: Compare traditional & advanced manufacturing processes
206.	V	AE3092	Automotive Styling and Design	CO1: Explain the process of new product design
207.				CO2: Explain the automotive design process.
208.				CO3: Discuss the components of exterior design of automobile.
209.				CO4: Discuss the components of interior design of automobile.
210.	V	AE3112	Automotive Production Systems	CO1: Explain need and basic elements of manufacturing automation.
211.				CO2: Perform quantitative analysis of transfer lines for its efficiency and effect of breakdowns
212.				CO3: Perform quantitative analysis of assembly

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				lines for its efficiency and effect of defective components
213.				CO4: Explain elements of cim and group technology
214.				CO5: Describe robot system
215.	V	AE3152	Hydraulics and Pneumatics	CO1: Identify various components of pneumatic and hydraulic control systems.
216.				CO2: Draw hydraulic and pneumatic circuits using appropriate symbols for different components.
217.				CO3: Design hydraulic and pneumatic circuits for given engineering application.
218.				CO4: Select hydraulic and pneumatic circuits for different engineering applications.
219.	V	AE3232	Internal Combustion Engines Lab	CO1: Demonstrate the construction and working of fuel supply system and its components, lubrication, cooling systems.
220.				CO2: Handle instruments like tachometer, thermometer, digital temperature indicator etc.
221.				CO3: Conduct the test on single cylinder and multicylinder petrol, diesel engine plot the characteristics curves and interpret the curves
222.				CO4: Calculate bp, ip, fp, air - fuel ratio and various engine efficiencies.
223.				CO5: Conduct the test and prepare heat balance sheet
224.	V	AE3252	Automobile Engineering Laboratory	CO1: Describe the operating principle, functions, and constructional details of suspension, steering, braking & transmission systems used in automobiles.
225.				CO2: Apply the concepts of human ergonomics for design of automobile
226.				CO3: Explain the use of various tests for designing the vehicle body.
227.				CO4: Test the working of various electrical components using testing instruments
228.	V	AE3272	Workshop Practice - III	CO1: Explain operation of CNC to develop mechanical parts
229.				CO2: Explain CNC programming to develop mechanical parts.
230.				CO3: Explain 3d printing technology to develop solid parts
231.	V	SH301	Indian Constitution	CO1: Create awareness about law depiction and importance of constitution.
232.				CO2: Define fundamental rights and fundamental duties of the Indian citizen to instill morality, social values, honesty, dignity of life, and their social responsibilities.
233.				CO3: Create awareness of their surroundings,

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				society, social problems, and their suitable solutions while keeping rights and duties of the citizen keeping in mind.
234.				CO4: Recognize distribution of powers and functions of local self-government.
235.				CO5: Comprehend the national emergency, financial emergency, and their impact on economy of the country.
236.	V	AE3292	Comprehensive Exam- III	CO1: Comprehend the knowledge gained in the course work.
237.				CO2: Demonstrate problem solving ability
238.	V	SH3032	Aptitude Training - I	CO1: Develop a through conceptual understanding an develop a logical approach towards solving aptitude and reasoning problems.
239.				CO2: Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications.
240.				CO3: Understand blood relations and ways of sitting arrangements along with various geometrical figures.
241.				CO4: Apply various short cuts and techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
242.	V	MA3312	Summer Internship	CO1: Acquaint with garage environment and processes to be carried out.
243.				CO2: Handle various tools and equipments used in garages.
244.				CO3: Diagnose minor faults of vehicle.
245.				CO4: Summarize the uses of advanced tools and equipments.
246.				CO5: Communicate and present his ideas / work in front of peers and superiors.
247.	VI	AE3022	Machine & Engine Design	CO1: Design components against fluctuating stresses.
248.				CO2: Design bolted joint, shafts, keys, and splines.
249.				CO3: Design spur and helical gears.
250.				CO4: Select the proper type of rolling contact bearing
251.				CO5: Design engine component
252.	VI	AE3042	Automotive Embedded Systems	CO1: Explain utility of sensors and instrumentation in-vehicle systems.
253.				CO2: Design control system for various vehicular modules
254.				CO3: Implement the protocols used by microcontroller to communicate with external sensors and actuators in real world.
255.				CO4: Provide technical embedded solutions for the development of automotive systems

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256.	VI	AE3062	Electric & Hybrid Vehicles	CO1: 1. appreciate the need for EVs and HEVs in today's transportation context.
257.				CO2: 2. design an electric vehicle application for given requirements.
258.				CO3: 3. elaborate the hybrid electric vehicle technology.
259.	VI	AE3122	Jigs and Fixture	CO1: Explain the functions and design principles of jigs and fixtures
260.				CO2: Illustrate the methods of locating, supporting, and clamping of jobs in jigs and fixtures
261.				CO3: Compare different types of fixtures
262.	VI	AE3142	Engine & Battery Management Systems	CO1: Justify the use of electronics in engine management
263.				CO2: Illustrate the working of SI and CI engine management systems
264.				CO3: Select sensors and actuators used for engine management systems
265.				CO4: Describe the battery management system
266.	VI	AE3182	Automotive Diagnostics	CO1: Describe the importance and significance of automotive maintenance and records.
267.				CO2: Select advanced equipments and machines used in automotive maintenance.
268.				CO3: Troubleshoot and carry out basic maintenance of automotive systems.
269.				CO4: Discuss the developments in automotive maintenance technology.
270.	VI	AE3262	Software Skills Laboratory - II	CO1: Develop surface models in modeling software
271.				CO2: Design sheet metal components
272.				CO3: Simulate the working of systems
273.	VI	AE3302	Capstone Project-I	CO1: Carry out literature survey and identify as well as select a problem.
274.				CO2: Comprehend and analyse an engineering problem and report findings to provide an appropriate solution.
275.				CO3: Design an experimental setup or develop an analytical model to analyze the system under consideration.
276.				CO4: Communicate problem, methodology and outcomes in a systematic and effective way in the form of a technical report.
277.				CO5: Work as a member and a team leader in engineering teams / multidisciplinary teams
278.				CO6: demonstrate an ability to use different tools and techniques to arrive at a solution to the given problem.
279.				CO7: Demonstrate ethical behaviour while completing the project work within given constraints and while delivering the expected

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				outcomes
280.	VI	SH302	Biology For Engineers	CO1: Apply biological engineering principles, procedures needed to solve real-world problems
281.				CO2: Demonstrate the functions of biological systems
282.				CO3: Analyze biological phenomena with math and physics to gain important insights
283.				CO4: Explain working of different biomedical instruments
284.				CO5: Select the sensors for given biological applications
285.				CO6: Explain relevant aspect of movement control process
286.		AE3202	Electric and Hybrid Vehicle Lab	CO1: Identify various trains for Electric and Hybrid Vehicle.
287.				CO2: Test various components of electric vehicle
288.				CO3: Model and simulate power train of electric vehicles.
289.				CO4: Prepare report on case studies.
290.	VI	AE3222	Automotive Diagnostic Lab	CO1: Carry out engine tune up
291.				CO2: Illustrate the critical inspection parameters while engine top overhaul.
292.				CO3: Measure wear of engine components.
293.				CO4: Perform wheel balancing and wheel alignment.
294.				CO5: Test spark plug and fuel injector performance as per their specification.
295.				CO6: Overhaul clutch, gearbox, braking system, electrical system, differential and axles.
296.	VI	AE3282	Comprehensive Exam- IV	CO1: Comprehend the knowledge gained in the course work.
297.				CO2: Demonstrate problem solving ability
298.	VI	SH3042	Aptitude Training - II	CO1: Develop a through conceptual understanding an develop a logical approach towards solving aptitude and reasoning problems.
299.				CO2: Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications.
300.				CO3: Understand blood relations and ways of sitting arrangements along with various geometrical figures.
301.				CO4: Apply various short cuts and techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
302.	VII	AE4011	Engine Design	CO1: Apply fluctuating stress theories for real life problems
303.				CO2: Select proper type of engine for given requirement.

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304.				CO3: Design engine components like cylinder, cylinder block, piston, connecting rod, crank shaft etc
305.				CO4: Design cooling and lubrication systems.
306.				CO5: Select proper bearings.
307.	VII	AE4021	Automotive System Design	CO1: Design of clutch for automotive application.
308.				CO2: Design gear box for automotive application.
309.				CO3: Design leaf spring and coil spring for automotive suspension.
310.				CO4: Design braking system (internal expanding shoe type) for a vehicle.
311.				CO5: Design front axle, differential, propeller shaft & final drive for automotive application.
312.	VII	AE4041	Vehicle Dynamics	CO1: Calculate dynamic longitudnal and transverse axle load transfer for a vehicle in motion.
313.				CO2: Determine the acceleration and braking performance of a vehicle when provided with specifications.
314.				CO3: Evaluate handling characteristics of a vehicle for a given set of data.
315.				CO4: Apply ride concepts while designing a suspension system for a vehicle.
316.	VII	AE4051	Finite Element Methods	CO1: Discretize the physical domain using appropriate elements and check the quality of mesh
317.				CO2: Develop FEA codes for analysis of structural problems
318.				CO3: Analyze thermal problems using FEA.
319.				CO4: Use isoparametric formulation for irregular geometries.
320.				CO5: Analyze natural frequency of structure.
321.	VII	AE4061	Electric and Hybrid Vehicles	CO1: 1. articulate the need of EVs and HEVs in today's transportation context.
322.				CO2: 2. describe and compare EVand HEV technology in general.
323.				CO3: 3. design an electric vehicle for given requirements.
324.				CO4: 4. design a hybrid electric vehicle for given requirements.
325.				CO5: 5. elaborate fuel cell technology for vehicular application.
326.	VII	AE4171	Motor Insurance Practices	CO1: Classify motor vehicle insurances
327.				CO2: Discuss applications of insurance principles in vehicle insurance
328.				CO3: Describe various forms in motor vehicle insurance
329.				CO4: Discuss mact in detail
330.				CO5: Analyze fraud management and internal audit in relation with motor vehicle insurance

Sr. No.	Semester	Course Code	Course Name	Course Outcome
331.	VII	AE4231	Transport Management	CO1: Describe the motor vehicle act & central motor vehicle rules.
332.				CO2: Illustrate motor vehicle insurance & taxation.
333.				CO3: Analyze the passenger & goods transport operations.
334.				CO4: Identify advanced techniques in traffic management.
335.	VII	AE4521	Automotive System Design Laboratory	CO1: Design automotive clutch assembly
336.				CO2: Design automotive gear box assembly.
337.				CO3: Draw / Sketch clutch and gear box details and assembly using suitable modeling software.
338.	VII	AE4531	Engine Design Laboratory	CO1: State functions of different engine components.
339.				CO2: Design engine components for given requirements.
340.				CO3: Develop the cad model of designed engine components.
341.	VII	AE4541	Ethics in Engineering Profession	CO1: Demonstrate knowledge of ethical practices and professional expectations.
342.				CO2: Analyse and evaluate practices carried out in the industry on the basis of ethicality
343.	VII	AE4551	Vehicle Testing and Emission Laboratory	CO1: Explain the measurement system for automotive testing.
344.				CO2: Analyze performance of two and four wheelers.
345.				CO3: Select appropriate sensor for measurement of noise and vibrations in the vehicles.
346.				CO4: Determine modal parameters of automotive components.
347.				CO5: Analyze performance of automotive engines.
348.				CO6: Analyze IC engine emissions of petrol and diesel engines
349.				CO7: Compare IC. engine emissions with air fuel ratio
350.	VII	AE4561	Software Proficiency	CO1: Explain user interface of the software.
351.				CO2: Develop appropriate model required for simulation.
352.				CO3: Apply proper constraints and boundary conditions
353.				CO4: select suitable solver settings of simulation software.
354.				CO5: Apply different post processing techniques to interpret the results.
355.				CO6: Optimize the engineering problems using simulation software.
356.	VII	AE4571	Project Phase - I	CO1: Carry out literature survey and identify as well as select a problem
357.				CO2: Comprehend and analyze an engineering

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				problem and report finding to provide an appropriate solution.
358.				CO3: Design an experimental set up to develop an analytical model to analyze the system under consideration.
359.				CO4: Communicate problem, methodology and outcomes in a systematic and effective way in the form of a technical report.
360.				CO5: Work as a member and a team leader in engineering teams / multidisciplinary teams.
361.				CO6: Demonstrate an ability to use different tools and technique to arrive at a solution to the given problem.
362.				CO7: Demonstrate ethical behavior while completing the project work within given constrains and while delivering the expected outcomes.
363.	VII	RE0407	URE Phase - I	CO1: Perform literature review and identify research topic.
364.				CO2: Write Synopsis of the research work that being done in semester VIII.
365.				CO3: Write technical review paper.
366.	VII	LL0407	Liberal Learning	CO1: Understand the functioning of the company in the terms of inputs, transformation process and the outputs (products and services)
367.				CO2: Learn to adjust with the company culture, work norms, code of conduct.
368.				CO3: Understand and follow the safety norms, code of conduct.
369.				CO4: Learn to observe, analyze and document the details as per the industry practices.
370.				CO5: Understand the processes, systems and procedures and to relate to the theoretical concepts-studies.
371.	VII	ED4001	Business Opportunity Guidance	CO1: Generate and identify different business ideas
372.				CO2: Make analysis of different ideas
373.				CO3: Select proper business idea to suit his personality and competencies.
374.				CO4: Prepare Pre-feasibility analysis.
375.	VII	AE4591	Industry in plant Training	CO1: Understand the functioning of the company in the terms of inputs, transformation process and the outputs (products and services)
376.				CO2: Learn to adjust with the company culture, work norms, code of conduct.
377.				CO3: Understand and follow the safety norms, code of conduct.
378.				CO4: Learn to observe, analyze and document the details as per the industry practices.
379.				CO5: Understand the processes, systems and

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				procedures and to relate to the theoretical concepts-studies.
380.	VIII	AE4101	Vehicle Maintenance Management	CO1: Distinguish between preventive and breakdown maintenance and its management.
381.				CO2: Prepare automotive dealership layout and its requirements.
382.				CO3: Apply concepts of management in parts ordering and servicing.
383.				CO4: Illustrate management tools for showroom and service sector automobile industry.
384.				CO5: Interpret and summarize multi-brand workshop management
385.	VIII	AE4111	Automotive Safety	CO1: Comprehend application of passive and active safety for vehicle.
386.				CO2: Describe importance of ergonomics in automotive safety and human response to impact
387.				CO3: Design vehicle safety systems
388.				CO4: Describe various regulations of vehicle safety and safety testing methods.
389.				CO5: Apply principle of collision to vehicle crash mechanism
390.	VIII	AE431	Hydraulics and Pneumatics	CO1: Identify various components of pneumatic and hydraulic control systems.
391.				CO2: Draw hydraulic and pneumatic circuits using appropriate symbols for different components.
392.				CO3: Design hydraulic and pneumatic circuits for given engineering application.
393.				CO4: Select hydraulic and pneumatic circuits for different engineering applications.
394.	VIII	AE433	Experimental Stress Analysis	CO1: Use polariscope for finding stresses in machine components.
395.				CO2: Analyze the photoelastic data by various methods.
396.				CO3: Determine the strains and stresses in the photoelastic coating by using a reflection polariscope.
397.				CO4: Use strain gauge for measurement of strain/stresses.
398.				CO5: Design strain gauge transducers.
399.	VIII	AE462	Hydraulics and Pneumatics Lab.	CO1: Draw symbols to represent hydraulic and pneumatic components.
400.				CO2: Select hydraulic and pneumatic components to suit a particular engineering application.
401.				CO3: Demonstrate working of various hydraulic circuits using hydraulic trainer kit.
402.				CO4: Demonstrate working of various pneumatic circuits using pneumatic trainer kit.
403.				CO5: Develop hydraulic and pneumatic circuits to

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				address the requirements of a particular engineering application.
404.				CO6: Analyse hydraulic and pneumatic circuits to meet the requirements of an engineering application.
405.	VIII	AE466	Experimental Stress Analysis Lab.	CO1: Use of transmission polariscope for measurement of stresses in machine components.
406.				CO2: Apply reflection polariscope technique for measurement of strain/stresses in photoelastic coating.
407.				CO3: Use strain gauge techniques for various applications.
408.	VIII	OE402	Renewable Energy Sources	CO1: Identify the need of requirement of renewable energy source
409.				CO2: Summarize the various available energy sources.
410.				CO3: Illustrate different technologies essential for conversion of renewable energy sources.
411.				CO4: Evaluate the performance of energy conversion systems for maximum efficiency
412.				CO5: Compare the various renewable energy technologies.
413.				CO6: Select appropriate renewable energy technology for specific application
414.	VIII	AE4581	Project Phase - II	CO1: Carry out literature survey and identify as well as select a problem
415.				CO2: Comprehend and analyze an engineering problem and report finding to provide an appropriate solution.
416.				CO3: Design an experimental set up to develop an analytical model to analyze the system under consideration.
417.				CO4: Communicate problem, methodology and outcomes in a systematic and effective way in the form of a technical report.
418.				CO5: Work as a member and a team leader in engineering teams / multidisciplinary teams.
419.				CO6: Demonstrate an ability to use different tools and technique to arrive at a solution to the given problem.
420.				CO7: Demonstrate ethical behavior while completing the project work within given constrains and while delivering the expected outcomes.
421.	VIII	REM4001	URE Phase - II	CO1: Select on the literature in the field, analyze and interpret research evidence published on a topic to establish a suitable research problem / issue or opportunity to explore further.
422.				CO2: Design the research study using a suitable

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				paradigm, associated methodologies and methods of data collection and analysis.
423.				CO3: Write a research proposal (research blue print), describing the topic
424.				CO4: Demonstrate the ability to use the statistical software to solve problems.

PG Mechanical Engineering Automobile

- **Department Name:Automobile Engineering**
- **PG Program Name:M. Tech.Mechanical Engineering Automobile**
- **Vision and Mission :-**
- **Vision: -** To offer programs of global repute with an emphasis on academics, research and innovation to provide competent and efficient human resources in the field of automotive engineering to fulfill the needs of the society.
- **Mission: -**

  1. To design and enrich the curricula based on changing needs of industry and society.
  2. To develop a center of excellence to promote automotive research and attract industry assignments.
  3. To provide an excellent academic environment for development of competent automotive professionals to meet industry expectations.
  4. To ensure participation of every stakeholder to enhance effectiveness of the programs being offered.

Sr. No.	Program Outcomes
1.	An ability to independently carry out research /investigation and development work to solve practical problems.
2.	An ability to write and present a substantial technical report/document.
3.	An ability to demonstrate a degree of mastery in Automotive Technology.
4.	An ability to collaborate, work harmoniously in teams and address multidisciplinary issues with consideration of professional, legal, and ethical issues.
5.	An ability to use advanced techniques, skills, and modern engineering tools with financial aspects.
6.	An ability to learn continuously, independently and update knowledge & skills.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	MAE1010	Motor Vehicle Technology	CO1: Outline the different vehicle layouts as per requirements of automotive applications.
2.				CO2: Explain the fundamentals, principle of operation of different automotive systems.
3.				CO3: Describe the constructional details and working of various transmission and chassis systems.
4.				CO4: Analyze the underlying mechanics of the various chassis systems.
5.				CO5: Select/configure components or subsystem for diverse vehicular application.
6.	I	MAE1020	Automotive Design	CO1: Choose and configure engine and chassis systems for proposed vehicle and design engine components.
7.				CO2: Carry out thermal and mechanical design of engine subsystems.
8.				CO3: Design clutch, gear box and drive train elements for specific vehicle.
9.				CO4: Analyze and select steering geometry

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				and design steering mechanism and components.
10.				CO5: Design suspension linkages, springs and shock absorber
11.				CO6: Design brake linkage and brake system
12.	I	MAE1040	Automotive Product Design and Development	CO1: Appreciate the product development process in general
13.				CO2: Establish target and final specifications of proposed product.
14.				CO3: Generate, screen and test concepts for proposed product
15.				CO4: Apply various techniques like industrial design, dfx for a proposed product.
16.				CO5: Perform economic analysis of proposed product.
17.	I	MAE1120	Finite Element Methods	CO1: Formulate finite element equation using weighted residual approach
18.				CO2: Formulate finite element equation using variational approach.
19.				CO3: Analyze vector and scaler field problems using fem.
20.				CO4: Analyze the dynamic behavior of structure using fem.
21.				CO5: Use Isoparametric formulation for irregular geometries
22.				CO6: Formulate axisymmetric problems.
23.	I	MAE1130	Research Methodology and IPR	CO1: Formulate a research problem.
24.				CO2: Analyze research related information
25.				CO3: Prepare and present research proposal/paper by following research ethics
26.				CO4: Make effective use of computers and computing tools to search, analyze information and prepare report.
27.				CO5: Describe nature and processes involved in development of intellectual property rights.
28.	I	MAE1140	Auto Engg Lab	CO1: Identify and list elements of various automotive systems
29.				CO2: Draw sketches /schematics of automotive systems
30.				CO3: Describe the operating principles, functions, constructional details and working of automotive systems.
31.				CO4: Compare various configurations/subtypes of automotive systems
32.				CO5: Select appropriate configuration/types for automotive systems as per requirements in automotive applications.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
33.	I	MAE1150	Vehicle Testing and Emission lab.	CO1: Analyses performance of two and four wheelers
34.				CO2: Determine modal parameters of automotive components.
35.				CO3: Select appropriate sensor for measurement of noise and vibrations
36.				CO4: Analyse effect of catalyst convertor on engine emissions
37.				CO5: Use of appropriate gas analyser or smoke meter to measure principal emissions
38.	I	MAE1160	CAE Lab	CO1: Develop/ select appropriate model required for simulation
39.				CO2: Apply proper constraints and boundary conditions
40.				CO3: Select suitable solver settings of simulation software.
41.				CO4: Apply different post processing techniques to interpret the results.
42.				CO5: Apply optimization tools from simulation software.
43.	II	MAE2020	Design of Electric & Hybrid Electric Vehicles	CO1: Appreciate the relevance of EVs and HEVs for road transportation.
44.				CO2: Design an EV for given requirements and estimate its performance.
45.				CO3: Design an HEV in terms of architecture, control strategy and various elements for said requirements.
46.	II	MAE2070	Automotive Emissions and Control Technology	CO1: Outline the overview of emission control technologies in SI engine.
47.				CO2: Explore the effects of engine design parameters and engine operating variables on SI engines emission performance.
48.				CO3: Analyze the pollutant formation mechanisms in IC engine emissions.
49.				CO4: Illustrate the knowledge of emission norms, standard test procedures and emission measurements techniques.
50.				CO5: Analyze different emission control technologies in IC engines.
51.	II	MAE2120	Mechatronics	CO1: Describe/identify basic elements of mechatronic systems.
52.				CO2: Describe/identify key elements of sensors and transducers and techniques of interfacing with plc, microprocessor and microcontroller etc.
53.				CO3: Apply a systematic approach to the design mechatronics systems.
54.				CO4: Design mechatronics systems in areas

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				such as manufacturing, automobile systems and robotics.
55.	II	MAE2130	CFD Lab	CO1: Select appropriate domain for CFD simulation.
56.				CO2: Select suitable meshing technique for CFD simulation
57.				CO3: Apply proper domain and boundary conditions.
58.				CO4: Simulate steady state and transient fluid flow and heat transfer problems.
59.				CO5: Simulate multiphase flow problems.
60.				CO6: Use CFD results for making design decisions.
61.	II	SH551	Technical Communication	CO1: Acquire skills required for good oral and written communication
62.				CO2: Demonstrate improved writing and reading skills
63.				CO3: Ensure the good quality of oral and written communication
64.	II	SHP513	Advanced Mathematical Methods in Engineering	CO1: Evaluate fourier series and fourier transforms for given function and apply it to solve the partial differential equations in engineering problems.
65.				CO2: Apply the specific method of solution of partial differential equations for solving the given problems.
66.				CO3: Formulate and solve a boundary value problem (partial differential equation, boundary.
67.				CO4: Use the relevant method for solving the simultaneous linear equations and compute the eigen values.
68.				CO5: Estimate numerically the solution of given algebraic equation.
69.				CO6: Analyze the variance and explain the different research designs.
70.	II	MAE2010	Vehicle Dynamics	CO1: Calculate axle loads under any combination of accelerations, grades, aerodynamic forces etc.
71.				CO2: Evaluate vehicle acceleration performance in the light of engine power constraint and traction limit constraints
72.				CO3: Determine braking performance of vehicle over the range of operating conditions
73.				CO4: Evaluate response of vehicle to steering inputs at low and high speeds and its characterization as understeer or oversteer
74.				CO5: Estimate ride performance of a vehicle

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				in terms of resonant frequencies, bounce and pitch frequencies
75.	II	MAE2140	Mini-Project	CO1: Identify a problem of small magnitude preferably in automotive domain
76.				CO2: Analyze the problem with certain objectives and within applicable constraints
77.				CO3: Offer/Suggest/Implement innovative solution to the said problem and validate the solution
78.				CO4: Communicate the effort through presentation, display and technical report
79.	III	MAE3010	Industry Internship	CO1: Acquire sufficient knowledge in the respective Industry
80.				CO2: Explain the various departments in the Industry
81.				CO3: Identify problems in the process in Industry
82.				CO4: Suggest some remedies for the identified problems
83.	III	MAE3020	MOOC Course	CO1: Identify the real applications and practices of courses studied, at industry level
84.				CO2: Recognize various modeling, analysis and validation techniques adopted at industries
85.				CO3: Demonstrate the issues at design, manufacturing and assembly levels
86.				CO4: Summarize and present technical data in report format
87.	III	MAE3030	Dissertation Stage-I	CO1: Explain the contributions of various researchers in the field of design engg after carrying out literature survey from reputed journals
88.				CO2: Recognize the gap in the research and define a problem statement
89.				CO3: Explain significance and applicability of problem statement
90.				CO4: Summarize and present technical data in report format
91.	III	MAE3040	Dissertation Stage-II	CO1: Outline the work plan for problem statement
92.				CO2: Identify the proper modeling and analysis tool
93.				CO3: Reproduce the preliminary results of problem statement
94.				CO4: Summarize and present technical data in report format
95.	IV	MAE4010	Dissertation Stage-III	CO1: Explain the issues related to method adopted in solving the problem

Sr. No.	Semester	Course Code	Course Name	Course Outcome
96.				CO2: Select proper technique in solving the problem
97.				CO3: Compare the results with available literature
98.	IV	MAE4020	Dissertation Stage-IV	CO1: Design new methodology to address the problem
99.				CO2: Justify the results obtained from new methodology
100.				CO3: Write technical report and defend work

UG Civil Engineering

- **Department Name:- Civil Engineering Department**
- **UG Program Name: - Civil Engineering**
- **Vision and Mission: -**

Department Vision:

To be an outstanding department devoted to provide high end research, technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community.

Department Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2.	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7.	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	**Ethics**: Apply ethical principles and commit to professional ethics and

Sr. No.	Program Outcomes
	responsibilities and norms of the engineering practice.
9.	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11.	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12.	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	PSO1: Enhance employability and/or entrepreneur skills through in-house and onsite training.
2.	PSO 2: Provide solutions/procedures to societal and rural development problems through research and innovative practices.

Academic Year 2020-21

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	SEM III	CE2012	Building Construction and Design	1. Choose s suitable building materials for building construction applications. 2. Prepare a functional design of components for residential buildings. 3. Plan and design residential buildings. 4. Choose the appropriate type of pluming, electrification system and building finishes for residential buildings.
2	SEM III	CE2032	Engineering Mechanics	**1.** Identify various forces and their effects, to analyze real life problems. **2.** Analyze engineering problems applying conditions of equilibrium **3.** Apply fundamental concepts of Kinematics and Kinetics to the analysis of practical problems **4.** Determine Centroid & Moment of Inertia of the geometrical plane lamina.
3	SEM III	CE2052	Strength of Material	1. Analyze structural members for various types of stresses and strains. 2. Determine shear and bending stresses for

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				determinate beams. 3. Construct shear force and bending moment diagrams for determinate beams.
4	SEM III	SH2052	Engineering Mathematics III	1. Solve problems on linear differential equations with constant coefficients. 2. Solve problems on deflection of beams and Columns 3. Solve problems on linear partial differential equations with constant coefficients 4. Determine Fourier series of given function 5. Compute Karl Pearson's coefficient of correlation and determine regression lines 6. Use probability distributions to solve the engineering problems
5	SEM III	CE2072	Surveying	1. Calculate reduced levels and prepare contour maps. 2. Calculate the angular and linear measurements by using tachometry and trigonometry 3. Design and Set out the curve on field. **4.** Illustrate the principles of advanced surveying techniques.
6	SEM III	SH2172	Environmental Science	1. Understand the importance and sensitivity of environment. 2. Avoid over exploitation of natural resources and follow the environmental ethics. 3. Do the sustainable practices for sustainable development. 4. Protect environment and prevent environmental pollution. 5. Apply their knowledge and skills to solve their environment related problems.
7	SEM III	CE2092	Building Construction and Drawing lab	1. Explain properties and uses of different building materials. 2. Draw various building components using AutoCAD software. 3. Prepare submission drawing of residential building using AutoCAD. 4. Prepare working drawings of residential building using AutoCAD. 5. Draw line plan of various public buildings.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
8	SEM III	CE2112	Surveying Lab	1. Calculate reduced levels and prepare contour maps by using theodolite. 2. Design and set out the curve on field. 3. Perform setting out for various construction works. 4. Apply tachometry and trigonometry concepts to calculate distances & elevations. 5. Prepare the layout map by using the Total Station.
9	SEM III	CE2132	Strength of Material lab	1. Demonstrate behavior of material under axial shear and bending forces. 2. Identify various types of stresses in various structural elements. 3. Determine various strengths of different construction materials
10	SEM III	CE2172	Engineering Mechanics Lab	1. Verify law of polygon of forces, law of triangle of forces and principle of moment. 2. Compare coefficient of friction of various surfaces in contact. 3. Correlate theoretical and practical results of support reactions and Centroid of plane lamina. 4. Analyze a simple truss.
11	SEM III	SH2602	Environment Project	1. Develop as an individual and in group leadership quality. 2. Identify and analyse social problems in Civil Engineering. 3. Develop presentation skill through oral and report writing. 4. Acquire theoretical knowledge regarding various problems in Civil Engineering.
12	SEM III		Open Elective –II Choice Based Soft Skill Program-I	
		SH254	Personal Effectiveness and Body Language Lab	1. Develop skills to build self-esteem and positive attitude. 2. Discover ways to overcome procrastination. 3. Demonstrate responsiveness towards stress and health issues. 4. Interpret the non-verbal behaviour of a person.
		SH255	Interpersonal Skills Lab	1. Exhibit interpersonal communication skills. 2. Demonstrate decision-making skills. 3. Apply conflict resolution styles appropriate in

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				different situations. 4. Demonstrate leadership skills.
		SH256	Leadership and Public Speaking Lab	1. Exhibit the ability to work effectively in team. 2. Describe the traits of a leadership through real life examples. 3. Plan the speech as per the audience and context requirements. 4. Analyze public speeches.
		SH257	Corporate Competency Lab	1. Demonstrate professional etiquette and ethics. 2. Apply various presentation tools. 3. Perform confidently in screenings of campus placement drives. 4. Demonstrate video and tele-conferencing skills
		SH258	Introduction to English Literature	1. Explain literary concepts and the underlying aesthetics of English literature. 2. Demonstrate reading skills. 3. Interpret different types of text. 4. Make use of newly learnt words in various contexts
13	SEM IV	CE2022	Engineering Geology	1. Identify common Earth materials and interpret their composition, origin, and uses. 2. Recognize and interpret geological structures, and be able to apply their knowledge and skills to interpret earth processes. 3. Classify hydro geological properties of various rocks. 4. Describe the processes operating at and beneath the Earth's surface, how those processes create the Earth's landscape and how humans affect and are affected by the processes. 5. Compare the suitable site s for construction of dam, tunnel in different geological formation and geological structures. 6. Interpret spatial relationships of geological and geographical features.
14	SEM IV	CE2042	Concrete Technology	1. explain properties of various materials used in the manufacture of different kinds of concretes and role played by them in developing strong, durable concretes 2. describe various types of properties of concretes in fresh and hardened state 3. design concrete mixes of given grade using mix design procedures recommended by IS Code andACI code 4. describe the properties of special types of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				concretes based on their material composition and method of manufacture 5. illustrate various mechanisms causing the deterioration of concrete /elements of concrete structures
15	SEM IV	CE2062	Fluid Mechanics	1. Analyze different physical properties of fluid. 2. Calculate varies forces acting on submerged and floating bodies. 3. Discriminate fluid kinematics and fluid dynamics. 4. Illustrate flow through pipe and flow through open channel. 5. Prepare dimensional analysis using different theories and models. 6. Explain terms used in hydraulic pumps.
16	SEM IV	CE2082	Mechanics of Structures	1. Analyse three hinged arches and circular shafts subjected to torsion. 2. Compute slopes and deflections at various locations for determinate beams. 3. Design axially loaded columns and circular shafts subjected to torsion. 4. Construct ILD for determinate beams and 2D trusses. 5. Determine strain energy stored in the material due to gradual, sudden and impact loads.
17	SEM IV	CE2102	Human Values and Professional Ethics	1. Illustrate the moral value to guide the engineering profession. 2. Resolve the moral issues in the profession. 3. Justify the moral judgment concerning the profession.
18	SEM IV	CE2122	Applications of Programming Language in Civil Engineering	1. Formulate simple programs for arithmetic, logical and loops problems(in C language) 2. Formulate simple programs for arithmetic, logical and loops problems(Microsoft excel) 3. Test and execute the programs and correct syntax and logical errors.
19	SEM IV	CE2142	Engineering Geology Lab	1. Recognize and describe common geological formations of relevance to civil engineering. 2. Identify the different Rock types. 3. Implement various methods for water conservation techniques. 4. Use of electrical resistivity method for determining depth of bedrock or groundwater.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
20	SEM IV	CE2162	Fluid mechanics Lab	1. Determine metacentric height, type of flow, major losses, minor losses, coefficient of discharge, coefficient of contraction, and coefficient of velocity of liquid. 2. Design most economical open channel section. 3. Measure velocity of flow using wind tunnel
21	SEM IV	CE2182	Concrete Technology Lab	1. Explain standard procedures for testing properties of various ingredients of concrete and concrete mixes/specimens 2. Perform tests on ingredients of concrete and on fresh and hardened concrete to determine their properties using standard procedures 3. Design the concrete mix for a given grade of concrete using guidelines of IS code 4. Prepare the test set up for conducting various tests on concrete mixes / specimens 5. Evaluate the quality of concrete specimens / elements using NDT equipments
22	SEM IV	CE2222	Internship	1. Make aware the responsibility of student on work site. 2. Seek knowledge, information and details at site from live situations at field. 3. Co relate practical and theoretical information and understand the concept of experienced learning.
23			Open Elective –III Choice Based Soft Skill Program-II	
24	SEM V	CE3012	Design of Steel Structures	1. Refer and use design codes and hand book for design of steel structural elements. 2. Analyze steel structural members. 3. Design steel structural members.
25	SEM V	CE3032	Geotechnical Engineering	1. Classify types of soil using different index properties of soil. 2. Calculate permeability of various types of soil using different methods. 3. Analyse compressibility phenomenon of soil using Laboratory and field considerations. 4. Determine settlement, shear strength and

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				bearing capacity of soil.
26	SEM V	CE3052	Irrigation & Hydraulics Structures	1. Discuss aspects of hydrology and ground water flow. 2. Estimate the parameters for water requirements of crop. 3. Explain importance of ground water resources. 4. Design earthen/ gravity dam. 5. Design canal and canal regulator structures.
26	SEM V	CE3072	Environmental Engineering	1. Analyze water and wastewater for various parameters. 2. Identify and value the effect of pollutants on the environment: atmosphere, water and soil. 3. Prepare layout of water and wastewater treatment process. 4. Design water and wastewater Treatment Plant. 5. Interpret the impact of humans on environment.
27	SEM V	CE3092	Transportation Engineering	1. Design of geometric components of highway and railway. 2. Determine traffic volume for design of road infrastructure 3. Perform pavement design and different tests on highway materials. 4. Design rail transportation system
28	SEM V	CE****	Programme Elective - I	
		CE3192	Structural Analysis	1. Analyse pin jointed truss for deflection by strain energy method. 2. Evaluate horizontal thrust, radial shear and normal of arches. 3. Analyse beam by plastic analysis method. 4. Determine bending stresses in beams due to unsymmetrical bending. 5. Analyse building frames using approximate methods of analysis. 6. Predict failure of structure by using various theories of failure.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
		CE3212	Composite Materials	1. Explain the methods of manufacturing, properties and applications of various composites materials. 2. Determine stresses and strains in composites. 3. Apply failure criteria and critically evaluate the results. 4. Explain mechanical behavior of composites due to variation in temperature and moisture.
		CE3232	Construction Safety and Quality Management	1. Apply various quality improvement techniques. 2. Diagnose problems in the quality improvement process 3. Suggest safety precautions to be taken during the execution of various construction works 4. Analyze possible hazards and accidents in construction projects. 5. Interpret various legal aspects of safety in construction.
		CE3252	Advanced Construction Techniques	1. Develop method statements for construction techniques. 2. Select construction technique for activity. 3. Justify application of construction technique for particular task. 4. Justify construction safety needs and management on projects.
		CE3272	Instrumental Monitoring of Environment and Modeling	1. Analyze the principles of volumetric and instrumental analytical methods in environmental monitoring 2. Evaluate statistical methods for evaluating and interpreting data of environmental interest 3. Describe various electrochemical methods. 4. Summarize various material characterization techniques and its principles
		CE3292	Tunnel Docks and Harbors Engineering	1. Develop method statement for given construction activity, 2. Compare tunnel construction technologies 3. Decides a safety and ventilation system for tunnels, 4. Suggest appropriate location for construction of docks and harbours. 5. Select dredging method for particular operation.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
		CE3312	Urban Transportation Systems	1. Categorize the transportation problems in urban area 2. Perform the transportation survey in urban area to predict the travel demand 3. Explain different urban transportation planning methods 4. Predict rout and schedule for mass transit system. 5. Explain different methods of preparation of transportation plan
		CE3112	Geotechnical Engineering lab	1. Determine index and engineering properties of soil. 2. Classify soil based on its index properties. 3. Analyze field conditions through Laboratory tests.
		CE3132	Environmental Engineering lab	1. Analyse water and wastewater characteristics 2. Prepare a layout of water and wastewater treatment plant. 3. Design of water and wastewater treatment plant.
		CE3152	Transportation Engineering lab	1. Characterize the pavement materials 2. Perform quality control tests on pavement materials 3. Design bituminous mixes for flexible pavement 4. Design concrete mix for rigid pavement. 5. Calculate thickness of different layers of pavement
		SH3032	Aptitude Training -I	1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. 2. Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests 3. Develop a bridge in analogies, series and visualizing directions. 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
		SH301	Constitution of India/ Essence of Indian	1. Create awareness about law depiction and importance of Constitution 2. Define Fundamental Rights and Fundamental Duties of the Indian Citizen to instill

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Traditional Knowledge	morality, social values, honesty, dignity of life and their social Responsibilities. 3. Create Awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind. 4. Recognize distribution of powers and functions of Local Self Government. 5. Comprehend the National Emergency, Financial Emergency and their impact on Economy of the country.
29	SEM VI	CE3022	Theory of Structures	1. Analyse indeterminate structures using force methods- Consistent deformation method and three moment equation. 2. Apply energy principles/theorems for analysis of indeterminate beams, truss, portal frames and two hinged parabolic arches. 3. Analyse indeterminate structures using displacement methods- Slope-deflection equation and moment distribution method. 4. Analyse indeterminate beam and portal frame using matrix methods of analysis- Stiffness and flexibility matrix method.
30	SEM VI	CE3062	Estimation and Costing	1. Apply standard requirements to prepare detailed estimate 2. Prepare detailed estimate of building, factory shed, road, canal and culvert. 3. Derive Rates for construction items, 4. Prepare tenders and contracts documents. 5. Perform valuation of property .
31		CE 3062	Design of Reinforced Concrete Structures	1. Analyze and design singly & doubly reinforced and flanged beams. 2. Analyze and design R.C.C. slab and R.C.C. staircase. 3. Analyze and design R.C.C. columns, isolated pad footing and combined footing.
32	SEM VI	CE****	Program Elective –II	
		CE 3162	Design of Industrial Structures	1. Design industrial buildings, beam columns 2. Design open web sections 3. Design steel towers, water tanks, truss bridge
		CE 3182	Repair and Rehabilitation of Structures	1. Diagnose the causes of distress and deterioration of concrete structure 2. Describe the procedures of various repair techniques or methods 3. Suggest appropriate materials and techniques

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				for repair and strengthening of structures/elements. 4. Prepare a report on condition assessment of buildings based on observations
		CE 3202	Construction Economics and Finance	**1.** Identify appropriate economic alternatives. **2.** Calculate depreciation and taxes for economic analysis. **3.** Select appropriate alternative related to equipment. **4.** Discuss methods of estimate. **5.** Discuss basics of financial management
		CE 3222	Disaster Preparedness and Planning	1. Analyze effects of natural and manmade disasters. 2. Demonstrate disaster management program. 3. Analyze vulnerable conditions and risk assessment. 4. Construct layout for sanitary landfill site and composting site. 5. Describe stakeholder's role in disaster response
		CE 3242	Air Quality Monitoring and Modeling	1. Illustrate structure of the atmosphere Air Pollution, Scales of air pollution 2. Interpret impact of air pollution on natural and artificial elements. 3. Analysis of air quality parameters by using air quality monitoring methods 4. Design Stack height for pollution control
33	SEM VI	CE****	Program Elective –III	
	SEM VI	CE 3302	Design of Bridges	1. Understand the load distribution and IRC standards. 2. Design the slab and T beam bridges. 3. Design Box culvert, pipe culvert. 4. Use bearings, hinges and expansion joints
	SEM VI	CE 3322	Design of Earthquake Resistant Structures	1. Evaluate responses for single degree of freedom system for free and force vibration by various methods. 2. Evaluate lateral loads developed due to earthquake force by equivalent static method 3. Predict causes of earthquake. 4. Design ductile detailing of RCC structural elements. 5. Apply principles of planning, structural systems for seismic resistant to structures.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
	SEM VI	CE 3342	Advance Construction Equipment	1. Select equipment base on economic analysis. 2. Justify equipment selection for particular activity. 3. Develop method statement for construction activity using equipments. 4. Draw optimum Layout of construction Plants.
	SEM VI	CE 3382	Environmental Management System	1. Apply an environmental policy for an organization. 2. Develop environmental objectives and monitor their implementation. 3. Perform a life cycle assessment for a selected product or service. 4. Apply standard environmental, health and safety auditing principles and practices to environmental management systems.
	SEM VI	CE 3402	Geographical Information System (GIS)	1. Apply GIS tool for solving civil engineering industry problem 2. Perform infrastructural planning 3. Analyse spatial data and query analysis 4. Develop base and thematic maps. 5. Develop projects and device solution for the area.
	SEM VI	CE 3422	Foundation Engineering	1. Investigate soil using different soil exploration methods. 2. Compute stress distribution in soil using different theories. 3. Design shallow and deep foundation on different types of soil. 4. Analyze stability of slope using different slope stability analysis techniques. 5. Compute lateral earth pressure for different conditions of soil
		CE 3442	Intelligent Transport System	1. Categorize the transportation problems in urban area 2. Perform the transportation survey in urban area 3. Calculate the travel demand in future 4. Explain different urban transportation planning and transportation plan preparation methods. 5. Predict rout and schedule for mass transit system
34	SEM VI		Biology for	1. Apply biological engineering principles,

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Engineers	procedures needed to solve real-world problems 2. Demonstrate the functions of biological systems 3. Analyze biological phenomena with math and physics to gain important insights 4. Explain working of different biomedical instruments 5. Select the sensors for given biological applications. 6. Explain relevant aspect of movement control process.
35	SEM VI	CE 3082	Estimating & Costing Lab	1. Explain mode of measurement and current market rates of civil engineering materials and labours. 2. Prepare detailed estimate of different structures like building, road, canal, culvert and factory shed etc. 3. Prepare bar bending schedule of different RCC items.
36	SEM VI	CE 3102	Design of Steel Structures Laboratory	1. Analyze and design steel industrial shed using STAAD-Pro software. 2. Interpret the results obtained from the software. 3. Prepare structural drawing of steel industrial shed.
37	SEM VII	SH 3042	Aptitude Training – II	1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning Problems 2. Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications. 3. Understand blood relations and ways of seating arrangements along with various geometrical figures 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
38	SEM VII	CE 3142	Mini Project	1. Develop as an individual and in group leadership quality. 2. Identify and analyse social problems in Civil Engineering. 3. Develop presentation skill through oral and report writing. 4. Acquire theoretical knowledge regarding various problems in Civil Engineering.
39	SEM VII	CE 4012	Construction Management	1. Apply principles of management. 2. Develop and analyze the network diagram for

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				civil engineering projects. 3. Apply principles of work study to design site layout. 4. Apply various techniques for inventory control.
40	SEM VII	CE 4032	Construction Equipment and Methods	1. Plan equipment utilization for earthwork operation. 2. Perform economic analysis of equipment. 3. Select earthwork equipment based on production and site requirements. 4. Decide plant capacity required for a project. 5. Select Equipment fleet for Project.
41	SEM VII		Program Elective -IV	
		CE 4092	Advanced Structural Analysis	1. Construct ILD for indeterminate beams. 2. Analyze and construct BMD, TMD for beams curves in plan. 3. Analyze beam on elastic foundation under various loads. 4. Analyze beam-column with different support and loading conditions. 5. Determine forces in space truss members. 6. Evaluate various forces developed in cables and stiffening girder.
		CE 4112	Finite Element Analysis	1. Apply variational and direct approach method for 1D, 2D problems. 2. Develop element stiffness matrix for 1D, 2D & 3D problem. 3. Describe Convergence and compatibility requirements 4. Generate relationship between natural and cartesian coordinate system. 5. Formulate element stiffness matrix for axisymmetric elements.
		CE 4132	Project Management	1. Analyze impact of time, cost and scope on construction projects. 2. Develop pre-feasibility report for construction project. 3. Plan the project using various techniques. 4. Develop project close out checklist for given project. 5. Apply techniques for manpower planning.
		CE 4152	Rock Mechanics	1. Describe the theory and analysis of in-situ induced stresses in a rock mass and structurally controlled failure.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				2. Apply the principles of rock mechanics and excavation design to develop excavation proposals for given geologic environments 3. Analyze the rock and soil slope stability and rockfall hazards. 4. Explain the principles and techniques of reinforcement design for the primary failure modes in underground rock excavations
		CE 4172	Industrial Waste Management	1. Apply various techniques of wastewater volume and strength reduction 2. Analyze characteristics of Industrial wastewater. 3. Suggest different wastewater treatment options for industrial wastewater. 4. Design Effluent Treatment Plant for Industrial wastewater treatment.
		CE 4192	Pavement Analysis and Design	1. Suggest suitable materials for different types of pavements. 2. Analyse the pavement components with respect to their material composition. 3. Estimate the stresses induced due to wheel load and temperature. 4. Design the pavement, flexible or rigid, for the conditions prevailing at site. 5. Understand the variation in specification for pavement materials used in other countries.
42	SEM VII		Program Elective -V	
		CE 4042	Advanced Structural Design	1. Analyze and design RC structures and their components like building frames, flat slab, retaining walls, water tanks and piles using relevant codes and applying codal provisions. 2. Analyze the slabs of irregular shapes by yield line theory and design rectangular and circular slabs for yield moments. 3. Sketching the detailing of reinforcement in structural components of building frames, flat slab, retaining walls, water tanks and piles.
		CE 4062	Pre-Stressed Concrete Structures	1. Explain the concept and importance of pre-stressing. 2. Analyse the pre-stressed concrete sections.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Design the pre-stressed concrete sections for flexure and shear. 4. Design an end block for pre-stressed members. 5. Design the pre-stressed concrete beams.
		CE 4082	Matrix Method of Structural Analysis	1.Perform the structural analysis of determinate and indeterminate structures using classical methods, force and displacement methods 2. Analyze the structures by using the stiffness & flexibility method. 3. Solve multiple degree of freedom two-dimensional problems involving trusses & beams.
		CE 4102	Construction Resource Planning and Management	1. Codify materials, **2.** Select vendor for material purchase, **3.** Manage inventory, **4.** Describe employee development and welfare, **5.** Design performance appraisal matrix,
		CE 4122	Total Quality Management	**1.** To identify basic requirements for applying TQM in construction. **2.** To prepare the TQM framework. **3.** To apply seven QC tools of quality assurance **4.** To use six sigma techniques to improve quality.
		CE 4142	Air Pollution and Control	1. Examine structure of the atmosphere air pollution, scales of air pollution 2. Interpret on sources of air pollution natural and artificial, air pollution Episodes 3. Analyse effect of different air pollutants on man, animals and plants. 4. Design Stack height and explain meteorology, transport and control mechanism Evaluate effects of noise pollution.
		CE 4162	Fundamentals of Urban and Regional	1. To apply international planning and design theories in a development design.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Planning	2. To measure the impact of manmade activities on urbanization. 3. To evaluate the impact of urban development plans in regards to sustainable urban development and urban quality. 4. To use tools and techniques of region planning.
		CE 4182	Solid and Hazardous Waste management	1. Determine solid waste properties and quantity for municipal and hazardous waste. 2. Illustrate health effects by municipal, hazardous waste. 3. Design Physicochemical and biological treatment and landfill site for solid waste. 4. Design of landfill design
		CE 4202	Photogrammetry Surveying	1. Apply advanced surveying methodologies to conduct topographical survey. 2. Analyse and correct the errors from the topographical survey maps. 3. Illustrate the principles of advanced surveying techniques.
		CE 4222	Geo-informatics for Engineering	1. Apply GIS tool for solving civil engineering industry problem 2. Develop infrastructural planning 3. Collect data and query analysis 4. Develop base and thematic maps 5. Develop projects and device solution for the area.
		CE 4242	Docks, Harbors and Airport Engineering	1. Analyze theoretical and practical aspects related to docks, harbour and airport management. 2. Apply diverse knowledge of Docks, Harbour and Airport engineering practices applied to real life problems. 3. Categorize port components 4. Design airport components
43	SEM VII		Open Elective – V	1.
44	SEM VII		Program Elective -IV Lab	
		CE 4212	Advanced Structural	1. Analyze beams curved in plan, multistoried buildings, space frames using classical

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Analysis Lab	methods and software. 2. Compare results of results of classical methods of structural analysis using software results. 3. Critique on the analysis results obtained by software
		CE 4232	Finite Element Analysis Lab	1. Illustrate terms used in Finite Element Method 2.Analyse 1D & 2D problems 3. Develop solution of 2D & 3D problems using Finite Element software
		CE 4252	Project Management Lab	1. Develop a project charter for a construction project. 2. Analyze feasibility of project. 3. Determine optimum time and optimum cost of project through network compression. 4. Develop project in Microsoft project tool. Plan resources required for execution of the project.
		CE 4272	Rock Mechanics Lab	1. Determine the physical and mechanical properties of rock sample. 2. Identify various types of rock based on observations and laboratory testing. 3. Prepare the site investigation report
		CE 4292	Industrial Waste Management Lab	1. Analyse Industrial wastewater characteristics. 2. Prepare a layout of wastewater treatment plants for Industrial wastewater. 3. Design of Effluent Treatment Plant for Industrial wastewater. 4. Prepare Field visit Report of ETP of Industry.
		CE 4312	Pavement Analysis and Design Lab	1. Categorize bituminous materials. 2. Analyse quality control of pavement materials 3. Design bituminous mixes for flexible pavement 4. Design concrete mix for rigid pavement
45	SEM VII	CE 4052	Design of Concrete Structures Laboratory	1. Estimate primary and combination design loads on building consulting appropriate standards and handbooks 2. Design the component parts of the building manually 3. Model the same building using any standard software 4. Design the building.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				5. Demonstrate effective team membership/leadership through a group project.
46	SEM VIII		Capstone Project Phase-II	**1. Internship** 1. Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) 2. Develop an attitude to adjust with the company culture, work norms, code of conduct. 3. Recognize and follow the safety norms, Code of conduct. 4. Demonstrate the ability to observe, analyse and document the details as per the industry practices. 5. Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies. 6. Develop the leadership abilities, communication. 7. Demonstrate project management and finance sense **2. Project** After the successful completion of the project, the student should be able to; 1. Identify the project/problem in the domain of a program relevant for the company. 2. Compile the information to the pertaining to the problem identified. 3. Analyse the information using the statistical tools/ techniques. 2. develop the feasible solution for given problem. 3. Analyse the impact of the project on the performance of company/department. **Entrepreneurship Development Project** 1. Apply knowledge of engineering, economics, marketing and finance for preparation of project report. 2. Make commercial, technical and financial appraisal of project.
47	SEM VIII	CE 4072	Employment Enhancement Skills (Software in Civil Engg.)	1. Develop technical competence in a Soft skill in the Civil Engineering field, 2. Apply the techniques and soft skills for Civil Engineering practice. 3. Develop oral and written presentation skills

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				for soft skill project. 4. Design and interpret data by soft skill Civil Engineering projects.

PG Structural Engineering

- **Department Name :- Department of Civil Engineering**
- **PG Program Name: M Tech Structural Engineering**

Department Vision:

To be an outstanding department devoted to provide high end research, technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community.

Department Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1.	PO1: An ability to independently carry out research /investigation and development work to solve practical problems.
2.	PO2: An ability to write and present a substantial technical report/document.
3.	PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Sr. No.	Program Specific Outcomes
1.	PSO 1:An ability to design civil engineering structures and execute the projects.
2.	PSO2 :An ability to use modern tools and techniques, skills, instrumentation and software packages necessary to predict and solve complex engineering problems.
3.	PSO3: An ability to perform efficiently with others as part of collaborative and/or multidisciplinary team with ethics.

Academic Year 2020-21

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SHP517	Numerical Methods for Structural Engineers	1. Estimate the error. 2. Apply the relevant numerical method for interpolating the polynomial 3. Develop the equation to be fitted and fit the curve for given data 4. Estimate numerically the solution of given algebraic equation. 5. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. 1. Construct the fuzzy set for given linguistic variable and apply fuzzy logic.
2.	I	CES1014	Advanced structural analysis	2. Construct of ILD for reactions, S.F. and B.M. for indeterminate structures. 3. Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition. 4. Analyze the beam-columns. 5. Analyze the skeleton structures by using matrix method. 6. Solve civil engineering boundary value problems
3.	I	CES1024	Structural Dynamics & Earthquake Engineering	1. Analyze the response of single and multi-degree freedom systems by fundamental theory and equations of motion. 2. Analyze the response of single and multi-degree freedom systems by numerical methods. 3. Predict causes of earthquakes. 1. Evaluate lateral loads developed on multi-storeyed RCC structures by the Response Spectrum Analysis Method and Static Equivalent Method.
4.	I	CES1034	Advanced Design of Steel Structures (PE I)	1. Design steel structures and frames by varying methods. 4. Design various connectivity of structure as per code provisions.
5.	I	CES115	Maintenance and Rehabilitation of Structures (PE I)	1. Diagnose various distress mechanisms of damaged or deteriorated concrete or elements of concrete structure based on the symptoms indicated.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				2. Carry out systematic condition assessment of RCC buildings/structures 3. Recommend appropriate repair materials and techniques for repairing and strengthening of deteriorated or damaged elements of RCC structures. Evaluate the quality of concrete or elements of concrete structure based on the results obtained through condition survey
6.	I	CES1044	Advanced Concrete Technology (PE I)	1. Illustrate the micro-structural aspects associated with concrete/concrete ingredients and their effect on concrete quality, strength and durability properties. 2. Design special concretes using existing and new methods of mix design. 3. Explain various types of special concretes, their properties and methods of manufacturing and placing. 4. Describe various special processes and new techniques involved in various concreting jobs. 5. Analyse qualities of fresh and hardened concrete / concrete elements using appropriate destructive or non-destructive testing methods for evaluating quality. 1. Identify and discuss various mechanisms affecting durability of concrete / concrete structures /elements.
7.	I	CES 1054	Design of Advanced Concrete Structures (PE-II)	1. Analyze the special R.C.C. structures. 2. Design and prepare detail structural drawings. 1.
8.	I	CES1064	Design of Industrial Structures (PE-II	1. Design the Steel Gantry Girders. 2. Design the Steel Portal, Gable Frames.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Design Steel Bunkers and Silos. 2. Design Chimneys and Water Tanks.
9.	I	CES1074	Design of formwork (PE-II)	1. Design the form work for Beams, Slabs, columns, Walls and Foundations. 2. Design the form work for Special Structures. 3. Explain the working of flying formwork. 4. Judge the formwork failures through case studies.
10.	I	SHP551	Technical Communication	1. Acquire skills required for good oral and written communication. 2. Demonstrate improved writing and reading skills. 6. Ensure the good quality of oral and written communication
11.	I	CES1084	Structural Design Lab – I	1.Analyze and design of the steel structures such as truss, Towers, Steel Building Frame and Hoarding Board etc. using standard software packages. 2. Interpret the results of analysis and design obtained from the software. 3.Prepare drawings of detailing of structural elements.
12.	I	CES1094	Advanced Concrete Technology Lab	2. Perform quality control tests on various ingredient of concrete and special concrete. 3. Design ordinary and special concretes using existing and new methods of mix design. 4. Evaluate quality of concrete using NDT. 3. Recommend appropriate methods / techniques for repair and strengthening works.
13.	I	CES1104	Mini Project I	2. Identify research problem. 3. Prepare and present statement of Purpose. 4. Perform analysis work. 5. Communicate with outside agencies. 6. Write report and Present the work carried out. 4. Develop self-learning ability.
14.	I	CES1084	Structural	1.Analyze and design of the steel

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Design Lab – I	structures such as truss, Towers, Steel Building Frame and Hoarding Board etc. using standard software packages. 2. Interpret the results of analysis and design obtained from the software. 3.Prepare drawings of detailing of structural elements. 3.
15.	I	CES1094	Advanced Concrete Technology Lab	5. Perform quality control tests on various ingredient of concrete and special concrete. 6. Design ordinary and special concretes using existing and new methods of mix design. 7. Evaluate quality of concrete using NDT. 4. Recommend appropriate methods / techniques for repair and strengthening works.
16.	I	CES1104	Mini Project I	7. Identify research problem. 8. Prepare and present statement of Purpose. 9. Perform analysis work. 10. Communicate with outside agencies. 11. Write report and Present the work carried out. 5. Develop self-learning ability.
17.	II	CES1114	Finite Element Analysis in Structural Engineering	1. Analyse structure using finite element method. 2. Solve continuum problems using finite element analysis. 6. Execute the Finite Element Program/ Software.
18.	II	CES1124	Advanced solid mechanics	2. Analyze bodies for stresses and strains. 3. Analyze prismatic bars and tubes subjected to torsion. 3. Analyze beams and thick cylinders for elasto-plastic loading
19.	II	CES1134	Advanced Earthquake Engineering (PE-III)	1. Design RCC structural elements for ductility requirements as per IS 13920 2916. Apply clauses given in IS codes to design of water tanks for earthquake force. 2. Apply new techniques for controlling the vibrations of the structures.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Evaluate natural frequency of continuous elements/systems. 4. Design elevated water tank for dynamic loading. 5. Apply IS code clauses masonry structures for improving resistance to earthquake forces.
20.	II	CES114	Composite Structures (PE-III)	1. Design composite structural elements like beams, columns, floors, trusses. 2. Design of Multi-storeyed commercial and residential composite building. 2. Design composite girder bridges. 1.
21.	II	CES1144	Structural Optimization (PE-III)	1. Use variational principle for optimization. 2. Apply optimization techniques to structural steel and concrete members. Design using frequency constraint
22.	II	CES1154	Design of Bridges and Flyovers (PE-III)	1. Study various components and loadings on bridge. 2. Analyze and design of super-structure of various bridges and flyovers. 3. Analyze and design of sub-structure of various bridges and flyovers.
23.	II	CES1164	Design of Pre-stress Concrete Structures (PE-IV)	1. Explain the concept of pre-stressing, behavior of the pre-stressed structures vis-à-vis that of the RCC structure. 2. Choose the decision with respect to the choice of pre-stressed section over RCC. 3. Describe the application of these techniques in civil engineering construction. 4. Analyze the various pre-stressed components of the structures and design the same. 3. Design the various pre-stressed components of the structures and design the same.
24.		CES1174	Theory of Thin Plates and Shells (PE-IV)	1. Analyse various problems using different theories based on plates and shells. 2. Derive equilibrium equations related with different theories of plates and shells.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
25.	II	CES1184	Research Methodology& Intellectual Property Rights(IPR)	1. Formulate a research problem. 2. Analyze research related information. 3. Prepare and present research proposal/paper by following research ethics. 4. Make effective use of computers and computing tools to search information, analyze information and prepare report. 5. Describe nature and processes involved in development of intellectual property rights.
26.	II	CES1194	Structural design Lab II	1. Analyze and design of the RCC structures such as building, retaining wall, flat slab and foundations using standard software packages. 2. Interpret the results of analysis and design obtained from the software. 3. Prepare drawings of detailing of structural elements.
27.	II	CES1204	Structural Dynamics and Earthquake Engineering Lab	1. Examine damping effect on beam 2. Perform testing of various models of structures for dynamic loading
28.	II	CES1214	Mini project II	1. Identify research problem 2. Prepare and present statement of Purpose 3. Perform analysis work. 4. Communicate with outside agencies. 5. Write report and present the work carried out. 6. Develop self-learning ability.
29.	III	CES	Internship	1. Identify training area. 2. Prepare on site work report of training. 3. Perform analysis work. 4. Communicate with agencies. 5. Generate report and Present the work carried out.
30.	III	CES2024	Dissertation Phase-I	1. Identify research problem from literature survey. 2. Prepare research design for identified problem. 3. Prepare synopsis report. 4. Present the work plan to be carried out.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
31.	III	CES2034	Dissertation Phase-II	1. Prepare the set up for experimentation/ develop/ learn software. 2. Perform experimental/software analysis for validation of research work. 3. Generate report of work carried out. Present the work carried out.
32.	IV	CES2064	Dissertation Phase-III	1. Perform experimental/software analysis for developing research work. 2. Generate report work carried out. Present the work carried out.
33.	IV	CES2074	Dissertation Viva Voice	1. Perform experimental/software analysis for developing research work. 2. Generate report work carried out. 3. Publish a research paper in journals/conference. 4. Prepare report using total work done as dissertation report. 5. Present the work carried out.

PG Construction Management

- **Department Name :- Department of Civil Engineering**
- **PG Program Name: M Tech Construction Management**
- **Vision and Mission :-**

Department Vision:

To be an outstanding department devoted to provide high end research, technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community.

Department Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1.	An ability to independently carry out research /investigation and development work to solve practical problems.
2.	An ability to write and present a substantial technical report/document.
3.	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
4.	An ability to Analyze, evaluate, and select computer applications for the purpose of efficient and effective construction project management.
5.	An ability to Analyze construction projects relative to fundamental aspects of construction management (i.e., cost, schedule, quality, safety, ethics) and develop appropriate solutions
6.	Apply ethical business principles and Demonstrate responsibility for safety planning and productivity in construction management settings.

Sr. No.	Program Specific Outcomes
1.	Enhance employability and/or entrepreneur skills through in-house and onsite training.
2.	Provide solutions/procedures to societal and rural development problems through research and innovative practices.

Academic Year 2020-21

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	CCM1144	Construction Project Management	1. Implement project management framework. 2. Develop time schedules for projects. 3. Identify and control project cost, quality, human resources and communications. 4. Apply project management information system for construction projects.
2.	I	CCM1154	Construction Equipment & Techniques	1. Compute productivity of various earth moving equipment. 2. Analyze economics of project execution. 3. Select optimum equipment for construction of particular task. 4. Develop method statement for construction task. 5. Select equipment based on method statement
3.	I	CCM1164	Ground Improvement Techniques	1. Apply principles of ground improvement techniques. 2. Assess the most appropriate ground improvement techniques in specific circumstances. 3. Carry out laboratory and in situ tests for soil improvement. 4. Justify the applications of soil improvement methods on projects.
4.	I	CCM1174	Operations Research	1. Formulate and analyze the managerial problem through or models and arrive at an optimal solution or decision 2. Select appropriate method for decision making. 3. Apply nonlinear programming for managerial problems.
5.	I	CCM1184	Pavement Construction Management	1. Apply PMS to pavement projects 2. Perform quality tests and analyze the results 3. Manage pavement inventory 4. Decide material specifications as per MORTH, 5. Plan the project execution,
6.	I	CCM1194	Total Quality Management	1. Derive strategic plan for TQM 2. Develop framework for TQM

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Apply quality management systems 4. Examine suitable systems for TQM.
7.	I	CCM1204	Bridge Construction	1. Select location for bridge through geotechnical investigation data. 2. Perform hydrological calculations of design parameters. 3. Apply standard loadings and safety consideration for bridge design. 4. Select appropriate bridge superstructure elements for bridges.
8.	I	CCM1214	Prefabricated Structures	1. Choose from various types of fabrications 2. Design pre-fabricated components
9.	I	CCM1224	Project Formulation and Appraisal	1. Perform technical and financial analysis of construction projects, 2. Perform BC ratio analysis, 3. Select project based on appraisal, 4. Develop administration process for project execution.
10.	I	CCM1234	Construction waste management	1. Develop strategies for construction and demolition waste management and resource efficiency. 2. Examine the environmental impact of building materials. 3. Design site waste management plans. 4. Justify the application of waste minimization techniques on construction site.
11.	I	CCM1244	Research Methodology & IPR	1. Prepare abstract through literature review. 2. Formulate a research problem. 3. Prepare and present research proposal/paper by following research ethics. 4. Prepare and present a report on Intellectual Property Rights.
12.	I	SHP551	Technical Communication	1. Acquire skills required for good oral and written communication. 2. Demonstrate improved writing skills and level of readability. 3. Ensure the good quality of technical reports at very first-time submission
13.	I	CCM1254	Fundamentals of BIM Lab	1. Develop drawings as per software requirement 2. Compute quantities of building items 3. Develop project schedule using “Revit” application
14.	I	CCM1264	Project Planning	1. Develop Work Breakdown Structure

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Lab I	for project. 2. Prepare project schedule using Microsoft project. 3. Modify construction schedule based on site progress. 4. Extract and present various types of reports.
15.	II	SHP526	Statistical Analysis	1. Identify, formulate and analyze the engineering problem; and apply Mathematical concepts effectively to engineering fields. 2. Apply relevant probability distribution to solve the problems. 3. Apply sampling and testing methods to distribute the given data. 4. Solve problems on correlation and regression.
16.	II	CCM1274	Project Economics & Financial Management	1. Select the best project of different alternatives. 2. Analyze projects using different techniques. 3. Identify and suggest sources of finance. 4. Analyze different financial statement. 5. Prepare and maintain different site accounts for civil engineering projects.
17.		CCM1284	Construction Contracts	1. Identify applications of contract types for construction projects. 2. Develop tender document for construction project. 3. Perform comparative analysis of types of contract. 4. Analyze arbitration documents for construction project.
18.	II	CCM1294	Special Construction Methods	1. Select proper technique and equipment for a project, 2. Decide type of pile foundation for a project, 3. Plan site investigation.
19.	II	CCM1304	Health and Safety Management	1. Classify hazards to employees on construction site 2. Determine safe practices necessary for a project site 3. Identify the causes of accidents and suggest preventive measures to avoid accident. 4. Prepare safety management plan.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
20.	II	CCM1314	Human Resource Management	1. Plan manpower for a project, 2. Develop organization for a project, 3. Apply aspects of human behavior to HRM. 4. Identify right person to build the team. 5. Discuss solutions for human resource problems.
21.	II	CCM1324	Management Information System	1. Demonstrate Information Systems used in organizations for meeting strategic and operational goals. 2. Develop skills using current end-user software for communication, data transformation, collaboration, and problem solving.
22.	I	CCM1334	Disaster Management	1. Summarize effects of natural and man-made disasters. 2. Develop disaster management program. 3. Analyze vulnerable conditions and risk assessment. 4. Prepare plan for post disaster management 5. Describe stakeholder's role in disaster response.
23.	II	CCM1344	Material Management	1. Apply supplier selection methods, 2. Produce optimal stores layout, 3. Perform codification and classification, 4. Perform material requirement planning, 5. Apply inventory control techniques for materials management
24.	I	CCM1354	Building Materials	1. Justify the need of new material development. 2. Choose material for construction process based on material properties.
25.	II	CCM1364	Shoring, Scaffolding and Formwork	1. Develop proper plan for form-work, 2. Select appropriate material and type of form-work, 3. Design form-work for components, 4. Design scaffold for construction task
26.	II	CCM1374	Project Planning Lab II	1. Prepare schedule plan for construction project. 2. Develop residential building construction project in primavera software 3. Analyze construction project using primavera. 4. Prepare and present various types of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				reports.
27.	II	CCM1384	Geographic Information System Lab	1. Justify the application of GIS in construction industry. 2. Analyze data using GIS software. 3. Prepare and present maps in GIS.
28.	II	CCM1394	Mini project	1. Select mini project problem. 2. Prepare and present statement of purpose. 3. Develop solution to the selected problem. 4. Prepare and present report related to project undertaken.
29.	III	CCM2014	Industry Internship	1. Relate theory to practice. 2. Compile technical data of the project. 3. Prepare daily work reports of ongoing activities. 4. Prepare and present internship report
30.	III	MOE2030	MOOCS Course	1. Apply techniques/processes/tools learned through MOOC in appropriate situation
31.	III	CCM2034	Dissertation Phase-I	1. Select research problem through literature survey. 2. Develop research design for research problem. 3. Prepare and present synopsis report
32.	III	CCM2054	Dissertation Phase-II	1. Perform data/experimental data collection for the project. 2. Analyze collected data using appropriate tools/techniques/ software. 3. Perform experimental/software analysis for validation of research work. 4. Prepare and present report
33.	IV	CCM2024	Dissertation Phase-III	1. Analyze collected data using appropriate tools/techniques/ software's. 2. Prepare and present/publish technical paper. 3. Prepare and present report.
34.	IV	CCM2044	Dissertation Phase IV (viva-voce)	1. Compile the work done in appropriate sequence. 2. Derive conclusion of the work done of the project. 3. Analyze proposed system. 4. Perform plagiarism analysis of compiled report. 5. Prepare and present the final

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				dissertation report in desired format

UG Computer Engineering

Department Name: Computer Science and Engineering

UG Program Name: Computer Engineering

Vision: To excel in the computer science engineering discipline through continuous research, innovation and industry-oriented curriculum leading to responsible IT professionals.

Mission:

1. To inculcate teaching and learning process promoting state-of-the-art IT industry practices in computer science engineering and technology to address global challenges.
2. To integrate academics, research and entrepreneurship skills to address present and future challenges of the society and industry.
3. To develop professionalism with strong foundations adapting to changing technology.

Sr. No.	Program Outcomes
1.	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2.	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7.	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to

Sr. No.	Program Outcomes
	comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11.	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12.	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	Apply knowledge of database management systems, data mining and analytics techniques to solve real world problems
2.	Apply knowledge of machine learning and intelligence to identify, formulate and solve complex engineering problems
3.	Design, develop and deploy software using emerging IT technologies like open source tools, mobile application development platforms, web technologies and cloud computing

Course and Course Outcomes

Sr. No.	Semester	Course Name	Course Code	Course Outcome
1.	III	Statistics, Probability and Fuzzy Theory	SH2071	CO1: Determine the co variance of bi-variate data and understand the concept of correlation and regression analysis.
				CO2: Restate and reproduce basic concepts of probability theory which stems from the analysis of chance and use it in problems related to computer science and engineering
				CO3: Identify different probability distributions; apply them in problem solving
				CO4: Define fuzzy sets, construct examples supporting to definition of fuzzy sets, demonstrate the knowledge of standard operations on fuzzy sets and differentiate crisp sets and fuzzy sets.
				CO5: Apply extension principle to fuzzy arithmetic and solve fuzzy equations

Sr. No.	Semester	Course Name	Course Code	Course Outcome
2.	III	Discrete Mathematics	CS2011	CO1: Express mathematical statements using logical connectives.
				CO2: Analyze and perform operations associated with sets.
				CO3: Distinguish between relations and functions.
				CO4: Describe the concept of lattices and Boolean algebra.
				CO5: Apply graph theory concepts to solve problems of connectivity.
3.	III	Data Structure using C	CS2031	CO1: Compare between Linear and Non Linear Data Structures
				CO2: Describe the characteristics of various data structures such as Stacks, Queues, Trees, graphs and Hash Tables
				CO3: Apply appropriate Abstract Data Types and algorithms to solve particular problems
				CO4: Determine a suitable data structure and algorithm to solve a real world problems.
4.	III	Data Communication & Networking	CS2051	CO1: Build and understanding of the fundamental concepts of computer networking
				CO2: Understand the concept of data communication and modulation techniques.
				CO3: Comprehend the use of different types of transmission media and network devices
				CO4: Analyze concept of error detection and correction in transmission of data
				CO5: Acquire knowledge of flow control, error control and LAN protocols
5.	III	Digital Systems & Microprocessor	CS2071	CO1: Demonstrate different types of gates.
				CO2: Develop modular combinational circuits using decoders
				CO3: Apply the concepts of sequential logic and memory devices in digital systems

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO4: Describe the architecture, functions of microprocessor and its interfacing with peripheral devices.
				CO5: Apply the programming techniques in developing the assembly language program for microprocessor systems.
6.	III	Data Structures using C Lab	CS2511	CO1: Analyze basic data structures used in programming
				CO2: Implement various data structures in C Language.
				CO3: Implement basic algorithms in c language.
				CO4: Choose appropriate data structures to develop an application.
				CO5: Analyze and compare the static and dynamic implementations of various data structures.
7.	III	Microprocessor Lab	CS2531	CO1: Demonstrate boolean expressions, demorgan's law, and other operations using different types of gates
				CO2: Design flip-flops and counters using gates/flip-flops
				CO3: Apply the knowledge of tools and techniques used by practicing engineers to design, implement and debug microprocessor-based systems
				CO4: Describe the architecture of the microprocessor, its peripheral devices, and basics of the instruction set
				CO5: Design flowchart and use programming techniques to develop the assembly language program for microprocessor system
8.	III	Data Communication & Networking Lab	CS2551	CO1: Identify and explain the main components in a communication system
				CO2 : Design, Implement error detection and correction algorithm
				CO3: Recognize network types and different models of network & networking components

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO4:Implement different Networking algorithms
				CO5: Analyze to compare performance of different routing protocols using different tools
9.	III	Choice based soft skill Program-I & II Personal Effectiveness and Body Language Lab	SH254	CO1: Develop skills to build self-esteem and positive attitude.
				CO2: Discover ways to overcome procrastination.
				CO3: Demonstrate responsiveness towards stress and health issues.
				CO4: Interpret the non-verbal behaviour of a person.
10.	III	Interpersonal Skills Lab	SH255	CO1: Exhibit interpersonal communication skills.
				CO2: Demonstrate decision-making skills.
				CO3: Apply conflict resolution styles appropriate in different situations.
				CO4: Demonstrate leadership skills
11.	IV	Theory of Computation	CS2001	CO1 Describe the basic concepts of Theory of computation
				CO2: Predict a grammar or regular Expression for given language
				CO3: Design computation models for different language classes
				CO4: Prove theorems in automata theory using its properties.
				CO5: Design an application using automata
				CO6: Apply parsing strategies to parse given input.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
12.	IV	Computer Networks	CS2021	CO 1. Identify the services and features provided by the network layer protocols to solve network-engineering problems.
				CO 2. Design and analyze performance of different routing algorithm.
				CO 3. Understanding the working principals, elements of transport layer protocols such as TCP, UDP
				CO4. Study on different application layer protocols such as HTTP, DNS, and SMTP.
				CO 5:To be able to design different data compression technique used in multimedia application
13.	IV	Computer Organization	CS2041	CO 1. To conceptualize basics of organizational and architectural issue ,functional unit of processor in digital computer and apply in computer organization
				CO 2. Construct the ability to perform computer arithmetic operations such as binary, signed, decimal, hexadecimal, floating point numbers.
				CO 3. Interpreting memory organization that uses banks for different word size operations and cache mapping techniques including translation, allocation.
				CO 4. Ability to understand input/output organization, data transfer techniques for computer.
				CO 5. To analyze processor performance improvement using instruction level parallelism in digital computer.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
14.	IV	Software Engineering	CS2061	CO 1. Apply knowledge of software principles to identify and solve real world problems.
				CO 2. Demonstrate the surveying and analysing capabilities.
				CO 3. Work with different tools for software design, development and testing.
				CO 4. Work within teams.
15.	IV	Computer Network Lab	CS2521	CO 1. Design , Implement and analyze simple computer networks
				CO 2. Identify operations of TCP/UDP , FTP, HTTP, SNMP etc
				CO 3. Compare different networking models
				CO 4. Demonstrate an understanding of computer communication standards
16.	IV	Object Oriented Design and Programming Lab	CS2541	CO 1. Understand object-oriented design concepts and apply them in software system design.
				CO 2. Implement basic OOP concepts like class & object, inline functions, dynamic memory allocations etc.
				CO 3. Use constructors, destructors, function overloading, operator overloading, and friend functions in C++.
				CO 4. Use C++ for implementing different types of inheritance and virtual functions.
				CO 5. Apply advanced features of C++ programming like exception handling, templates etc.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
17.	IV	Mini Project-Environmental Science	CS2581	CO 1. Utilize scientific methods to solve environmental problems
				CO 2. Examine technologies for restoration of degraded environment
				CO 3. Develop presentation and report writing skills
				CO 4. Develop as an individual and in group leadership quality
18.	IV	Free and Open SourceSoftwares Lab	CS2601	CO 1. Efficiently use FOSS environments & tools needed for software development
				CO 2. Collaborate in a network of Foss developers
				CO 3. Evaluate software development practices which exploit Foss
				CO 4. Apply Foss strategies in the software development life cycle
19.	IV	Environmental Science	SH2011	CO 1. Interpret impacts of human activities on natural resources and its control measures. environmental problems
				CO 2. Apply ecological knowledge to solve
				CO 3. Select the appropriate technology to control environmental pollution
				CO 4. Plan waste management and disaster management practices
				CO 5. Justify methods to assess impacts of developmental activities on environment
				CO 6. Analyze environmental change and its social impacts

Sr. No.	Semester	Course Name	Course Code	Course Outcome
20.	V	Database Management Systems	CS3011	CO1: Express terms related to database design and management.
				CO2: Apply the relational algebra structured query language sql for database definition and manipulation.
				CO3: To use concept of functional dependency and decompose schema by applying certain normal forms.
				CO4: Apply ethical computing concepts and practices to design database and implementation security, concurrency control , recovery, deadlock handling
				CO5: To design and create database to solve real world problem.
21.	V	System Programming	CS3031	CO1: Analyze the role of systems programming and apply appropriate knowledge of computing and mathematics to solve systems programming problems.
				CO2: Demonstrate the Concept of Lex &Yacc tool and formulate the spect of Lex &Yacc program
				CO3: Illustrate the concept of Logical analysis & design aspect of macro preprocessor program
				CO4: Determine the aspect of LP activity of compiler for processing expressions
				CO5: List the various s/w tools for program development using Debugging, Editors, User interfaces and DLL
22.	V	Operating System	CS3051	CO1: Explain basic concepts of operating system like memory management.
				CO2: Apply scheduling techniques to solve real world problems.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO3: Calculate average waiting time, page faults.
				CO4: Differentiate different operating systems according to their features.
				CO5: Solve scheduling problem using different scheduling algorithms.
				CO6: Explain basic concepts of operating system like memory management.
23.	V	Design and Analysis of Algorithm	CS3071	CO1: Explain the basic concepts of time and space complexity, divide-and-conquer strategy, dynamic programming, greedy and approximate algorithms, amortized analysis and computational geometry.
				CO2: Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains.
				CO3: Identify and apply appropriate algorithm design techniques for solving problems.
				CO4: Design an algorithm to solve problem in different domains.
				CO5: Explain non-deterministic and randomized algorithms
24.	V	Object Oriented Modelling & Design	CS3091	CO1: Comprehend basics of object oriented modelling and compare the need of object-oriented modelling with traditional methods.
				CO2: Propose software system using requirements/feature lists, use cases, and simple structural of UML models.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO3: Demonstrate knowledge of functional and behavioural modelling techniques.
				CO4: Design a software system based on advanced static/dynamic UML models.
				CO5: Analyze the application domain and requirements of the problem. Develop the skills to determine which processes and OOAD techniques should be applied to a given project.
				CO6: Able to work in teams to perform the above techniques as well as the ability to translate UML models into code using an OO programming language.
25.	V	Database Management Lab	CS3511	CO1: Examine the real world organization where database management system is required.
				CO2: Analyze the need of particular organization for DBMS.
				CO3: Design and implement relational database management system.
				CO4: Develop database design with the help of open source tools.
				CO5: Experiment the RDBMS tools such as SQL / Microsoft Access.
				CO6: Work in team for database designing and application creation.
26.	V	Self-Learning	CS3551	CO1: Demonstrate domain specific knowledge through various applications.
				CO2: Apply Mathematical concepts to solve various social, scientific and engineering problems.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO3: Analyze problems in multidisciplinary nature and design solution for such problems.
				CO4: Select and use appropriate designing and analysis tools for the selected problems.
27.	V	Aptitude I	SH3191	CO1: Apply basic mathematics to solve problems from various domains.
				CO2: Select and apply appropriate business mathematics.
				CO3: Analyze and solve problems in multidisciplinary nature.
				CO4: Develop logic to solve the selected problems.
28.	VI	Principles of Compiler Design	CS3001	CO1:Discuss working of various phases of compiler
				CO2:Apply scanning and parsing techniques on given grammar
				CO3:Generate syntax tree and check the meaning of given input
				CO4: Apply appropriate techniques to optimize given input.
				CO5:Generate intermediate code and resolve various issues in code generation
29.	VI	LINUX Operating System	CS3021	CO1:Recall the basic concepts of Linux Operating system and basic commands
				CO2: Writes shell programming using C
				CO3: Familiarize with system calls for file system, Structure of process, Memory management Policies, and 10 Subsystem in LINUX.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO4: Analyze Linux utilities, principles of Linux programming and compare with other operating system.
30.	VI	Computer Graphics & Virtual Reality	CS3041	CO1: To apply the mathematical techniques for representing points, lines, curves and surface in graphics
				CO2:Design algorithms to draw lines, circle, polygons, etc.
				CO3:To demonstrate the knowledge of projections
				CO4:Learn the basics of OpenGL and emerging technologies using OpenGL and GLUT libraries
				CO5:To design a virtual environment
31.	VI	Computer Graphic & Virtual Reality Lab	CS3521	CO1:Implement and demonstrate 2D/3D transformations in computer graphics
				CO2:Implement and Demonstrate the algorithms to display 2D basic primitives and clipping
				CO3:Implement and Demonstrate representation of basic primitives using OpenGL
				CO4:Develop mini-games/ graphical interface using OpenGL and GLUT libraries
32.	VI	Internet Technology Lab	CS3541	CO1:Execute Socket programs using C, Java OR Python Programming
				CO2:Develop and host website for commercial Applications
				CO3:Design and Develop application servers like FTP,DNS etc. using socket programming

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO4:Design wired and wireless topology along with features of NS-2like XGraph, NAM etc.
				CO5:Analyze Routing and Audio Video streaming protocol using NS-2 simulator
33.	VI	NET Programming Lab	CS3561 .	CO1: Explain the most important features of .NET Framework technology
				CO2:Developing Console and Windows application by using C# language
				CO3:Implement OOP concepts like data encapsulation, data hiding, inheritance and polymorphism using C# language
				CO4:Analyze and implement advanced features of C# language like multithreading, exceptions and delegates
				CO5:Developing projects in C# that include control structure, looping, file handling event handling, ADO.NET, multithreading etc
34.	VI	Mini Project-II Lab	CS3581	Formulate a real world problem and develop its requirements.
				Develop a design solution for a set of requirements.
				Self-learn new tools, algorithms, and/or techniques that contribute to the software solution of the project
				Test and validate the conformance of the developed prototype against the original requirements of the problem
				Work as a responsible member and possibly a leader of a team in developing software solutions and Decision making.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
35.	VI	Aptitude II	SH3222	Develop through conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning Problems
				Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications.
				Understand blood relations and ways of seating arrangements along with Various geometrical figures
				Apply Various short cuts and technique to manage speed and accuracy to get equipped for various competitive and campus recruitment exams
36.	VI	System Software Lab	CS3601	Apply basic knowledge of automation theory to build a compiler
				Design and Implement phases of compiler
				Build scanners and parsers using different tools
				Build an application by applying concepts of compiler
37.	VII	Advanced Database Systems	CS4011	CO1: Evaluate and describe the fundamental theories and requirements that influence the design of modern database systems.
				CO2: Describe and compare client-server, distributed & parallel database.
				CO3: Make use of object relational database and xml for different application in database.
				CO4: Demonstrate handling and administration of real time systems.
				CO5: Discuss concept of data warehousing, security and different case studies like PostgreSQL etc.
38.	VII	Virtualization and Cloud Computing	CS4031	CO1: Explain the fundamental concepts of cloud computing and its architecture

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO2: Describe the concepts of virtualization
				CO3: Demonstrate the cloud deployment models using Aneka and its programming models
				CO4: Apply the concurrent, high throughput and data intensive computing paradigms in real life scenarios.
				CO5: Develop applications in science, engineering and life science problems using Aneka programming models.
				Analyze the use cloud computing in different domains and future research.
39.	VII	Information Security	CS4021	CO1: Analyze different methods of Data Encryption and Decryption; their advantages & limitations.
				CO2: Use different key distribution methods for distribution of Public/Private & Secret keys
				CO3: Apply message authentications techniques for implementing security during message communication
				CO4: Create and use digital signatures
				CO5: Discuss different security attacks & security solutions for e-mail & web applications
40.	VII	Parallel Programming Techniques	CS4001	CO1: Identify compute intensive part from sequential algorithm.
				CO2: Design parallel algorithm from given sequential algorithm.
				CO3: Develop parallel programs to use multi-core processors using OpenMP
				CO4: Write parallel programs to demonstrate various features of CUDA C/C++
				CO5: Explore different compute intensive applications.
41.	VII	Parallel Programming Lab	CS4541	CO1: Design different parallel algorithms to solve compute intensive problems.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO2: Use different parallel programming languages on multi-core and many-core systems.
				CO3: Perform the analysis with different performance metrics.
42.	VII	Web Technology Lab	CS4531	CO1: Comment difference between static and dynamic web page.
				CO2: Develop application using html5, css 3.-, java script and jquery.
				CO3: Create xml document and its dtd, create xml parser and apply xsl on xml
				CO4: Develop application using java servlet, manage session of users in web application.
				CO5: Create application using java server pages and access database.
				CO6: Configure apache tomcat server
43.	VII	Mobile Application Development Lab	CS4521	CO1: Setup the Android development environment
				CO2: Utilize the appropriate User Interface controls in Android app
				CO3: Implement SQLite and Shared Preferences concepts to store data in Android app
				CO4: Implement Location and Notification based functionalities in Android app
				CO5: Design and develop a webview based Android app
				CO6:Build and deploy Android app on Google Play Store
44.	VII	Program Elective I Recent IT Technologies	CS4111	CO1: Define the terminology and describe concepts of recent trends in Operating Systems
				CO2: Express recent trends in Databases
				CO3: Discuss latest trends and technologies in Networking
				CO4: Apply concepts of recent trends in Web Technology

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO5: Describe concepts of recent technology in IOT
45.	VII	Program Elective I Mobile Technology	CS4071	CO1: Identify the different generations of cellular networks with their change in technologies.
				CO2: Categorize different generations of mobile communication
				CO3: Distinguish different between GSM and CDMA technology
				CO4: Familiarize with mobile network and transport layer.
				CO5: Acquaint with link and security management in mobile computing
46.	VIII	Program Elective-II Wireless Network	CS4151	CO1: Differentiate between Wired Networks and Wireless Networks.
				CO2: Identify challenges in designing wireless networks and discuss possible solutions to overcome these challenges.
				CO3: Review architectures of various wireless technologies like 3G,4G, Wi-Fi etc.
				CO4: List issues in working of Wireless ad-hoc networks and discuss techniques to address these issues.
				CO5: Demonstrate working of different networking applications.
47.	VIII	Program Elective-II Machine Learning	CS4131	CO1: Identify and describe the characteristics of machine learning that make it useful to the real-world problems.
				CO2: Apply clustering and Bayesian decision theory to classify given data.
				CO3: Sketch decision tree using various decision tree building algorithms.
				CO4: Describe inference and learning algorithms for the hidden Markov model.
				CO5: Explain different reinforcement learning algorithms.
48.	VIII	Program Elective-	CS4581	CO1: Demonstrate the basic concepts of machine learning.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
		II Laboratory Machine Learning Lab		CO2: Implement various supervised learning algorithms on given dataset.
				CO3: Build recommendation system using various filtering methods.
				CO4: Design solutions for the problem optimization.
49.	VIII	Program Elective-III Big Data Analytics	CS4041	CO1: Analyze big data for business intelligence
				CO2: Learn business case studies for big data analytics
				CO3: Apply understand no sql big data management
				CO4: Manage big data without sql
				CO5: Implement map-reduce analytics using HADOOP related tools
50.	VIII	Program Elective-III Internet of things	CS4061	CO1: Identify the various components of IoT.
				CO2: Design a middleware for IoT.
				CO3: Identify the issues to address the security, intelligence in IoT.
				CO4: Describe various protocols used in IoT.
				CO5: Establish the communication between IoT devices and cloud server using wireless technology.
				CO6: Develop IoT application to solve real world problems.
51.	VIII	Open Elective-I Network Administration	OE421	CO1: Identify various types of topologies used in designing of a network
				CO2: Discuss the need and significance of OSI model
				CO3: Design a network to demonstrate the collision and collision free broadcasting
				CO4: Identify the appropriate IP addressing scheme used to design a network
				CO5: Configure the network services like FTP, Telnet, DHCP and DNS on a server

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO6: Design an optimal network with appropriate components for given requirements
52.	VIII	Project Phase II	CS4561	CO1: Apply knowledge of computer science for real world problem.
				CO2: Possess Professional, Practical and reflective practitioner skills.
				CO3: Upgrade and apply the knowledge through continuous learning.
				CO4: To develop project management and time management skills
				CO5: Effectively apply Design Thinking Processes and Template to structure learning lifecycle in the development of a prototype.
53.	VIII	Internship	IP402	CO1: Examine the functioning of the company on the terms of inputs, transformation process and the outputs products and services
				CO2: Develop an attitude to adjust with the company culture, work norms, code of conduct.
				CO3: Recognize and follow the safety norms, Code of conduct.
				CO4: Demonstrate the ability to observe, analyse and document the details as per the industry practices.
				CO5: Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies.
				CO6: Improve the leadership abilities, communication.
				CO7:Demonstrate project management and finance sense
				CO1: Identify the project/problem in the domain of a program relevant for the company.
54.	VIII	Project Individual related to their specialization	IP404	CO2: Collect the information to the pertaining to the problem identified.
				CO3: Analyse the information using the statistical tools/ techniques.
				CO4:.Suggest the feasible alternative solution and select the best solution.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO5:.Present the solution to the company and seek assistance for the implementation.
				CO6:.Measure the impact of the project on the performance of company/department.
				CO1: Select on the literature in the field, analyze and interpret research evidence published on a topic to establish a suitable research problem/issue or opportunity to explore further;
55.	VIII	Research Methodology	RE402	CO2: Design the research study using a suitable paradigm, associated methodologies and methods of data collection and analysis.
				CO3: Write a research proposal research blueprint describing the topic.
				CO4: Demonstrate the ability to use the statistical software to solve problems.
				CO1: Select research topic, write literature review.
56.	VIII	Research Methodology lab	RE406	CO2:Design research, like full factorial, fractional factorial, Taguchi or RSM
				CO3: Analyse the research problem using software
				Due to different courses selected by the students no specific COs are defined.
57.	VIII	Research Elective I Open / Program Elective/ Self-study course Designed by guide	RXXX4 YY	Due to different courses selected by the students no specific COs are defined.
58.	VIII	Research Elective I Online Certification course	RXXX4 YYY	CO1: Select, formulate and carry out a substantial research-based project
59.	VIII	Research project	RE404	CO2: Possess Professional, Practical and reflective practitioner skills.
				CO3: Use research findings to advance education theory and practice
				CO4: Communicate research findings in written and verbal forms
				CO5: Analyse data and synthesize research findings
				CO1: Construct business Plan for selected business.

Sr. No.	Semester	Course Name	Course Code	Course Outcome
60.	VIII	Project feasibility analysis	ED402	CO2: Build risk analysis& market analysis of selected project.
				CO3: Develop technical appraisal of selected project.
				CO4: Develop financial appraisal of selected project.
				CO1: Interpret basic Financial Terminologies.
61.	VIII	Commercial aspects of project	ED404	CO2: Create &analyze financial statements.
				CO3: Develop financial Plan for venture
				CO4: Apply basic principles of marketing for various products.
				CO5: Build market survey.
				CO6: Apply knowledge of marketing management for selected business.
62.	VIII	EDP Program	ED406	CO1: Apply knowledge of engineering, economics, marketing and finance for formulation of the business plan, starting & managing new business.
				CO2: Apply different software like Live plan, business plan prostrategizer business canvas, and online business plan by Small Industries Development Bank of India SIDBI , for preparing financial projections of selected project.
63.	VIII	Project report: product/start-up complete techno economic feasibility access by funding agencies and approved for funding	ED408	CO1: Apply knowledge of engineering, economics, marketing and finance for preparation of project report.
				CO2: Develop commercial, technical and financial appraisal of project.

PG Computer Science and Engineering

Department Name: Computer Science and Engineering

PG Program Name: Computer Science and Engineering

Vision:

To excel in the computer science engineering discipline through continuous research, innovation and industry-oriented curriculum leading to responsible IT professionals.

Mission:

1. To inculcate teaching and learning process promoting state-of-the-art IT industry practices in computer science engineering and technology to address global challenges.
2. To integrate academics, research and entrepreneurship skills to address present and future challenges of the society and industry.
3. To develop professionalism with strong foundations adapting to changing technology.

Sr. No.	Program Outcomes
1.	An understanding of the theoretical foundations and the limits of computing.
2.	An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
3.	An ability to design, develop and evaluate new computer-based systems for novel applications which meet the desired needs of industry and society.
4.	Understanding and ability to use advanced computing techniques and tools.
5.	An ability to undertake original research at the cutting edge of computer science & its related a
6.	An ability to function effectively individually or as a part of a team to accomplish a stated goal.
7.	An understanding of professional and ethical responsibility.
8.	An ability to communicate effectively with a wide range of audience.
9.	An ability to learn independently and engage in lifelong learning.
10.	An understanding of the impact of IT-related solutions in an economic, social and environmental context.

Course and Course Outcomes

Sr. No.	Semester	Course Name	Course Code	Course Outcome
1.	I	Linear Algebra and Probability Distributions	SHP5153	CO1: Use relevant probability distribution to solve the engineering problems
				CO2: Compute the rank of a matrix and solve the system of linear equations.
				CO3: Examine for dependency and determine the dimensions of vector space.
				CO4: Use different mathematical techniques to model and solve the problem
2.	I	Machine Learning	CSE1014	CO1: Set necessary mathematical background to understand Machine Learning concepts
				CO2: Recognize and appreciate need of Machine Learning in various applications
				CO3: Apply Classification and Regression techniques for decision making
				CO4: Use probabilistic graphical models to represent given problems
				CO5: Apply sequential data processing algorithms to solve problems
3.	I	Advanced Algorithm	CSE1024	CO1: Select appropriate algorithm design techniques such as greedy method, dynamic programming, backtracking and heuristic algorithms
				CO2: Apply backtracking algorithm to solve real world problems
				CO3: Explore different NP problems and approximation algorithmic solutions
				CO4: Apply and design parallel algorithms to solve fundamental problems
				CO5: Apply and compare performance of local search techniques algorithms for solving fundamental combinatorial problems
				CO6: Compare and design global search techniques for solving engineering/real-world combinatorial problems
				CO7: Identify the new trends and research directions in algorithms

Sr. No.	Semester	Course Name	Course Code	Course Outcome
4.	I	Program Elective-I (Big Data)	CSE1034	CO1: Analyze big data for business intelligence
				CO2: Learn business case studies for big data analytics
				CO3: Implement map-reduce analytics using hadoop related tools
				CO4: Apply NoSQL big data management
				CO5: Manage big data with aspects of Privacy and ethics
5.	I	Program Elective-I (Cloud Computing)	CSE1044	CO1: Compare cloud computing with other computing technologies
				CO2: Illustrate the virtualization technologies and its role in enabling the cloud computing system model
				CO3: Identify and compare different cloud service and deployment models for scientific, business and consumer applications
				CO4: Describe Aneka platform as a service to design different applications
				CO5: Compare different cloud services with pros and cons from multiple cloud providers
				CO6: Describe recent advances in cloud framework/services for solving scientific and business applications
6.	I	Program Elective-I (Open Source Technologies)	CSE1054	CO1: Demonstrate the configuration of software services on servers
				CO2: Exercise the FOSS tools for the software development
				CO3: Contribute to existing FOSS in FOSS environment
7.	I	Program Elective-II (Natural Language Processing)	CSE1064	CO1: Acquire knowledge of the fundamental mathematical models and algorithms in the field of NLP
				CO2: Apply these mathematical models and algorithms in applications in software design and implementation for NLP
				CO3: Apply deep learning models to solve machine translation and conversation problems
				CO4: Apply deep structured semantic models on information retrieval and natural language applications
				CO5: Acquire knowledge of the design and implementation issues in various NLP applications such as information extraction and Machine translation

Sr. No.	Semester	Course Name	Course Code	Course Outcome
8.	I	Program Elective –II (Computer Vision)	CSE107	CO1: To implement fundamental image processing techniques required for computer vision
				CO2: Understand Image formation process
				CO3: To perform shape analysis
				CO4: Extract features form Images and do analysis of Images
				CO5: Generate 3D model from images
				CO6: To develop applications using computer vision techniques
9.	I	Program Elective-II (Advanced Networks)	CSE1084	CO1: Discuss the design and research issues in wireless networks
				CO2: Demonstrate the working of 802.11 a/g/n wireless standard
				CO3: Apply the different types of routing protocols in ad-hoc networks
				CO4: Analyze different protocols in MAC, Routing and Transport Control for Sensor Networks
10.	I	Research Methodology	CSE1094	CO1: Formulate a research problem
				CO2: Analyze research related information
				CO3: Prepare and present research proposal / paper by following research ethics
				CO4: Make effective use of computers and computing tools to search information, analyze information and prepare report
				CO5: Describe nature and processes involved in development of intellectual property rights
11.	I	Machine Learning Laboratory	CSE1104	CO1: Set necessary mathematical background to understand Machine Learning concepts
				CO2: Recognize and appreciate need of Machine Learning in various applications
				CO3: Apply Classification and Regression techniques for decision making
				CO4: Use probabilistic graphical models to represent given problems
				CO5: Apply sequential data processing algorithms to solve problems
12.	I	Advanced Algorithm Laboratory	CSE1114	CO1: Select appropriate algorithm design techniques such as greedy method, dynamic programming, backtracking and heuristic algorithms

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO2: Apply backtracking algorithm to solve real world problems
				CO3: Explore different NP problems and approximation algorithmic solutions
				CO4: Apply and design parallel algorithms to solve fundamental problems
				CO5: Apply and compare performance of local search techniques algorithms for solving fundamental combinatorial problems
				CO6: Compare and design global search techniques for solving engineering/real-world combinatorial problems
				CO7: Identify the new trends and research directions in algorithms
13.	I	Program Elective-I Laboratory (Big Data Laboratory)	CSE1124	CO1: Identify and investigate the distributed underlying experimental bed of Hadoop
				CO2: Compare the attributes of different Hadoop versions and their artifacts
				CO3: Determine the usage of Map-reduce paradigm for parallel execution
				CO4: Recognize the NoSQL prototype to build the big data management
				CO5: Apply the skills to construct NoSQL designs and its manipulation
14.	I	Program Elective-I Laboratory : (Cloud Computing Laboratory)	CSE1134	CO1: Configure various virtualization tools such as Virtual Box, VMware workstation
				CO2: Illustrate the design and development process involved in creating a cloud based application
				CO3: Design and deploy application in a Aneka PaaS environment
				CO4: Simulate a cloud environment to implement new schedulers
				CO5:
15.	I	Program Elective-I Laboratory: (Open Source Technology Laboratory)	CSE1144	CO1: Demonstrate the configuration of software services on servers
				CO2: Exercise the FOSS tools for the software development
				CO3: Contribute to existing FOSS in FOSS environment

Sr. No.	Semester	Course Name	Course Code	Course Outcome
16.	II	Deep Learning	CSE115	CO1: Compare Machine Learning and Deep Learning approaches to solve problems; understand usefulness of each one
				CO2: To get knowledge about introduction to Deep Learning and understand how Deep Learning solves problems which Machine Learning cannot
				CO3: To implement analyse and evaluate Convolutional networks, RNNs, LSTM, Adam, Dropout, BatchNorm, Xavier/He initialization, and more
				CO4: To apply deep learning concept for different real-time applications
				CO5:
17.	II	Data Analytics	CSE1164	CO1: Explore the fundamental concepts of big data and its analytics
				CO2: Analyze the big data using Hadoop and intelligent techniques
				CO3: Investigate big data solutions using Hadoop eco system
				CO4: Identify and formulate various techniques for mining data stream
				CO5: Recognize the suitable secure models for building competitive business decisions
18.	II	Program Elective-III: (Web Application Development)	CSE1174	CO1: Gain technical competencies in web application development and maintenance
				CO2: Implement interactive web pages and apply validation checks using client side programming languages like HTML, CSS, Java Script and AngularJS
				CO3: Process the business data and generate responses dynamically using PHP
				CO4: Design and develop web services
				CO5: Use Django Python framework to design interactive web applications
19.	II	Program Elective –III: (Parallel Computing)	CSE1184	CO1: Explain how massive parallelisms are implemented in accelerator architectures
				CO2: Design and implement parallel algorithms for GPGPU
				CO3: Demonstrate parallel patterns for performance improvement

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO4: Analyze the parallel programming and computational thinking strategies
				CO5: Compare different Parallel algorithms from various application domains for performance analysis
20.	II	Program Elective-III : (Internet of Things)	CSE1194	CO1: Identify the components of IoT
				CO2: Design a middleware for IoT
				CO3: Develop IoT application to solve social problems
				CO4: Analyze various protocols for IoT
				CO5: Establish the communication to the cloud through Wi-Fi / Bluetooth
21.	II	Program Elective-IV:(Optimization Techniques)	CSE1204	CO1: Illustrate the concepts of optimization and its terminologies
				CO2: Apply and compare the biology-based algorithms
				CO3: Explore different physics-based algorithms for optimization problems
				CO4: Design efficient parallel and hybrid algorithms for complex problem solving
				CO5: Formulate multi-objective optimization problems and categories the multi-objective optimization algorithms
				CO6: Analyze performance of different algorithms for single and multi-objective mathematical and real-world optimization problems
22.	II	Program Elective-IV:(Cryptology and Network Forensics)	CSE1214	CO1: Understand OSI security architecture and classic encryption techniques
				CO2: Acquire fundamental knowledge on the concepts of finite fields and number theory
				CO3: Understand various block cipher and stream cipher models
				CO4: Describe the principles of public key cryptosystems, hash functions and digital signature
				CO5: Understand and the principles of network forensics and investigate network frauds
23.	II	Program Elective-IV: (Software Architecture)	CSE1224	CO1: Recognize major software architectural styles, design patterns, and frameworks
				CO2: Describe a software architecture using various documentation approaches and architectural description languages
				CO3: Design and develop software architecture for large scale software systems

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO4: Formulate architectural alternatives for a problem and select among them
				CO5: Apply well-understood paradigms for designing new systems
24.	II	Deep Learning Laboratory	CSE123	CO1: To get knowledge about introduction to Deep Learning and understand how Deep Learning solves problems which Machine Learning cannot
				CO2: To acquire knowledge about advanced Machine Learning concept and relevant topics of Linear Algebra and Statistics.
				CO3: To implement analyze and evaluate Convolutional networks, RNNs, LSTM, Adam, Dropout, BatchNorm, Xavier/He initialization, and more
				CO4: To apply deep learning concept for different real-time applications
25.	II	Data Analytics Laboratory	CSE1244	CO1: Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
				CO2: Introducing Java concepts required for developing map reduce programs
				CO3: Derive business benefit from unstructured data
				CO4: Experimenting programming tools PIG & HIVE in Hadoop echo system
				CO5: Developing Big Data applications for streaming data using Apache Spark
26.	II	Program Elective-III Laboratory: (Web Application Development Laboratory	CSE1254	CO1: Gain technical competencies in web application development and maintenance
				CO2: Implement interactive web pages and apply validation checks using client-side programming languages like HTML, CSS, Java Script and AngularJS
				CO3: Process the business data and generate responses dynamically using PHP
				CO4: Design and develop web services
				CO5: Use Django Python framework to design interactive web applications
27.	II	Program Elective -III Laboratory: - (Parallel	CSE1264	CO1: Design different parallel algorithms suitable for multi-core and many-core systems.
				CO2: Implement different parallel algorithms on multi-core and many-core systems

Sr. No.	Semester	Course Name	Course Code	Course Outcome
		Computing Laboratory)		CO3: Solve compute intensive problems/develop applications using accelerators
				CO4: Perform the analysis with different performance metrics
28.	II	Program elective-III Laboratory: (Internet of Things Laboratory)	CSE1274	CO1: Identify the components of IoT
				CO2: Design a middleware for IoT
				CO3: Develop IoT application to solve social problems
				CO4: Analyze various protocols for IoT
				CO5: Establish the communication to the cloud through Wi-Fi / Bluetooth
29.	II	Mini Project	CSE1284	CO1: Identify and formulate research problem
				CO2: Identify and implement suitable techniques for research problems
				CO3: Analyze the results with appropriate tools and techniques available
				CO4: Present the finding of experimental details and result
30.	II	Technical Communication	SHP551	CO1: Acquire skills required for good oral and written communication
				CO2: Demonstrate improved writing skills and level of readability
				CO3: Ensure the good quality of technical reports at very first-time submission
31.	III	Industry Internship	CSE2014	CO1: Acquire sufficient knowledge in respective Industry / advanced IT Technology
				CO2: Identify problems in the process in industry and provide solution to the same / Implement small demonstrative module using learning got through the professional certification
32.	III	Artificial Intelligence - Machine Learning	MOE2010	CO1: Describe central machine learning methods and techniques and how they relate to artificial intelligence
				CO2: Differentiate between supervised and unsupervised learning techniques
				CO3: Apply the ML algorithms to a real-world problem
				CO4: Optimize the models learned and report on the expected accuracy that can be achieved by applying the models
				CO5: Evaluate a given problem and apply appropriate machine learning technique

Sr. No.	Semester	Course Name	Course Code	Course Outcome
33.	III	Creative Thinking: Tools & Techniques	MOE2020	CO1: Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios
				CO2: Apply different brainstorming techniques in group activities
				CO3: Be proficient in the application of the 6 thinking hats tool in different life scenarios
				CO4: Develop a systematic approach to idea generation through the use of morphological analysis
				CO5: Innovate on an existing product, service or situation applying the SCAMPER method
				CO6: Get confident with the theory of inventive problem solving, called TRIZ
				CO7: Select and apply the appropriate technique based on the opportunity to seize or the problem to tackle
34.	III	MOOC Course	MOE2030	CO1: Identify the real application and practices of the courses studied, at the industry level
				CO2: Recognize various modeling ,analysis and validation techniques adopted at industries
				CO3: Demonstrate the issue at design, manufacturing and assembly level
				CO4: Summarize and persent technical data in report format
				CO5:
35.	III	Condition Monitoring and Signal Processing	MOE2040	CO1: Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors
				CO2: Analyze for machinery condition monitoring and explain how this compliments monitoring the condition
				CO3: Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure
				CO4: Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system
				CO5: Identify vibration measurement, lubrication oil analysis
36.	III	Aircraft Conceptual Design	MOE2050	CO1: Understand the design process of aircraft and decide the aircraft configuration
				CO2: Choose type of power plant as per flight regime

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO3: Decide the fuselage layout as per type of aircraft
				CO4: Design the wing for type of aircraft and its wing loading
				CO5: Accurately evaluate lift, drag and mass for design synthesis process
				CO6: Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design
37.	III	Dissertation Phase –I	CSE2034	CO1: Identify domain, sub-domain and problem statement for the Study
				CO2: Perform a literature survey and identify possible gaps in the existing work in context with identified problem statement
				CO3: Formulate the problem statement and its objectives of project
				CO4: Selection of suitable methodology, techniques and dataset for the research work
				CO5: Write synopsis using standard format with technical aspects and language
38.	III	Dissertation Phase –II	CSE2044	CO1: Design and develop bench-marking system which complies expectations and technical specifications mentioned in the Synopsis
				CO2: Perform experimental observation and analysis of the bench-marking system
				CO3: Identify gap and propose possible improvements in the implemented bench-marking system
				CO4: Submit an research article to reputed international conference which should be based on work done till Dissertation Phase 2
				CO5: Prepare a comprehensive, technically and grammatically correct Dissertation Phase 2 report describing the work done
39.	IV	Dissertation Phase –III	CSE2054	CO1: Identify research gap or opportunities for novel work in selected problem statement or domain
				CO2: Define the problem based on identified research gap
				CO3: Develop algorithm/ methodology to address the identified research gap/ provide solution to the selected problem
				CO4: Write pseudo code/develop flow-chart/ develop working flow of proposed system

Sr. No.	Semester	Course Name	Course Code	Course Outcome
				CO5: Implement the proposed approach using required tools
40.	IV	Dissertation Phase -IV Viva-Voce	CSE2064	CO1: Develop / simulate / implement the proposed system by complying with desired technical specifications
				CO2: Compare working and experimental results of the proposed system with the existing system
				CO3: Analyze and synthesize obtained results in theoretical and practical context
				CO4: Present findings in logical order and write Dissertation Report on basis of work done, results and observations, findings, and contributions
				CO5: Submit an research article to reputed international conference which should be based on work done

UG Electrical Engineering

- **Department Name :- Electrical Engineering**
- **UG Program Name :- Electrical Engineering**
- **Vision and Mission :-**

  Vision of the Department: Develop globally competent electrical engineers to serve future needs and challenges of the society

  Mission of the Department: To impart technical education and research skills in close interaction with industry and society for the development of young minds, sensitive to ethical and environmental issues.

Sr. No.	Program Outcomes
1	Apply knowledge of mathematics, science, and electrical engineering.
2	Design and conduct experiments, as well as to analyze and interpret data.
3	Design a system, components or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
4	Function on multidisciplinary teams.
5	Identify, formulate, and solve electrical engineering problems.
6	Demonstrate professional and ethical responsibility.
7	Communicate effectively at work.
8	Understand the impact of electrical engineering solutions in global, economic, environmental, and societal context.
9	Engage in life-long learning.
10	Use the techniques, skills, and modern engineering tools necessary for engineering practice.
11	Apply the knowledge to evaluate contemporary issues with project and finance management skills.
12	Participate and succeed in competitive exams.

Sr. No.	Program Specific Outcomes
1.	Apply knowledge of circuits, machines, power electronics, power systems for the industrial automation and control applications
2.	Operate and control wind power, solar power and electric vehicle systems.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	III	EE2031	Dc Machines & Transformer	Explain the working principle and operation of single phase and three phase transformer.
				Identify various industrial application for single phase and three phase transformer.
				Describe behavior of dc machines.
				Interpret characteristics of dc machines.
				Identify the importance of testing and control of dc machines with suitable industrial applications.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	III	EE2051	Electrical Circuit Analysis	Apply knowledge of mathematics, science, and engineering to the analysis and design of electrical circuits
				Identify, formulate, and solve engineering problems in the area circuits and systems
				Coordinate various components and process of electrical system to meet desired needs within realistic constraints
				Explain importance of various network topology methods for computer analysis of large networks
				Implement network reduction techniques to solve power system networks
				Construct and organize various filter for specific circuits
1.	III	EE2071	Analog Electronics	Explain the fundamentals of solid state electronics including diode, BJT, JFET & MOSFET.
				Apply DC & AC (small signal) analysis to solid state electronic circuits.
				Design solid state electronic circuits.
				Analyze operational amplifier application circuits.
				Classify power amplifier circuits.
2.	III	EE2091	Power System Economics	Distinguish conventional and non-conventional energy sources
				Identify variable load on power stations and factors associated for per unit cost of energy generation.
				Choose various factors for cost of energy in terms different tariff.
				Determine different methods of power factor improvement
				Compare different supply systems used in power system
3.	III	EE2511	Dc Machines & Transformers Lab	Perform various experiments on DC machines
				Perform various experiments on Transformer.
				Find out the characteristics of various machines along with their efficiencies
				Analyze various parameters and predict the durability of the machines
				Compare the performances of the machines by referring relevant standards
4.	III	EE2531	Electrical Circuits & Simulation Lab	Analyze responses of electrical circuits in real time
				Design electrical networks using MATLAB/PSPICE etc.
				Compare responses of real-time electrical

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				networks with simulations.
				Explain the importance of the virtual environment to analyze electrical networks
				Implement various network reduction techniques for power system analysis and modeling
5.	III	EE2551	Analog Electronics Lab	Build and analyze electronic circuits as per requirement
				Observe input and output waveform at various test points
				Plot the input & output response of electronic circuits.
				Interpret results of experiment and compare with theoretical values
				Improve the ability to communicate effectively through written lab journals
6.	III	SH2091	Engineering Mathematics-Iii	Solve linear differential equations & problems related to application by using various methods
				Determine expansion of functions by using Fourier series.
				Solve problems on probability distribution by using different formula.
				Determine Laplace transform & inverse Laplace transform of various functions by using properties.
				Laplace transform & apply Laplace transform to solve linear differential equations
				Calculate z- transform & inverse z- transform by using properties of z- transform
7.	IV	EE2021	Alternating Current Rotating Electrical Machines	Explain different types, construction, working principle & characteristics of three phase induction motors
				Apply the knowledge gained through characteristics of three phase induction motor.
				Explain various types, construction, principle of operation, & application of single phase induction motor
				Describe construction, working principle along with winding details of synchronous generator.
				Analyze performance, characteristics and testing of synchronous machine.
8.	IV	EE2041	Power Transmission & Distribution System(	Explain structure of power systems
				Analyze various transmission line parameters and its mathematical modelling
				Discover various design aspects of overhead transmission lines
				Explain construction & classification of various underground cables

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				Classify various types of A.C and D.C. distribution systems
9.	IV	EE2101	Signals And Systems	Classify various signals and systems.
				Analyze linear time invariant systems using different tools.
				Apply time and frequency domain analysis techniques to different signals and systems.
				Evaluate discrete time Fourier transform of a set of well-defined signals.
				Explain the need of signal processing techniques for various engineering fields.
10.	IV	EE2061	Electrical And Electronic Measurements	Demonstrate basic concept of calibration, statistical evaluation of measurement data.
				Explain construction & working of various electrical measuring instruments.
				Identify and demonstrate both electrical and electronic measuring instruments.
				Determine R, L, C parameters using AC and DC bridges.
				Explain construction and working of digital instruments
11.	IV	EE2081	Digital Electronics	Describe the fundamental concepts and techniques used in digital electronics.
				Formulate the logic expressions using Boolean laws & K-map.
				Design and verify combinational logic circuits
				Design and verify sequential logic circuits.
12.	IV	EE2521	A.C. Rotating Electrical Machines Lab	Perform various experiments on AC rotating machines.
				Analyze the characteristics of various ac machines along with their efficiencies.
				Analyze various parameters and predict the durability of the machine.
				Compare the performances of the machines by referring relevant standards.
				Identify proper machine for particular application.
				Study the constructional details of various electrical motors.
13.	IV	EE2541	Electrical And Electronic Measurements Lab	Demonstrate calibration of various measuring instruments using statistical evaluation of measurement data.
				Determine power and energy for the given system using various measurement techniques.
				Explain construction and working of various instruments
				Calculate R, L, C parameters using AC and DC bridges..

Sr. No.	Semester	Course Code	Course Name	Course Outcome
14.	IV	EE2561	Digital Electronics Lab	Verify the truth table of digital electronic components
				Implement desired Boolean functions using digital electronic components
				Design and verify combinational logic circuits.
				Design and verify sequential logic circuits
15.	IV	EE2581	Mini Project Environmental Science	Utilize scientific methods to solve environmental problems
				Examine technologies for restoration of degraded environment
				Develop presentation and report writing skills
				Develop as an individual and in group leadership quality.
16.	V	EE3031	Power Electronics	Understand the behavior of semiconductor devices operated as power switches.
				Explain operation, waveform and performance parameters of phase controlled converters, uncontrolled rectifiers.
				Analyze and design ac-dc converters
				Explain the basic topologies of dc-dc converters analyze and design dc-dc converters.
				Explain different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods. Analyze and design dc-ac inverters.
				Apply the electronic devices for conversion, control and conditioning of power.
17.	V	EE3051	Power System Stability And Control	Analyze symmetrical faults in power systems
				Apply symmetrical components method for fault analysis
				Interpret the necessity of automatic generation control and excitation control.
				Analyze the optimal operation of power system.
				Analyze power system stability.
18.	V	EE3071	Feedback Control System	Identify the basic elements and structures and demonstrate an understanding of the fundamentals of feedback control systems.
				Develop the mathematical models of any physical systems such as: state space, transfer function
				Determine the response of different order systems for various standard signals.
				Interpret and analyze time domain systems using virtual environment.
				Interpret and analyze frequency domain systems using virtual environment.
19.	V	EE3091	Microprocessors And Micro	Describe the architecture of microprocessor and micro-controller.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Controller	Write assembly language programs for 8085.
				Explain a typical input-output interface.
				Identify instruction addressing modes and syntax for 8051.
				Create an assembly language or C program for 8051 that performs a prescribed task.
				Design and implement a micro-controller-based embedded system.
20.	V	EE3011	Electromagnetic Field Theory	Define electric and magnetic fields according to their force effect.
				Understand the physical meanings of the differential equations for electrostatic and magneto static fields
				Calculate the electric field from the stationary charge distributions and magnetic fields from steady current distributions
				Describe and use simple models of electric and magnetic field interactions with materials
				Explain the concept of electromotive force, Maxwell's equations and their physical meanings
				Analyze energy transportation and wave propagation in an electromagnetic field.
21.	V	EE3511	Power Electronics Lab	Understand the behavior, turn on & turn off schemes of semiconductor devices operated as power switches.
				Analyze, sketch, examine waveforms, and calculate, measure performance factors of output of ac-to-dc converters.
				Analyze, sketch, examine waveforms, and calculate, measure performance factors of output of dc-to-dc converters.
				Analyze, sketch, examine waveforms, and calculate, measure performance factors of output of dc-to-ac inverters.
				Simulate, analyze and design power electronic circuits using MATLAB software.
22.	V	EE3531	Feedback Control Systems Lab	Solve the mathematical model of different electromechanical systems
				Model any given electrical, mechanical system with respect to transfer function and state space domain
				Classify appropriate feedback signal, synthesis feedback gains and analyze their results and deduce the first and second order responses.
				Draw the root locus and analyze the system
				Plot the bode, polar and Nyquist plots and analyze frequency domain

Sr. No.	Semester	Course Code	Course Name	Course Outcome
23.	V	EE3551	Microprocessors And Micro Controller Lab	Create a template program, compile it, and then build the executable file.
				Examine the effects of executing many of the 8085 and 8051 instructions by tracing the execution of a program in GNU Simulator and Keil for microprocessor and microcontroller respectively.
				Write their own program in assembly language for 8085 and 8051.
				Write the steps they go through to perform their tasks..
				Apply their programming knowledge (assembly and C) for real time applications.
24.	V	SH 3191	Scholastic Aptitude I	Develop a thorough conceptual understanding and develop a logical approach towards solving aptitude and reasoning problems
				Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests
				Develop a bridge in analogies, series and visualizing directions
				Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams
25.	VI	EE3021	Switch Gear And Protection	Explain different types of protective devices and relay systems.
				Classify circuit breakers and relays
				Suggest suitable protection scheme for a particular power system component
				Discuss under voltage and overvoltage protection scheme
				Design a protection scheme for power system
26.	VI	EE3041	Control System Design	Design and tune proportional, integral and derivative controllers for given specifications
				Design a suitable compensator using root-locus technique for the given specifications
				Design a suitable compensator in frequency domain for the given specifications
				Design state feedback controller and observer for given system
				Construct MATLAB models for the implementation of cl-osed-loop systems.
27.	VI	EE3101	Restructured Power System	Explain restructuring of power system and related fundamentals of economics
				Analyze role of independent system operator in deregulated power system
				Analyze transmission congestion management

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				and ancillary services in deregulated power system
				Explain Indian electricity act in context with deregulated power market
				Compare different organizations in Indian power sector in view of Indian electricity grid.
28.	VI	EE3081	Electrical Drives And Control	Analyze stability, moment of inertia, speed and torque in drive systems
				Compare various control strategies for electrical drive systems
				Discuss starting, braking and speed control for AC and DC drives.
				Explain vector control of induction motor drives.
				Explain the speed control of synchronous motor and special motor drives.
29.	VI	EE3541	Switchgear And Protection Lab	Identify different switches and circuit breakers
				Observe and explain MCCB.
				Plot characteristics of Relays.
				Assure working of Relays based on their technology and characteristics.
				Discuss different protection schemes.
				Demonstrate for Transformer and Generator protection
30.	VI	EE3561	Electrical Drives And Control Lab	Demonstrate AC and DC drives fed from various power electronics converter.
				Examine closed loop control of electrical drive systems.
				Analyze performance of electrical drives by plotting speed-torque characteristics.
				Compare performance of electrical drive systems according to speed-torque characteristics.
				Simulate AC and DC drives fed from various power electronic converters.
31.	VI	EE3521	Control System Design Lab	Design and implement PID controller for a closed-loop system
				Design a suitable compensator using root-locus technique.
				Design a suitable compensator in frequency domain.
				Develop state feedback controller and observer for SISO system.
				Demonstrate control of closed-loop systems using MATLAB.
32.	VI	EE3061	Instrumentation Techniques	Describe basic concepts of instrumentation and characteristics of instruments.
				Explain selection factors and application of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				transducers and sensors.
				Discuss different types of signal conditioning devices
				Explain different data conversion techniques and digital instruments
				Describe different type of industrial process controllers
33.	VI	SH3222	ScholisticApititute	Develop a thorough conceptual understanding and develop a logical approach towards
				Solving aptitude and reasoning problems
				Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications.
				Understand blood relations and ways of seating arrangements along with various geometrical figures
				Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams
34.	VII	EE4021	Industrial Organization And Management	Apply the industrial management concepts, financial management concepts
				Contribute to the development, implementation, and evaluation of employee recruitment, selection, and retention plans and processes.
				Explain the importance of materials management function in an organization, and how it can help in integrating various plans and reduce the material related costs
				Design a marketing research study that will act as a key resource in the development of a marketing plan
				Explain industrial psychology and solve the industrial problems.
35.	VII	EE4031	Electrical Machine Design	Calculate MMF and thermal rating of various types of electrical machines
				Design armature and field systems for DC machines
				Design core, yoke, windings and cooling systems of transformers.
				Design stator and rotor of induction machines.
				Design stator and rotor of synchronous machines and study their thermal behavior.
36.	VII	EE4041	Automation And Control	Describe the need of industrial automation and their functions.
				Make use of standard IEC programming languages.
				Design relay/RLL based control logic for

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				Boolean expressions.
				Construct relay logic ladder diagram for the given application.
				Develop GUI for monitoring system of the given real time applications using SCADA/HML.
37.	VII	EE4051	Computer Modelling Of Electrical Power System	Develop mathematical models of various equipment used in power system to analyses both AC and AC-DC power system network.
				Model single and three phase power system network components by using linear transformation and compound admittance technique.
				Formulate AC and AC-DC power system analysis problem.
				Apply various methods of load flow studies to analyze AC power system network.
				Analyze AC-DC power system network by using power flow analysis method
38.	VII	EE4061	Energy Audit And Management	Identify and assess the energy conservation/saving opportunities in different electric system
				Identify and assess energy conservation opportunities in thermal system
				Demonstrate skills required for energy audit and management
				Prepare energy flow diagrams and energy audit report
				Suggest cost-effective measures towards improving energy efficient and energy conservation.
39.	VII	EE4071	FACTS And HVDC	Understand the importance of controllable parameters and benefits of facts controllers.
				Analyze the functional operation and control of series and shunt compensation.
				Describe the principles, operation and control of multi-functional facts controller.
				Identify significance of DC over AC transmission system, types and application of HVDC links in practical power systems.
				Apply various methods of grid control for HVDC systems.
40.	VII	EE4081	Power System Planning	Explain the need of power system expansion
				Analyze the given power system for determining optimal values of decision variables.
				Apply mathematical tools to solve multi-objective optimization problems in expansion

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				planning and reliability studies.
				Explain long term and short term planning.
				Discuss various economic analysis methods.
41.	VII	EE4121	Digital Control System	Apply z transform techniques to model systems
				Realize the digital PID controller
				Analyze the systems in s-plane and z-plane
				Determine state-space representation of dynamical systems using linear algebra
				Design the controller using pole placement technique and optimal control
42.	VII	EE4511	Advanced Power Electronics Laboratory	Evaluate different DC-DC regulators
				Simulate and analyze resonant converters
				Select appropriate phase shifting converter for multiphase converter
				Evaluate various multi-level inverter configuration
				Compare various facts devices for VAR compensation
43.	VII	EE4521	Automation And Control Lab	Design relay logic control system for given application using relays.
				Develop RLL for Boolean expressions.
				Develop RLL using timer and counter instructions.
				Develop RLL using math instructions.
				Develop GUI using SCADA/HMI for given application
44.	VII	EE4531	Electrical Machine Design Lab	Calculate design parameters of an electric machine
				Analyze the effect of calculated design parameters electrical machines
				Design electrical machine using design software
45.	VII	EE4531N	Computer Modelling Of Electrical Power System Lab	Develop admittance matrix for the given power system network by using linear transformation technique and inspection method
				Analyzing HVDC conversion plant by simulating power electronic conversion system.
				Apply various power flow analysis method to solve AC and AC-DC power system network.
				Develop MATLAB program to solve the defined power system problem.
				Use various application software packages to perform power flow study of given power system network.
46.	VIII	EE4571	Industry In-Plant Training	To acquire and apply fundamental principles of engineering.
				Become updated with all the latest changes in technological world

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				Develop ability to communicate efficiently
				Improve ability to identify, formulate and model problems and find engineering solution based on a systems approach
				Develop awareness of the social, cultural, global and environmental responsibility as an engineer
47.	VIII	RE0407	Research Urop Phase I	Perform literature review and identify research topic.
				Write synopsis of the research work that being done in semester.
				Write technical review paper.
48.	VIII	LL0407	Liberal Learning Iip	Identify the liberal learning online course from the NPTEL platform
				Describe the online course given by the institute
				Apply the concept understand through the course in day to day life
49.	VIII	ED4001	Business Opportunity Guidance	Generate & identify different business ideas.
				Make analysis of different ideas.
				Select proper business idea to suit his personality & competencies.
50.	VIII	EE4101	Advanced Power Electronics	Apply knowledge of modern power electronics converters and its application in modern power electronics
				Compute mathematical model of converter
				Solve the state space model for power converters
				Analyze resonant converters and their topologies
				Analyze the operation of power converters, filters, ups systems
51.	VIII	OE432	Wind Energy Engineering	Apply fundamental principles of thermodynamics, fluid mechanics and mechanical systems to wind turbine engineering.
				Calculate various parameters related to wind turbine.
				Design of wind turbine components.
				Design in virtual environment.
				Work on team-based projects.

PG Power System and Power Electronics

- **Department Name: Electrical Engineering**
- **PG Program Name: Power system and Power Electronics**
- **Vision and Mission :**
- **Vision of the Department:** Develop globally competent electrical engineers to serve future needs and challenges of the society
- **Mission of the Department:** To impart technical education and research skills in close interaction with industry and society for the development of young minds, sensitive to ethical and environmental issues.

Sr. No.	Program Outcomes
1.	To independently carry out research /investigation and development work to solve practical problems.
2.	To write and present a substantial technical report/document.
3.	To demonstrate a degree of mastery over the area of power systems and power electronics.

Sr. No.	Program Specific Outcomes
1.	Demonstrate skills in the area of power systems and power electronics for industrial applications.
2.	Investigate and conduct research in the area of power & energy systems and electric mobility

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SHP5151	NumericalComputationalTechnique	1. Estimatetheerror. 2. Applythe relevantnumericalmethodforinterpolating thepolynomial 3. Developtheequationtobefitted andfitthecurveforgiven data 4. Estimatenumericallythe solutionofgivenalgebraic equation. 5. UsetherelevantmethodforsolvingthesimultaneouslinearequationsandcomputetheEigenvalues. 6. Construct thefuzzysetfor given linguistic variable and applyfuzzylogic.
2.	I	EPP1011	ComputeraidedPowerSystemAnalysis	1. Modeldifferentcomponentsofpowersystem 2. Carryout contingencyanalysis of power system

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Analyzepowernetworkbyconductingpowerflowstudies 4. Modelandsimulategeneratorexcitationsystem 5. Estimatestateof power systemusingstateestimation theory
3.	I	EPP1021	Electric andHybridElectricVehicles	1. Discussthetrends and philosophyof electricvehicles 2. AnalyzeConventionalVehiclesandPowertrains 3. Discusstheelectricdrivemechanism. 4. Classifyhybrid electricvehicles 5. DifferentiateElectricand range-extendedelectricvehicles 6. Describeplug-inhybridelectricvehiclesand electricalinfrastructure
4.	I	EPP1031	Wind andSolarenergyTechnology	1. Describetheprincipleofenergygenerationfromwind andsolarPV systems 2. Formulatewind and solar energysystems bymathematical equations 3. Assessenergyproducedfrom wind and solarenergysystems. 4. Comparethe differentmethods ofenergygeneration fromwind andenergysystems 5. Developeconomicanalysisof awind turbineandsolarPV systems
5.	I	EPP1041	Advanced PowerElectronicssystems	1. Classifydifferenttype’sconverterswithrespecttopoweroutput,configurationandapplication. 2. Comparedifferenttypes ofpowerconverters 3. Describetheworkingprincipleofdifferenttypesofpower converters 4. Modeldifferenttypesofpowerconvertersmathematically. 5. Designporeconverterforspecific application.
6.	I	EPP1051	DistributionAutomation	1. Preparelayoutofthesubstationsandfeeders consideringload anddesiredvoltage 2. Designdistributionsystemandassociated equipmentanddevices. 3. Identifyanappropriatemethodofcommuni

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				cationforanyparticulardistributionsystem with aviewof automationand SCADA 4. Analysisdistributionfeedercomponents. 5. Modelthedifferentdistributionfeeder components.
7.	I	EPP1061	HVDCTransmission	1. JustifytheneedofHVDCTransmissionsystemforpowertransmission 2. Analyzedifferentworkingmodes of convertersused forHVDCtransmission 3. Comparedifferentcontrolschemes employedforcontrollingHVDC system 4. Computethefilterparametersforeliminationofvoltage andcurrentharmonicsinHVDCsystem 5. Drawandcomparedifferentconfiguration multi-terminalHVDCsystem
8.	I	EPP1071	Power Electronics ApplicationtoPower Systems	1. Justifyneedof reactivepower compensationschemes 2. Classifydifferentpower electronicsbasedreactivepowercompensationsystems 3. Identifysuitablereactive powercompensation systemforspecificpowersystemproblems. 4. Compareperformanceof differentpowerelectronicsbasedreactivepowercompensationsystems 5. Designsuitablepowerelectronicbasedreactivepower compensationsystemforspecificpower system problem
9.	I	EPP1081	Smart GridTechnologies	1. DiscussthesmartgridinIndianperspective 2. Explainvarioussmartgridtechnologies. 3. Describesmartmetersandadvancemeteringinfrastructure. 4. CompareSmartgridand microgrid 5. Applypower qualitymanagement in smartgrid Identifycommunicationtechnologiesforsmartgrid
10.	I	EPP1091	Power SystemSteadyStateAnalysisLab	1. Developscripttoanalyze symmetricalcomponentsusingpowersystemsoftware. 2. Analyze loadflowandfaultstudiesof

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				givenpower systemnetworkusingpower systemsoftware. 3. Developprogrammeforpowersystemoptimizationproblem 4. Developestimationalgorithmusingleastsquaremethods. 5. Usevariouspower systemsoftwarepackagesto analyzepowersystem networks
11.		EPP1101	RenewableEnergyLab	1. Preparereportonwindresourceassessment 2. OperateandmaintainsquirrelcageandDFIGbasedsystems. 3. Computereactivepower requirementforstandalonewindturbinesystem 4. Demonstratethe effectsofshadowingonPVmodules 5. Listtheinstallationmaterialsforoffgrid PVsystems
12.		SH551	TechnicalCommunication	**1.** Acquireskillsrequiredforgoodoralandwrittencommunication **2.** Demonstrateimprovedwritingandreadingskills **3.** Ensurethe good qualityoforal andwrittencommunication
13.	II	EPP2011	Power SystemDynamicsand Stability	1. Describepowersystemoperatingstatesand control 2. Analyzesynchronousmachinemodels 3. Modelexcitationandprimemoversystem 4. Explainthe powersystem stability 5. Discussscenarioofvoltage collapse
14.	II	EPP2021	Advanced Control ofElectricalDrives	1. Justifytheneed ofclosed loop drivesystemfor industrialapplications. 2. Explainthe workingprincipleofdifferent types ofdrivesystem. 3. Comparedifferenttypesofelectricdrives. 4. Developmathematicalmodelsofelectric drivesystemforspecific application. 5. Design controllersforclosed-loopoperationofdifferenttypesofelectrical motors.
15.		EPP2031	GridIntegratio	1. Summarizethegridcodes

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			n ofRenewableE nergy Sources	forintegrationofrenewableenergysources 2. Explaintheworkingprincipleofdifferent powerelectronictopologiesandcontrollers. 3. Modelmathematicallyrenewable energysourcesand associated control system 4. Designsystemstoreduce impactofrenewable energyfluctuationsongrid 5. DevelopsimulationsystemsusingMATLAB
16.	II	EPP2041	DigitalProtecti onofPowerSys tem	1. Discusstheimportanceofpower electronicsdevicesinpowersystemprotection. 2. Distinguishbetween conventionalrelaysandmodernrelays 3. Applymathematicalapproachtowardsprotection 4. Developalgorithmsfornumericalprotection 5. Explorerecentadvancesindigitalprotection ofpowersystems
17.	II	EPP2051	PowerSystem Optimization	1. Explaintheneedofpowersystemoptimization 2. Formulatepowersystem optimizationproblem 3. Applynumericaland heuristictechnique tosolvepowersystemoptimizationproblem. 4. Solvepowersystemoptimizationproblem 5. Assesstheimpactof parameters ondefined optimization problem.
18.	II	EPP2061	Power SystemRestru cturing	1. Describethenew dimensionsassociatedwiththepowersystems. 2. Determinetransmissioncongestionmanagement 3. Discusspricingof transmission network 4. Explainancillaryservicemanagementinelectrical market 5. Justify the role and functions of PX, IEX and various organization in Indian restructuredpowermarket
19.	II	EPP2071	PowerQualityandHa	1. Discussvariouspowerqualityproblemsand

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			rmonics	their analysis. 2. Classifyvarious voltagequalityissues and solutions. 3. DescribePowerQualityStandardsandMonitoring. 4. Assessourcesofharmonicinpowersystem 5. AnalyzeeffectsofHarmonicsonPowersystem 6. Designofharmonic filters.
20.	II	EPP2081	EnergyStorageSystems	1. Discusstheenergystorageasastructuralunit of apowersystem. 2. Comparevariousenergystoragetechnologies forpowersystems. 3. Applybatteryenergystorageand management forpower system. 4. Describehydrogenenergystorageforpower system. 5. Discussshort-term,mid-termandlong-termapplicationsofpowersystem. 6. Analyze economicsandreliabilityofenergystorageSystems
21.	II	EPP2091	ResearchMethodology& IPR	1. Formulatea researchproblem. 2. Analyzeresearch relatedinformation 3. Prepareandpresentresearchproposal/paper byfollowingresearchethics 4. Makeeffectiveuseofcomputersandcomputingtoolstosearchinformation,analyzeinformationand prepare report. 5. Describenatureandprocessesinvolvedin developmentofintellectualpropertyrights
22.	II	EPP2101	Advanced PowerSystemProtectionLab	1. Analyzecharacteristicsofdigitalrelays 2. Demonstratefaultsimulationondifferentprotectionpanels 3. Developan algorithmfordifferentprotectionschemes 4. Simulateprotectionmodels Interpretthesimulationresults
23.	II	EPP2111	Advanced Electric DrivesLab	1. Demonstratecontrolof Inductionmotordrive. 2. ExperimentwithchopperfedDCdrivesystem. 3. Experimentwiththreephasehalf and fullconverterfedDCmotor drive. 4. DemonstratecontrolofBLDC,servoandste

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				pper motordrivesystem. Demonstratecontrolof ACandDCdrivesusingMATLAB/SIMULINK
24.	II	EPP2121	MiniProject	1. Formulatea real worldproblem. 2. Designsolutionforasetofrequirements. 3. Usesoftwarepackagesavailabletoanalyzethepproposedtheory. 4. Explaintechnicalideas,strategiesandmethodologiesinwrittenformandoralpresentations
25.	III	EPP3011	IndustryInternship	**1.** Applyengineeringknowledgelearned duringthe program. **2.** Applyhis/her technicalskills tosolveindustrialproblem. **3.** Workinmulti-disciplinaryenvironment.
26.	III	MOE2010	ArtificialIntelligence-MachineLearning	1. Describecentralmachine learningmethodsandtechniquesand howtheyrelatetoartificialintelligence 2. Differentiatebetweensupervisedandunsupervisedlearningtechniques 3. Applythe MLalgorithms to a real-worldproblem, 4. Optimize the models learned and report on the expected accuracy that can beachieved byapplyingthemodels. 5. Evaluatea given problemand applyappropriate machine learningtechnique
27.	III	MOE2020	Creative Thinking: Techniques & Tools	1. Comprehend importance in tackling global challenges as well as in everydayproblem-solvingscenarios 2. Applydifferentbrainstormingtechniquesin groupactivities 3. Beproficient intheapplicationofthe6 thinkinghats toolin differentlifescenarios 4. Developasystematic approachtoideagenerationthroughtheuseofmorphologicalanalysis 5. Innovateonanexistingproduct,serviceor situationapplyingtheSCAMPERmethod 6. Getconfidentwith thetheoryof inventiveproblemsolving, calledTRIZ Select and apply the appropriate technique based on the opportunity to seize

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				ortheproblem totackle
28.	III	MOE2030	MOOC Course	1. Identifythe realapplicationsand practicesof coursesstudied, atindustrylevel 2. Recognizevariousmodeling,analysisandvalidationtechniquesadoptedatindustries. 3. Demonstratetheissuesatdesign,manufacturingandassemblylevels. 4. Summarizeandpresenttechnicaldatainreport format.
29.	III	MOE2040	Condition Monitoring and SignalProcessing	1. Identify the maintenance scheme, their scope and limitations – apply themaintenancestrategiestovariousproblemsin theindustrialsectors. 2. Analyzefor machinerycondition monitoringand explainhow this complimentsmonitoringthe condition. 3. Develop an appreciation for the need of modern technological approach for plantmaintenanceto reducethe maintenanceexpenditure. 4. Emphasizesoncasestudiesthatrequire gatheringinformation usingthemoderntestingequipment andprocessingit toidentifythemalfunctionin thatsystem. 5. Identifyvibrationmeasurement,lubricationoilanalysis.
30.		MOE2050	Aircraft Conceptual Design	1. Understandthedesignprocessofaircraftand decidetheaircraftconfiguration. 2. Choosetypeofpowerplantasperflightregime. 3. Decidethe fuselagelayoutas pertypeof aircraft. 4. Designthewingfortype of aircraftandits wingloading. 5. Accuratelyevaluatelift,dragandmassfor designsynthesisprocess.
31.	III	EPP3021	Dissertation StageI	1. Identifyresearch opportunities in his/herdomain ormultidisciplinarydomains 2. Formulatetheproblemstatement anditsobjectivescorrectly

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Applythe principlesof projectmanagement duringdevelopment of theproject 4. Presentsynopsisinlogicalorder 5. Writesynopsisofthepropose dsystem
32.	III	EPP3031	Dissertation StageII	1. Identifyresearch opportunities in his/herdomain ormultidisciplinarydomains. 2. Formulatetheproblemstatement anditsobjectivescorrectly 3. Develop,simulateandimplementthesyste mbycomplyingwithdesiredtechnicalspeci fications 4. Analyzeandsynthesizeobtainedresultsinth eoreticalandpractical context 5. Presentreportinlogical order 6. Writereport ofthe systemimplementation
33.	IV	EPP4011	Dissertation StageIII	1. Formulatetheproblemstatement anditsobjectivescorrectly 2. Develop,simulateandimplementthesyste mbycomplyingwithdesiredtechnicalspeci fications 3. Analyzeandsynthesizeobtainedresultsinth eoreticalandpractical context 4. Presentreportinlogical order 5. Writereport ofthe systemimplementation 6. Applythe principlesof projectmanagementduringdevelopment of theproject
34.	IV	EPP4021	Dissertation StageIV	1. Formulatetheproblemstatement anditsobjectives correctly 2. Develop,simulateandimplementthesyste mbycomplyingwithdesiredtechnicalspeci fications 3. Analyzeandsynthesizeobtainedresultsinth eoreticalandpractical context 4. Presentreportinlogical order

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				5. Writereport ofthesystem implementation 6. Applythe principlesof projectmanagement duringdevelopment of theproject

UG Electronics and Telecommunication Engineering

- **Department Name: - Electronics and Telecommunication Engineering**
- **UG Program Name: - Electronics and Telecommunication Engineering**
- **Vision and Mission :-**
    - **Vision:**
        - Promote excellence in the field of Electronics & Telecommunication Engineering and allied areas through quality education and research to provide valuable assets for industry and society with global perspective.

    - **Mission:**
        - To provide quality education through industry ready curriculum, effective teaching learning process and state-of-art infrastructure to develop global competency.
        - To inculcate research aptitude leading to patents and publications in refereed journals.
        - To imbibe professional ethics, leadership skills, social, cultural & environmental awareness with a passion for lifelong learning.
        - To strengthen relationships with industry, society, government bodies and alumni

Sr. No.	Program Outcomes
1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2.	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
4.	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5.	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7.	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
8.	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9.	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to

	comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11.	**Project management and finance**: Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12.	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	Analyze, design and develop electronic systems for communication applications by using appropriate modern tools and techniques
2.	Demonstrate the knowledge of the state of art tools and apply for the development of VLSI circuits/systems

Sem	Code	Course	CO Statement
III	EC2012	Electronics Devices	Describe fundamentals of semiconductor devices
			Explain working principle of various solid state devices
			Illustrate various applications of electronics devices
			Analyze different biasing circuits and frequency models
	EC2032	Digital System Design	State fundamental knowledge of digital design
			Apply knowledge for real-time application
			Illustrate combinational and sequential circuits
			Design combinational and sequential circuits
	EC2052	Analog Communication	Describe the basic concepts of communication systems.
			Solve problems based on different communication signals.
			Develop simple systems for generating and demodulating am and fm signals.
			Explain different types of pulse modulation systems.
			Compare the performance of various modulation systems
	EC2072	Network Theory	Analyze ac & dc circuits
			Illustrate resonance in series & parallel circuit
			Calculate different parameters of electrical circuits
			Design analog passive filters & attenuators
	SH2112	Engineering Mathematics III	Build and test circuit as per the requirement
			Observe and plot the frequency response of amplifier
			Interpret results of experiment and compaired with measured values
			Communicate results and observations and write report
	EC2092	Comprehensive Exam I	Demonstarte overall understanding of core subjects together.
			Mange time to solve critical problems in core subjects.
			Apply apropriate mathematical tools and techniques for quick analysis of the problem.
			Understand self intelectual level to prepare for future competitive exam.

Sem	Code	Course	CO Statement
	EC2112	Electronics Devices Lab	Build and test circuit as per the requirement
			Observe and plot the frequency response of amplifier
			Interpret results of experiment and compaired with measured values
			Communicate results and observations and write report
	EC2132	Digital System Design Lab	Apply boolean laws/k-map-method to reduce a given boolean function
			Demonstrate the operation of combinational and sequential circuits for various practical applications
			Interpret results and compare with experimental values
			Communicate effectively through lab journals
	EC2152	Analog Communication Lab	Analyze & design simple analog communication systems
			Illustrate amplitude and frequency modulation and demodulation methods
			Draw different modulation and demodulation waveforms and frequency spectrums.
			Demonstrate different types of pulse modulation systems
			Conduct the experiments in group and write reports.
V	EC3012	Digital Signal Processing	Relate effect of computation accuracy on performance of digital signal processing system
			Represent signals mathematically in continuous and discrete-time, and in the frequency domain.
			Analyze discrete-time systems using z-transform
			Describe the Discrete-Fourier Transform (DFT) and the FFT algorithms.
			Design digital filters for various applications.
	EC3032	Power Electronics	Discuss characteristics, ratings and drive circuits of the power devices
			Analyze the operation of power electronics converters, inverters and drives
			Determine performance parameters of the converters and inverters
			Design switching control circuit to meet desired specifications.
	EC3052	Product Design	Describe the stages of product design and development
			Apply various concepts for product design.
			Devise product testing methods.
			Explain the processes and importance of documentation.
	EC3072	Electromagnetic Waves & Antenna Theory	Apply the knowledge of vector algebra and co-ordinate system to formulate and solve electromagnetic field problems.
			Use and apply basics of electric and magnetic fields to solve the electrostatics and magnetostatics problems.
			Solve transmission line and Wave propagation problems.
			Explain basics of antennas.
	EC3092	Program Elective - I ECS_ ITC	Able to use Mathematics,investigate existing techniques-To have electronics systems

Sem	Code	Course	CO Statement
			Analyze coding techniques with mathematics using different software-To Demonstrate in systems
			Apply research based knowledgeof coding.-To Analyze the system
			Analyze coding and error correction techniques considering ethical aspectsand communicate effectively by demonstrating engineering principleswithlife long learning.-Demonstrate effectively
	EC3172	Program Elective - I CS	Identify different mathematical models of the control systems
			Design and analyze the system parameters to meet performance specifications in time and frequency domain.
			Comment on stability of control system using different methods
			Compare different control system and compensators
	EC3192	Comprehensive Exam III	Demonstrate overall understanding of core subjects together.
			Mange time to solve critical problems in core subjects.
			Apply appropriate mathematical tools and techniques for quick analysis of the problem.
			Understand self intellectual level to prepare for future competitive exam.
	EC3212	Digital Signal Processing Lab	Design and simulate the working of given digital signal processing techniques
			Describe techniques available for implementation of digital signal processing system
			Write relevant conclusion on the performance of designed digital signal processing system
			Present and write laboratory reports in desired format in grammatically correct language
	EC3232	Power Electronics Lab	Interpret v-i characteristics of power electronics devices
			Experiment power electronics converter for various conditions
			Design and test power electronic converter.
			Write report on the conduction of experimentation.
	EC3235	Object Oriented Programming using C++ Lab	Write, debug, and test basic cpp codes using the object oriented approaches introduced in the course.
			Discuss and analyze c++ problems in an object-oriented programming tool.
			Evaluate the performance of developed c++ program.
			Present and write laboratory reports in desired format in grammatically correct language.
	EC3272	Antenna Lab	Measure and analyze the parameters of the different antennas
			Design and Simulate different types of Antennas using Electromagnetic Field solver
			Analyze the performance of the different types of antennas

Sem	Code	Course	CO Statement
			Demonstrate ability to work effectively in a team
	SH3032	Aptitude Training I	Develop thorough conceptual understanding and logical approach towards solving Aptitude and Reasoning problem.
			Write use of basic aptitude terms of percentage, average, ratios and application of business aptitude terms of profits and interests.
			Develop a bridge in analogies, series and visualizing directions.
	EC3292	Summer Internship	Demonstrate skills to use modern engineering tools, software, and equipment to solve real world problems.
			Apply knowledge of professional and ethical responsibilities.
			Communicate in verbal and written form.
			Write a detailed report on Summer Internship
IV	CE2262	Engineering Mechanics	Identify various forces and their effects, to analyze real life problems
			Analyze engineering problems applying conditions of equilibrium
			Determine centroid & moment of inertia of the geometrical plane lamina
			Apply fundamental concepts of kinematics and kinetics to analyze practical problems
	EC2022	Analog Circuits	Interprete different parameters of various configurations of Operational Amplifier
			Analyze various applications of Operational Amplifier
			Explain various oscillators and active filters
			Illustrate waveform generators using special IC s
	EC2042	Microcontrollers	Describe basic fundamentals of pic microcontroller
			Write programs for pic microcontroller
			Interface peripherals with pic microcontroller
			Develop an embedded application using pic microcontroller
	EC2062	Digital Communication	Explain different concepts of digital communication systems
			Solve numerical on statistical theory, source coding & channel coding
			Apply various theorems of encoding, error control etc on signals
			Analyze various digital modulation and channel coding techniques
	EC2082	Signals and Systems	Classify continuous and discrete-time signals and systems
			Illustrate use of convolution and impulse response in lti systems
			Apply mathematical techniques to represent signals and systems
			Make use of transform theory techniques for system analysis

Sem	Code	Course	CO Statement
			Distinguish fourier techniques for frequency-domain analysis
	EC2102	Comprehensive Exam II	Demonstrate overall understanding of core subjects together.
			Mange time to solve critical problems in core subjects.
			Apply appropriate mathematical tools and techniques for quick analysis of the problem.
			Understand self intellectual level to prepare for future competitive exam.
	CE2282	Engineering Mechanics Lab	Identify various forces and their effects, to analyze real life problems
			Analyze engineering problems applying conditions of equilibrium
			Determine centroid & moment of inertia of the geometrical plane lamina
			Apply fundamental concepts of kinematics and kinetics to analyze practical problems
	EC2122	Analog Circuits Lab	Analyze different parameters of various configurations of Operational Amplifier
			Design various applications of Operational Amplifier
			interpret theoretical & practical results
			Communicate effectively through lab journals
	EC2142	Microcontrollers Lab	Install configure and utilize the MPLAB tool for pic microcontroller programming.
			Write programs for pic microcontroller
			Compile debug and test programs for pic microcontroller
			Develop application using pic microcontroller
	EC2162	Digital Communication Lab	Calculate PDF, CDF, mean and variance of continuous and discrete random variables using simulation tool
			Demonstrate different modulation and shift keying techniques
			Write necessary reports and conduct the experiments in group
	SH2172	Environmental Science	Interpret impacts of human activities on natural resources and its control measure
			Apply ecological knowledge to solve environmental problems
			Select the appropriate technology to control environmental pollution
			Plan waste management and disaster management practices.
			Justify methods to assess impacts of developmental activities on environment.
			Analyze environmental change and its social impacts
VI	EC3022	CMOS VLSI Design	Describe fundamentals of mos circuits
			Apply knowledge of mos circuits and fabrication process to solve problems
			Analyze combinational and sequential mosvlsi circuits

Sem	Code	Course	CO Statement
			Design various digital modules using mos technology
	EC3042	Robotics	Relate concepts of mathematics and engineering related to robot mechanism.
			Design solutions for society by considering public safety. relevant to the professional engineering
			Communicate effectively by Working in multidisciplinary environment using modern tools
	EC3062	Artificial Intelligence	Describe fundamentals of artificial intelligence
			Explain various algorithms in machine and deep learning
			Analyze different architectures and basic techniques used in AI
			Apply mathematical models and algorithms to solve real-world problems
			Design and implementation issues in various AI applications
	EC3081	Program Elective-II SCIENTIFIC COMPUTING	Describe the significance of computing methods
			Apply methods in strengths in application area
			Perform the computation on various data using appropriate computation tools
	EC3162	Program Elective-II AUTOMOTIVE ELECTRONICS	Explain section blocks of automotive electronics systems
			Interpret components faults in automotive electronics system.
			Analyze control parameters of automotive electronics system.
			Justify the need of safety and comfort features in automobile.
	OE3142	Open Elective -IV MECHATRONICS	Explain mechatronics system
			Identify electrical, hydraulic and pneumatic components
			Analyze the mechatronics based system
	SH302	Biology for Engineers	Apply biological engineering principles, procedures needed to solve real-world problems
			Demonstrate the functions of biological systems
			Analyze biological phenomena with math and physics to gain important insights
			Explain working of different biomedical instruments
			Select the sensors for given biological applications
			Explain relevant aspect of movement control process
	EC3182	Comprehensive Exam IV	Demonstrate overall understanding of core subjects together.
			Mange time to solve critical problems in core subjects.
			Apply appropriate mathematical tools and techniques for quick analysis of the problem.
			Understand self intellectual level to prepare for future competitive exam.
	EC3202	CMOS VLSI Design Lab	Describe fundamentals of mos circuits
			Apply knowledge of mos circuits and fabrication process to solve problems

Sem	Code	Course	CO Statement
			Analyze combinational and sequential mosvlsi circuits
			Interpret results and compare with measured values
			Improve the ability to communicate effectively through written lab journals
	EC3222	Python Programming Lab	Describe various features, students and programming aspects of python
			Demonstrate varoius functions and operators in Python programming
			Differentiate modular programming approches through use of functions and modules
			Implement machine learning algorithms with Tensorflow
			Solve real world problems using Deep Learning with Tensorflow
	EC324	Electronics Product Design Lab	1. Develop different modules of electronics product
			2. Write embedded c-code for electronic product
			3. Interpret and verify the results
	EC3262	Capstone Project Phase I	Apply knowledge of mathematics, science, physics, engineering and management principles to solve complex engineering problems
			Identify, formulate and analyse engineering problem based on experimental statistical and computational method to meet desired needs.
			Design a system, component or process to meet desired needs within realistic constrains.
			Work as a leader or productive member of multidisciplinary and multicultural team
			Design simulate analyze and implement desired system (hardware and software) by using modern and appropriate tools and techniques.
			Communicate effectively through reports, presentations and discussions within both the
VII	EC4011	RTOS based Embedded System Design	Describe basic fundamentals of LPC2148 and ucos-II
			Write programs for LPC2148 controller and ucos-II
			Interface peripherals with LPC2148
			Develop an Embedded application using ucos-II and LPC2148
	EC4061	Power Electronics	Discuss characteristics and ratings of the power devices
			Analyse the operation of power electronics converters, inverters and drives
			Determine performance parameters of the converters and inverters.
			Design dc-dc converters to meet desired specifications
	EC4031	Computer Communication Network	Describe basic networking concepts along with role of different network devices used in computer network.
			Elaborate various protocols used in computer communications network.
			Differentiate frame formats used in computer communication system

			Analyze various algorithms implemented in computer communication system
			Illustrate network security aspect
	EC4191	Image Processing	Explain different concepts and processes in digital image processing.
			Apply different image processing operations on an image.
			Analyze various operations on image using different tools
			Compare various filtering, enhancement, segmentation and classification techniques used in image processing
	EC4131	Program Elective Satellite Communication	Discuss the fundamentals of satellite communication.
			Explain different satellite subsystems and satellite applications.
			Design link budget for a satellite.
			Compare different satellite systems.
	EC4531	Embedded System Lab	Install configure and utilize the IDE tool for LPC2148 controller programming
			Write programs for LPC2148 controller and ucos-II
			Compile debug and test programs for LPC2148
			Develop application using LPC2148 and ucos-II
	EC4511	Computer Network Lab	Describe basic networking concepts along with role of different network devices used in computer network.
			Elaborate various protocols used in computer communications network.
			Differentiate frame formats used in computer communication system
			Analyze various algorithms implemented in computer communication system
			Illustrate network security aspects.
	EC4551	Industrial Training	Demonstrate skills to use modern engineering tools, software, and equipment to solve real world problems.
			Apply knowledge of professional and ethical responsibilities.
			Communicate in verbal and written form.
			Write a detailed report on Summer Internship
	EC4571	Employability Enhancement Skill - I	Simulate using modern tools, with industry problems,with investigations
			Do project management by communicating and working effectively and in groupfolowing ethics.
			Analyze the systems by investigatingwith environment and sustainability considering financial aspects.
	EC4601	Online Course	Learn new topics from various disciplines without any structured teaching or tutoring
			Apply his/her technical skills to industrial problem
			Develop creative and innovative solution to the given problem.
			Support in multi-disciplinary environment
			Demonstrate given task and assess yourself at various stages of learning.

	EC4591	Project Phase I	Apply knowledge of mathematics, science, physics, engineering and management principles to solve complex engineering problems
			Identify, formulate and analyse engineering problem based on experimental statistical and computational method to meet desired needs.
			Design a system, component or process to meet desired needs within realistic constrains.
			Work as a leader or productive member of multidisciplinary and multicultural team
			Design simulate analyze and implement desired system (hardware and software) by using modern and appropriate tools and techniques.
			Communicate effectively through reports, presentations and discussions within both the
	RE0407	URE Phase I	Investigate the literature survey and formulate the problem.
			Develop the methodology to implement the problem
			Write a research synopsis and present.
	LL0407	Internship Phase I	Make a survey and choose an appropriate course from online platform
			Describe the important contents learnt in the course
			Demonstrate knowledge from online course in projects to relate theoretical concepts and practical results
			Write a report and present
	ED4001	ED Phase I	Generate & Identify different business ideas.
			Make analysis of different ideas.
			Select proper business idea to suit his personality & competencies.
			Prepare pre feasibility analysis.
	EC4151	WSN &IoT	Categorize sensor networks for various applications
			Choose suitable medium access protocols for wsn hardware
			Design and simulate small sensor nodes
			Illustrate quality of service, fault-tolerance, and security resource constraints of wsn.
			Evaluate the performance of sensor networks with iot and identify bottlenecks
	EC4541	Power Electronics Lab	Interpret v-i characteristics of power electronics devices
			Experiment power electronics converter for various conditions
			Design and test power electronic converter
VIII	EC4101	Program Elective I Embedded Linux	Describe basic fundamentals of Embedded Linux
			Write applications in Linux for various peripherals
			Implement Linux environment on given hardware.
			Design an embedded system using embedded Linux OS.
	EC4201	Program Elective I System Verilog	Describe various concepts of verification methodologies, using system Verilog
			Write a system Verilog code for any digital function/module.

			Analyse the differences between Verilog and system Verilog.
			Design digital modules and verify using system Verilog
	EC4181	Program Elective - II Fuzzy Logic	Describe fuzzy tools and techniques.
			Apply fuzzy relations for given problem.
			Analyze applicability of fuzzy sets to given problem.
			Select suitable fuzzification and defuzzification methods to given problem.
			Design FKBC system for control applications.
	OEC442	Open Elective - I Robotics	Describe architecture, components and technical specifications of robot.
			Test programming on fire bird v atmega2560 robot with different i/o modules.
			Apply wired and wireless communication techniques for robotics applications
	OEC476	Open Elective - II Mechatronics	Study of sensors, actuators, system modeling and design with real-time controller interfacing
			Design step-by-step mechatronics system design
			Analyze the system for different input and different output
	EC4501	Program Elective - I Lab System Verilog Lab	Write system verilog code for given specification
			Interpret the results as per specification
			Use tools for simulation and verification of digital modules
			Analyze the results by comparing with interpreted values
			Demonstrate and communicate effectively through lab journals
	EC4503	Program Elective - I Lab Embedded Linux Lab	Prepare Linux environment on host and target
			Write c and shell programming for various application
			Test and debug the embedded c code using various ide
			Develop small application using Beaglebone black
	EC4581	Project Phase II	Design simulate analyse and implement desired system (hardware and software) by using modern and appropriate tools and techniques
			Analyse result of implemented system to reach proper conclusions
			Inculcate professional, ethical, moral and social responsibilities.
			Communicate effectively through reports, presentations and discussions within both the technical domain and the community at large
			Apply the principles of projects management both as a member and a team leader for project development
			Learn independently and be ready for a lifelong learning to face increasing challenges and responsibilities
	RE402A	URE-II (Research Methodology)	Select on the literature in the field, analyze and interpret research evidence published on a topic to establish a suitable research problem/issue or opportunity to explore further;
			Design the research study using a suitable paradigm,

			associated methodologies and methods of data collection and analysis.
			Write a research proposal (research blueprint) describing the topic.
			Demonstrate the ability to use the statistical software to solve problems.
	RE404A	URE-II (Research project)	Design a research problem and develop a methodology
			Implement the project and test it
			Demonstrate the project and explain the research done.
			Write a research report and paper
	RE406A	URE-II(Research methodology lab)	Writing a research proposal
			Design the questionnaire for data collection.
			Analyze with techniques like annova, factorial design, randomized block design, fractional factorial design & solve numerical problems based on it.
			Use of statistical software to solve the problems
			Design the experiment & analysis the problem.
	REC4002	URE-II(Research related online course)	Make a survey and choose an appropriate course from online platform.
			Describe the important contents learnt in the course
			Write a report and present.
	ED4002	ED-II(Project Feasibility Analysis)	Prepare business Plan for selected business.
			Make risk analysis& market analysis of selected project.
			Make technical appraisal of selected project.
			Make financial appraisal of selected project.
	ED4004	ED-II(Finance for Entrepreneurs)	Understand basic Financial Terminologies.
			Prepare &analyze financial statements
			Prepare financial Plan for venture
			Apply basic principles of marketing for various products.
			Prepare market survey.
			Apply knowledge of marketing management for selected business.
	ED4008	ED-II(ED Lab)	Apply different software like Live plan, business plan pro, Strategize business canvas, online business plan by SIDBI, KDK software for preparing financial projections of selected project.
	ED4010	ED-II Product Startup	Apply knowledge of engineering, economics, marketing and finance for preparation of project report.
			Make commercial, technical and financial appraisal of project.
	ED4012	ED-II EDP Program	Apply knowledge of engineering, economics, marketing and finance for formulation of business plan, starting & managing new business.
	IIP480X	IIP-II (Online Course)	Make a survey and choose an appropriate course from online platform
			Describe the important contents learnt in the course
			Demonstrate knowledge from online course in internship projects to relate theoretical concepts and practical results

			Write a report and present
	IIP4801	IIP-II (Internship)	Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services)
			Develop an attitude to adjust with the company culture, work norms, code of conduct
			Recognize and follow the safety norms, Code of conduct
			Demonstrate processes, systems and procedures and to relate to the theoretical concepts- studies.
	IIP4002	IIP-II(Project)	Identify the project/problem in the domain of a program relevant for the company.
			Compile the information to the pertaining to the problem identified.
			Analyse the information using the statistical tools/ techniques.
			Design the feasible solution for given problem.
			Develop soft skills, ethical skills and corporate etiquettes.

PG Electronics Engineering

- **Department Name: - Electronics and Telecommunication Engineering**
- **PG Program Name: - Electronics Engineering**
- **Vision and Mission: -**

    - **Vision:**
        - Promote excellence in the field of Electronics & Telecommunication Engineering and allied areas through quality education and research to provide valuable assets for industry and society with global perspective.

    - **Mission:**
        - To provide quality education through industry ready curriculum, effective teaching learning process and state-of-art infrastructure to develop global competency.
        - To inculcate research aptitude leading to patents and publications in refereed journals.
        - To imbibe professional ethics, leadership skills, social, cultural & environmental awareness with a passion for lifelong learning.
        - To strengthen relationships with industry, society, government bodies and alumni

Sr. No.	Program Outcomes
1.	An ability to independently carry out research /investigation and development work to solve practical problems
2.	An ability to write and present a substantial technical report/document
3.	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
4.	Adapt professional, ethical and moral responsibilities
5.	Use knowledge of Project Management and Finance to tackle administrative responsibilities.
6.	Explore ideas and engage in lifelong learning

Semester	Course Code	Course Name	Course Outcome
I	EEE1014	Advanced Digital Signal Processing	1. Explain techniques available for implementation of digital signal processing system 2. Design and simulate the working of given digital signal processing system 3. Evaluate performance of digital signal processing system 4. Interpret the performance of digital signal processing system
	EEE1034	VLSI Design	1. Describe VLSI front end and back design of combinational and sequential systems 2. Model VLSI circuits and System

Semester	Course Code	Course Name	Course Outcome
			using Verilog HDL 3. Analyze various parameters of MOS VLSI Circuits 4. Design circuits and Layout of digital VLSI systems
	EEE1174	Research Methodology & IPR	1. Formulate a research problem. 2. Analyze research related information 3. Use computing tools effectively 4. Describe nature and processes involved in development of intellectual property rights 5. Prepare and present research proposal/paper by following research ethics
	EEE1194	Advanced Digital Signal Processing Lab	1. Design digital signal processing system based on given specifications 2. Develop MATLAB program to simulate the working of designed digital signal processing system 3. Analyze performance of digital signal processing system 4. Demonstrate effectively though oral/lab report
	EEE1214	VLSI Design Lab	1. Design circuits and Layout of digital VLSI systems 2. Model VLSI circuits and Systems using Verilog HDL 3. Use of Tools and techniques to perform experiment and verify the results 4. Demonstrate effectively though oral/lab report
	Elective I		
	EEE1054	Wireless Sensor Networks	1. Analyze single node network architecture of WSN 2. Classify routing and MAC layer protocol in WSN 3. Develop specific requirements of applications in wireless sensor networks for energy efficiency, computing, storage and transmission
	EEE1074	Advanced Power Electronics	1. Describe operation and applications of converters 2. Design magnetic components, heat sinks and converters 3. Illustrate methods of high power parameters measurements 4. Justify requirement of power factor correction in utility interface
	EEE1094	Advanced	1. Describe advanced concepts of

Semester	Course Code	Course Name	Course Outcome
		Computer Architecture	computer architecture 2. Differentiate of RISC and CISC architectural characteristics 3. Design structures of Pipeline and Multiprocessor systems 4. Classify recent computer architectures and I/O devices
	Elective II		
	EEE1114	Soft Computing	1. Describe soft computing techniques and their roles in building intelligent machines 2. Apply neural networks to pattern classification and regression problems 3. Solve engineering problems using fuzzy logic 4. Develop genetic algorithms to combinatorial optimization problems
	EEE1134	Biomedical Signal Processing	1. Analyze genesis of biomedical signals such as the action potential, EMG, ECG, EEG, and heart sound signals 2. Describe signal processing techniques for filtering, noise removal, and cancellation of interference and characterization of signals 3. Design and implement techniques for the detection of events such as the QRS complex, heart sounds and murmurs and the dichotic notch
	EEE1154	Industrial Automation	1. Apply necessary learning directions to deal with the field of industrial automation 2. Illustrate independent and outside-the-box creative thinking for automation 3. Develop functional solutions to industrial problems
II	EEE1004	Numerical Computation Techniques	6. Apply the relevant numerical methods for interpolating the polynomial 7. Solve engineering problems using ordinary differential equations and statistical techniques 8. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values 9. Estimate numerically the solution for given algebraic equation
	EEE1024	Embedded System Design	1. Describe basic fundamentals of ARM processors 2. Write programs for LPC2148 controller

Semester	Course Code	Course Name	Course Outcome
			3. Demonstrate the methods of interfacing peripherals with LPC2148 4. Design an embedded application using LPC2148
	EEE1044	Antennas and Microwave Engineering	1. Explain different concepts of Antenna and Microwave Engineering 2. Apply the basic Principles of Antenna and Microwave Engineering 3. Design and assess the performance of various antennas 4. Develop microwave systems for various applications
	EEE1184	Technical Communication	**1.** Acquire skills required for good oral and written communication **2.** Demonstrate improved writing skills and level of readability **3.** Ensure the good quality of technical reports at very first-time submission
	EEE1204	Embedded System Design Lab	1. Write programs for ARM and DSP controllers 2. Compile debug and test programs for ARM and DSP controller 3. Develop application using ARM or DSP controller 4. Demonstrate through oral/reports
	EEE1224	Antennas and Microwave Engineering Lab	1. Identify different parameters of Antennas and Microwave structures 2. Design and Simulate different types of antennas and Microwave structures in Electromagnetic Field solver 3. Compare the performance of different types of antennas and Microwave structures 4. Write necessary reports
	EEE1244	Mini Project	1. Select title of mini-project and formulate its objectives correctly 2. Develop, simulate and implement the system by complying with desired technical specifications 3. Analyze and synthesize obtained results in theoretical and practical context 4. Present findings in logical order Write a report to document his/her findings
	Elective III		
	EEE1064	Internet of Things	1. Describe the structure of the Internet of thing 2. Explore to the interconnection and integration of the physical world with

Semester	Course Code	Course Name	Course Outcome
			cyber space 3. Develop IOT based application
	EEE1084	Automotive Electronics	1. Describe components of automotive electronics, its evolution, trends, safety standards and advances towards autonomous vehicles 2. Develop automotive grade microcontroller based system 3. Design and model various automotive control systems
	EEE1104	Network Security	1. Explain network security, services, attacks, mechanisms, types of attacks on TCP/IP protocol suite 2. Apply network layer security protocols, Transport layer security protocols, Web security protocols 3. Illustrate authentication services, algorithms 4. Describe wireless network security threats
	Elective IV		
	EEE1124	Machine Learning and Artificial Intelligence	1. Describe basic concepts and techniques of Machine Learning 2. Develop skills of using recent machine learning software for solving practical problems 3. Build AI and ML applications
	EEE1144	VLSI Verification and Testing	1. Write system verilog test benches 2. Develop verification and testing algorithms 3. Identify faults/bug in the design 4. Analyze code coverage and functional coverage 5. Create reusable verification environment
	EEE1164	Wireless Communication	1. Design appropriate mobile communication systems 2. Apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques 3. Distinguish various multiple-access techniques for mobile communications 4. Analyze path loss and interference for wireless telephony and their influences on a mobile communication systems performance
III	EEE2014	Industry Internship	1. Apply engineering knowledge learned during the program

Semester	Course Code	Course Name	Course Outcome
			2. Propose creative and innovative solution to the given problem 3. Work in multi-disciplinary setting 4. Show concern for society, environment and other social concerns 5. Demonstrate given tasksaccordingtotheindustrialneedswithfull integrityand responsibility

	Open Elective		
	MOE2010	Artificial Intelligence - Machine Learning	1. Describe central machine learning methods and techniques and how they relate to artificial intelligence 2. Differentiate between supervised and unsupervised learning techniques 3. Apply the ML algorithms to a real-world problem, 4. Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. 5. Evaluate a given problem and apply appropriate machine learning technique
	MOE2020	Creative Thinking: Tools & Techniques	1. Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios 2. Apply different brainstorming techniques in group activities 3. Be proficient in the application of the 6 thinking hats tool in different life scenarios 4. Develop a systematic approach to idea generation through the use of morphological analysis 5. Innovate on an existing product, service or situation applying the SCAMPER method 6. Get confident with the theory of inventive problem solving, called TRIZ 7. Select and apply the appropriate technique based on the

			opportunity to seize or the problem to tackle
	MOE2030	MOOC Course	1. Identify the real applications and practices of courses studied, at industry level 2. Recognize various modelling, analysis and validation techniques adopted at industries. 3. Demonstrate the issues at design, manufacturing and assembly levels. 4. Summarize and present technical data in report format.
	MOE2040	Condition Monitoring and Signal Processing	1. Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors. 2. Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. 3. Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure. 4. Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. 5. Identify vibration measurement, lubrication oil analysis
	MOE2050	Aircraft Conceptual Design	1. Understand the design process of aircraft and decide the aircraft configuration. 2. Choose type of power plant as per flight regime. 3. Decide the fuselage layout as per type of aircraft. 4. Design the wing for type of aircraft and its wing loading. 5. Accurately evaluate lift, drag and mass for design synthesis process. 6. Examine the influence of various design requirements on

			the configuration of an aircraft to derive an optimized design.
	EEE2034	Dissertation Phase-I	1. Identify research opportunities in his/her domain or multidisciplinary domains 2. Formulate the problem statement and its objectives correctly 3. Apply the principles of project management during development of the project 4. Present synopsis in logical order 5. Write synopsis of the proposed system
	EEE2054	Dissertation Phase-II	1. Identify research opportunities in his/her domain or multidisciplinary domains. 2. Formulate the problem statement and its objectives correctly 3. Develop, simulate and implement the system by complying with desired technical specifications 4. Analyze and synthesize obtained results in theoretical and practical context 5. Present report in logical order 6. Write report of the system implementation 7. Apply the principles of project management during development of the project
IV	EEE2004	Dissertation Phase-III	1. Identify research opportunities in his/her domain or multidisciplinary domains. 2. Formulate the problem statement and its objectives correctly 3. Develop, simulate and implement the system by complying with desired technical specifications 4. Analyze and synthesize obtained results in theoretical and practical context 5. Present report in logical order 6. Write report of the system implementation 7. Apply the principles of project management during

			development of the project
	: EEE2024	Dissertation Viva Voce (Dissertation Phase-IV)	1. Identify research opportunities in his/her domain or multidisciplinary domains. 2. Formulate the problem statement and its objectives correctly 3. Develop, simulate and implement the system by complying with desired technical specifications 4. Analyze and synthesize obtained results in theoretical and practical context 5. Present report in logical order 6. Write report of the system implementation 7. Apply the principles of project management during development of the project

UG Computer Science and Information Technology

- **Department Name :- Information Technology**
- **UG Program Name :- B. Tech. in Computer Science and Information Technology**
- **Vision and Mission :-**
  - **Vision:** To become a prominent department of Computer Science and Information Technology producing competent IT professionals with research and innovation skills, inculcating moral values and societal concerns.
  - **Mission:**
    - To offer high quality education through state of art curriculum and innovative teaching & learning practices.
    - To establish state of art laboratories and center of excellence in the field of technology.
    - To adopt professional practice, standards and values.
    - To inculcate problem solving aptitude in graduates with lifelong learning skills to become valuable resource for IT industry and society.
    - To create, share, and apply knowledge in Computer Science and Information Technology, including in interdisciplinary areas that extend the scope of Computer Science and Information Technology to benefit society.

Sr. No.	Program Outcomes
1.	**PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and IT engineering specialization to the solution of complex engineering problems.
2.	**PO2: Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
3.	**PO3: Design/Development of solutions:** Design and develop IT solutions using domain knowledge for engineering problems that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	**PO4: Conduct investigations of problems:** Use fundamental knowledge and engineering skills including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	**PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7.	**PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
8.	**PO8: Ethics:** Apply ethical principles and commit to professional ethics

	and responsibilities and norms of the engineering practice.
9.	**PO9: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
10.	**PO10: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
11.	**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12.	**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	**PSO1:Domain Specific Knowledge:** Apply the relevant methods and techniques to develop solutions in the domains of automation and intelligent systems.
2.	**PSO2:Software Product Development:** Apply the design and deployment principles to deliver a quality software product for the success of business of varying complexity.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	III	CI201	Discrete Mathematics	10. Evaluate logic statements using the properties of logic. 11. Apply the concepts in discrete data structures such as sets, relations and functions to solve the problems. 12. Use elementary combinatorics to solve counting problems. 13. Solve examples of lattices, algebraic structures. 14. Prove the theorems and properties of lattices, algebraic structures, graphs. 15. Apply graph theory concepts to solve problems of connectivity.
2.		CI203	Computer Networks	1. Describe the various network components and topologies. 2. Illustrate the concepts, services, protocols and algorithms used in Computer Networks. 3. Write the terminology and client-server programs using Berkeley socket programming. 4. Solve problems related to routing, framing, error correction, detection and IPv4 addressing.

				5. Compare the different services, protocols and algorithms used in Computer Networks.
3.		CI205	Data Structures and Algorithms	1. Describe the basic terminologies of data structures and algorithms 2. Write algorithms for operations to be performed on data structures 3. Demonstrate the working of stack, queue, linked list, tree and graph 4. Compare static and dynamic representations of linear and non-linear data structures 5. Choose appropriate data structures while developing solution to the problem
4.		CI207	Digital Electronics	1. Convert the number from one system to another and vice versa. 2. Explain the basic gates and realize it using universal gate. 3. Minimize the given expression using Boolean algebra and Karnaugh Map 4. Draw a circuit diagram for combinational logic and analyze its properties 5. Design the sequential logic circuits. 6. Describe the 8085 architecture, Identify the instruction set and apply it in assembly language programming using modern tools.
5.		CI209	Computer Networks Lab	5. Implement client server applications using Berkeley Socket programming 6. Implement programs to demonstrate framing methods, error detecting, correcting methods and routing algorithms. 7. Solve problems based on IPv4 network addressing. 8. Demonstrate the use of various networking tools and utilities. 9. Distinguish between the network hardware and software used for network design.
6.		CI211	Data Structures and Algorithms Lab	1. Describe the basic terminologies of data structures and algorithms 2. Write algorithms for operations to be performed on data structures 3. Implement stack, queue, linked list, tree and graph data structures in C language 4. Compare static and dynamic representations of linear and non-linear data structures 5. Choose appropriate data structures while developing solution to the problem
7.		CI213	Digital Electronics	1. Verify the basics of all logic gates using IC Trainer Kit. 2. Demonstrate the working of Combinational circuits on

			Lab	IC Trainer Kit. 3. Demonstrate the working of Sequential circuits on IC Trainer Kit. 4. Implement the 8085 assembly language program using TASM or simulator.
8.		CI215	Object Oriented Design and Programming Lab	1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. 2. Illustrate dynamic memory management techniques using pointers, constructors, destructors, etc. 3. Implement the concept of function overloading, operator overloading, virtual functions and polymorphism. 4. Apply inheritance with the understanding of early and late binding, usage of exception handling, generic programming. 5. Develop solution for a given application using various OOPs concepts.
9.		CI217	**Comprehensive Exam-I**	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
10.		SH2592	**Open Elective-II** Choice Based Soft Skill Program-I-Personal Effectiveness and Body Language	1. Develop skills to build self-esteem and positive attitude. 2. Discover ways to overcome procrastination. 3. Demonstrate responsiveness towards stress and health issues. 4. Interpret the non-verbal behavior of a person.
11.		SH2612	**Open Elective-II** Choice Based Soft Skill Program-I-Interpersonal Skills (Work life Balance)	1. Exhibit interpersonal communication skills. 2. Demonstrate decision-making skills. 3. Apply conflict resolution styles appropriate in different situations. 4. Demonstrate leadership skills.
12.		SH2632	**Open Elective-II** Choice Based Soft Skill Program-I-Leadership & Public Speaking	1. Adequate knowledge of basic grammar of English language. 2. Intermediate level vocabulary of English language. 3. Communicate moderately using English language.

13.		SH2692	**Open Elective-II** Choice Based Soft Skill Program-I-Innovation Tools and Methods for Entrepreneurs	1. Learn structured approach to define the problem with every possible detail, identify conflicts and solve them 2. Apply User Journey Map to the selected problem to show user interaction at various stages 3. Analyze the solutions provided by competitors for effectiveness and gaps if any**.**
14.		SH2732	**Open Elective-II** Choice Based Soft Skill Program-I-German Language-Basic Level	1. Introduce herself or himself in German. 2. Can listen and understand alphabets, numbers in German language. 3. make basic and easy sentences required in day to day situations Read, write, speak and listen basic and simple text in German.
15.		SH2712	**Open Elective-II** Choice Based Soft Skill Program-I-Japanese Language-Basic Level	1. To get the students acquainted with foreign language**.** 2. To gain knowledge of basic Japanese grammar**.** 3. To acquire basic Japanese language skills **(**listening, speaking, writing, and reading**).** 4. To enable students demonstrate an awareness of the relevance of Japanese language to professions and careers**.** 5. To make students understand the cultures and civilizations of the country of Japan**.** 6. To enable the students to function in an environment where Japanese is used exclusively**.**
1.	IV	SH2043	Mathematics for Data Analytics	1. Compute Karl Pearson's Product moment correlation Coefficient and fit the lines of regression. 2. Compute Discrete probability distribution, Continuous probability distributions and Joint probability distributions. 3. Apply specific probability distributions to real-life examples. 4. Compute the Mathematical formulas for the given fuzzy set. 5. Prove additional properties of alpha-cuts and use extension principle to fuzzy sets. 6. Apply extension principle to fuzzy arithmetic and solve fuzzy equations.
2.		CI202	Automata Theory	1. Predict the regular expression for given language 2. Design computational models for given language 3. Parse the given string using top down & bottom up parsing

				4. Construct the CFG for given language 5. Prove the properties of regular language and context free language
3.		CI204	Software Engineering	1. Describe fundamental concepts in software engineering and project management 2. Practice software process models for the undertaken software problems 3. Design function-oriented and object oriented models using modern tools. 4. Compare different software testing techniques and strategies. 5. Apply the project management concepts for the undertaken software problems 6. Illustrate concepts of project monitoring and control in software development
4.		CI206	Computer Organization	1. Describe the basic structure of computers with its different components. 2. Perform the basic arithmetic operations like Number complements and floating points. 3. Analyze the machine's instruction set architecture (ISA). 4. Categorize memory organization and explain the function of each element of a memory hierarchy. 5. Illustrate the different ways of communicating with I/O devices. 6. Classify the different hazards occurred in pipelining.
5.		CE2262	Engineering Mechanics	1. Identify[3] various forces and their effects, to analyze real life problems. 2. Analyze engineering problems applying conditions of equilibrium. 3. Determine Centroid & Moment of Inertia of the geometrical plane lamina 4. Apply fundamental concepts of Kinematics and Kinetics to analyze practical problems.
6.		CI208	Python lab	1. Explain the concepts in python. 2. Implement program using loops, decision statements and functions in Python. 3. Use object oriented programming with classes and modules using python. 4. Implement file handling and database handling using python. 5. Plot data using appropriate Python visualization libraries.
7.		CE2282	Engineering Mechanics Lab	1. Compare coefficient of friction of various surfaces in contact. 2. Correlate theoretical and practical results of support reactions and Centroid of plane lamina. 3. Verify law of polygon of forces, law of triangle of

				forces and principle of moment
8.		CI210	Comprehensive Exam-II	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
9.		SH2592	**Open Elective-II** Choice Based Soft Skill Program-I-Personal Effectiveness and Body Language	1. Develop skills to build self-esteem and positive attitude. 2. Discover ways to overcome procrastination. 3. Demonstrate responsiveness towards stress and health issues. 4. Interpret the non-verbal behavior of a person.
10.		SH2612	**Open Elective-II** Choice Based Soft Skill Program-I-Interpersonal Skills (Work life Balance)	1. Exhibit interpersonal communication skills. 2. Demonstrate decision-making skills. 3. Apply conflict resolution styles appropriate in different situations. Demonstrate leadership skills.
11.		SH2632	**Open Elective-II** Choice Based Soft Skill Program-I-Leadership & Public Speaking	1. Adequate knowledge of basic grammar of English language. 2. Intermediate level vocabulary of English language. 3. Communicate moderately using English language.
12.		SH2692	**Open Elective-II** Choice Based Soft Skill Program-I-Innovation Tools and Methods for Entrepreneurs	1. Learn structured approach to define the problem with every possible detail, identify conflicts and solve them 2. Apply User Journey Map to the selected problem to show user interaction at various stages 3. Analyze the solutions provided by competitors for effectiveness and gaps if any**.**
13.		SH26422	**Open Elective-II** Choice Based Soft	1. Introduce herself or himself in German. 2. Can listen and understand alphabets, numbers in German language. 3. make basic and easy sentences required in day to day

			Skill Program-I-German Language-Advanced Level	situations 4. Read, write, speak and listen basic and simple text in German.
14.		SH26222	**Open Elective-II** Choice Based Soft Skill Program-I-Japanese Language-Advanced Level	1. To get the students acquainted with foreign language**.** 2. To gain knowledge of basic Japanese grammar**.** 3. To acquire basic Japanese language skills **(**listening, speaking, writing, and reading**).** 4. To enable students demonstrate an awareness of the relevance of Japanese language to professions and careers**.** 5. To make students understand the cultures and civilizations of the country of Japan**.** 6. To enable the students to function in an environment where Japanese is used exclusively**.**
15.		SH2172	Environmental Science	1. Explain the importance and sensitivity of environment**.** 2. Analyze the over exploitation of natural resources and follow the environmental ethics. 3. Explain methods to protect environment and prevent environmental pollution 4. Apply their knowledge and skills to solve environment related problems.
16.		SH2602	Environmental Science Miniproject	1. Utilize scientific methods to solve environmental problems. 2. Evaluate technologies for restoration of degraded environment. 3. Develop presentation and report writing skills. 4. Develop as an individual and in group leadership quality.
1.	V	IT3012	Operating Systems	1. Explain fundamental concepts in operating systems 2. Apply the concepts of operating systems for the given requirement 3. Select the appropriate algorithm such as scheduling, deadlock, page replacement or disk scheduling for devising solution to the given problem 4. Compare various operating system techniques 5. Justify findings of the given problem using operating system concepts
2.		IT3032	Database Management Systems	1. Describe the fundamental elements of relational database management systems. 2. Design ER-models to represent simple database application scenarios 3. Write SQL/PL-SQL query to perform various operations on the database. 4. Apply integrity constraints on database. 5. Apply concepts of indexing and hashing on databases.

				6. Illustrate the transaction management, concurrency control and crash recovery.
3.		IT3052	Design and Analysis of Algorithms	1. Apply mathematics needed for the analysis of algorithms. 2. Use asymptotic analysis to analyze the performance of algorithms. 3. Compare various searching and sorting algorithms. 4. Apply different algorithm design techniques to solve real life problems like change making problem, job sequencing, finding shortest path, etc. 5. Identify appropriate algorithm design strategy that is applicable to a given contextual problem. 6. Describe Computational complexity theory to classify computational problems according to their inherent difficulty.
4.		IT3072	**Program Elective-I -** Organizational Management and Behavior	1. Describe & apply a selection of key concepts/theory/frameworks relevant to management. 2. Discuss the basic concepts of operation, financial, material and marketing management. 3. Present/Solve for the case study based on management and organizational behavior concepts. 4. Review basic concepts of organizational behavior and group and interpersonal processes like team, group management and conflict management and handling. 5. Relate organizational culture and performance and the organizational change
5.		IT3092	**Program Elective-I -** Cyber Laws and Security	1. Describe fundamental terms in cybercrime legislations. 2. Compare various cyber-attacks & offenses. 3. Analyze Indian IT Act 2000 & amendments in IT Act 4. Demonstrate cyber forensics investigations using modern tools & techniques. 5. Construct a strategy for creating awareness about cyber security for e-banking and legal issues among the social community.
6.		IT3112	**Program Elective-I -** Software Modeling & Design	1. Identify object classes and build the domain model using advanced concepts in object, dynamic and functional modeling. 2. Apply different object-oriented design techniques. 3. Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment. 4. Design software systems using open source and advanced modeling tools. 5. Evaluate designs of software systems in mini-projects, projects using Software Modeling & Design concepts.

7.		IT3132	JAVA Programming Lab	1. Explain the concepts and terminologies in java programming language 2. Create class hierarchy using Java inheritance and interface for given requirement. 3. Implement programs on Exception Handling, Packages , File Handling using IDE's 4. Design GUI based applications by using AWT and Swing package for given problem. 5. Develop Java applications to address particular software needs by making use of collections classes.
8.		IT3152	Database Management Systems Lab	1. Draw Schema Diagram on given problem statement. 2. Write SQL query for various operations like retrieval, insertion and manipulation of data etc. 3. Implement PL/SQL cursor, procedure/function and trigger. 4. Implement a program to connect databases to application programs. 5. Implement basic commands of MongoDB with installation.
9.		IT3172	Operating Systems Lab	1. Identify and use the basic and advanced commands in Unix 2. Practice simple and advanced filters of Unix system using regular expression 3. Implement shell scripts and shell programs for given problems 4. Practice user management administration in Unix
10.		SH3032	Aptitude Training-I	5. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. 6. Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests 7. Develop a bridge in analogies, series and visualizing directions. 8. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
11.		IT3212	Comprehensive Exam-III	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
12.		SH301	Indian Constitution	1. Create awareness about law depiction and importance of Constitution 2. Define Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities. 3. Create Awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind. 4. Recognize distribution of powers and functions of Local

				Self Government. 5. Comprehend the National Emergency, Financial Emergency and their impact on Economy of the country.
1.	VI	IT3022	Information Security	1. Describe the key components of information security, security model, legal and ethical issues, risk management. 2. Apply cipher techniques and cryptographic algorithms, tools. 3. Present the ways to provide access control like authorization and authentication. 4. Illustrate the working of several real-world security protocols. 5. Analyze the security provisions in software, operating system and data. 6. Explain the model for implementing information security and the measures to maintain the security of information systems.
2.		IT3042	**Program Elective-II** - Advanced Database Systems	1. Describe the nature of object based databases. 2. Apply database centric design issues involved in application development and the advances in database systems. 3. Evaluate and analyze the different types of advanced databases. 4. Implement the complex and real world database applications. 5. Demonstrate No-SQL database.
3.		IT3062	**Program Elective-II** - Sensor Networks	1. Explain the basic terminology, architecture and concepts of Sensor networks. 2. Identify the different Platforms, Communication Technologies and Protocols in Sensor networks. 3. Apply time-synchronization strategy for any wireless sensor application. 4. Identify the security issues and challenges in wireless sensor networks. 5. Compare different Sensor Network Platforms and Tools.
4.		IT3082	**Program Elective-II** - Machine Learning Algorithms	1. Differentiate Machine Learning algorithms from traditional algorithms. 2. Apply Regression algorithms to predict the values for given applications. 3. Analyze the Classification and Clustering techniques. 4. Compare the strengths and weaknesses of different Machine Learning algorithms. 5. Elaborate the working of the Recommendation System and its importance in different application domains. 6. Evaluate performance of Artificial Neural Networks on different parameters such as architecture, learning rate etc.

5.		IT3102	**Program Elective-II** - Multimedia Techniques	1. Identify basics of multimedia and multimedia system architecture**.** 2. Illustrate the different types of multimedia data with its compression techniques**.** 3. Demonstrate tools to Create animations. 4. Analyze Multimedia User Interfaces for effective human computer interaction. 5. Demonstrate Multimedia in networking, Android and gaming.
5.		IT3122	**Program Elective-III** - Soft Computing	1. Gain understanding of various soft computing techniques. 2. Identify and design fuzzy based systems. 3. Explore different selection, crossover and mutation operators of genetic algorithm. 4. Analyze performance of different evolutionaryalgorithms for mathematical and real-world optimization problems. 5. Identify and formulate complex problems from different engineering domains.
6.		IT3142	**Program Elective-III** - Human Computer Interaction	1. Identify the advantages of good graphic interface design 2. Describe human needs in the contexts of graphical user interface 3. Analyze the steps involved in the design process of human computer interaction. 4. Develop graphical user interface for a given Screen specification. 5. Demonstrate the different Software tools used for Interaction devices. 6. Design effective HCI for mobile and web.
7.		IT3162	**Program Elective-III** - Cloud Computing	1. Illustrate the technological changes in computing technologies. 2. Compare the architectures and service deployment models of cloud computing. 3. Explore the need and importance of virtualization technologies. 4. Analyze different cloud platforms for IaaS, PaaS and SaaS services. 5. Examine cloud computing service and application adoption issues in different sectors by considering business issues.
8.		SH302	Biology for Engineers	7. Apply biological engineering principles, procedures needed to solve real-world problems 8. Demonstrate the functions of biological systems 9. Analyze biological phenomena with math and physics

				to gain important insights 10. Explain working of different biomedical instruments 11. Select the sensors for given biological applications 12. Explain relevant aspect of movement control process.
9.		IT3182	C#. Net Lab	1. Describe .NET framework & fundamentals. 2. Implement object oriented concepts. 3. Implement Multi-threaded and file handling programs. 4. Implement Database programming with ADO.NET 5. Implement Exception handling programs. 6. Develop desktop applications.
10.		IT3202	Mobile Application Development Lab	1. Explain the basic concepts and terminologies of Android technology 2. Design User Interfaces using views, layout managers, menus and dialogs 3. Make use of shared preferences, files and SQLite database for persistent data storage and multimedia in android application 4. Develop mobile application using activity, services, content providers and broadcast receivers of Android Technology 5. Apply testing frameworks, packaging and deploy android application to emulators and physical devices
11.		IT3222	Capstone Project Phase-I	1. Find the real life problems and provide software based solutions for them. 2. Describe system requirements in the form of a requirements specification. 3. Organize project development teams and conduct project development processes using modern software engineering methodologies. 4. Implement projects according to a documented software design. 5. Develop and enhance the leadership skills and communication skills. 6. Improving presentation skills and other soft skills.
12.		SH3052	Aptitude Training-II	1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning Problems 2. Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications. 3. Understand blood relations and ways of seating arrangements along with various geometrical figures 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and

				campus recruitment exams.
13.		IT3242	Comprehen sive Exam-IV	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
1.	VII	IT4152	Principles and Practices for IT Managemen t	1. Prepare the detailed plan for various IT projects. 2. Differentiate an IT projects using various project network methods. 3. Discuss the TQM & ISO related concepts in IT Project Management. 4. Use the Modern approaches in IT Project management 5. Illustrate the importance of project procurement management & Stakeholder Management
2.		IT4032	Parallel Computing	1. Summarize parallel programming technique and compare it with Sequential Programming 2. Write parallel programs using MPI, Open MP, CUDA etc. 3. Describe CUDA architecture with their memory structure. 4. Compare parallel matrix algorithm 5. Explain Parallel Sorting algorithms
3.		IT4052	Internet of Things	1. Explain the basic terminology and concepts of IoT 2. Identify the different IoT Platforms, Communication Technologies and Protocols 3. Identify the security issues, challenges in IoT 4. Implement program the IoT based application with Raspberry Pi3, Arduino kits 5. Design the IoT solution for real word problems.
4.		IT4072	Software Testing and Quality Assurance	1. Describe software testing fundamentals. 2. Explain different software testing types. 3. Employ correct testing terminology throughout the testing process. 4. Make use of modern automation tools for testing a given

				program. 5. Assess quality attributes of the problem using software quality standards.
5.		IT4092	Program Elective I - Big Data	1. Recognize need of Big data Technologies. 2. Write program using Map Reduce framework. 3. Describe Hadoop and its component 4. Write the queries using HIVEQL 5. Use Hadoop ecosystem like Pig and Hive to build application.
6.		IT4112	Program Elective I - Cloud Computing	1. Understand the technological changes in computing technologies. 2. Compare the architectures and service & deployment models of cloud computing. 3. Explore the need and importance of virtualization technologies. 4. Explore and identify different cloud platforms. 5. Explore the business issues and applications of cloud computing in different sectors.
7.		IT4132	Program Elective I - E-Commerce	1. Understand E-commerce framework & role of internet 2. Familiar with E-commerce & EDI applications 3. Recognize security standard used in E-commerce application 4. Know web based marketing and online advertisement
8.		IT4572	Free and Open Source Software Laboratory	1. Implement basic concepts of PHP. 2. Develop dynamic web application using PHP. 3. Build web application using Laravel MVC framework. 4. Implement Basic concepts of Python.
9.		IT4592	Advanced Java Laboratory	1. Use Bootstrap to make web application responsive. 2. Build fast and interactive web application using JQuery and Angular JS2

				3. Develop dynamic, server-side applications using Servlets. 4. Develop dynamic, server-side applications using JSP. 5. Build web applications using Hibernate framework.
10.		IT4552	Project Phase- I	1. To demonstrate ability of analysis, design and implementations. 2. To improve ability to work in teams. 3. To finalize real life problems to provide software based solutions. 4. Design and analyze the project and manage the time involved to complete the project within given time constraints by using modern IT tools. 5. Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.
1.	VIII	IT4022	Program Elective II– Soft Computing	1. Discuss importance of soft computing. 2. Demonstrate different applications of fuzzy logic. 3. Apply genetic algorithm to solve different real world problems. 4. Demonstrate working of Particle swarm optimization and Teaching learning based optimization algorithms.
2.		IT4042	Program Elective II– Business Intelligence	1. Understand fundamentals of BI Process, Technology, Roles and Applications. 2. Perform data integration through various approaches. 3. Understand high quality data with data profiling concepts. 4. Perform different data modeling for efficient handling of data.
3.		IT4062	Program Elective II– Virtualization	1. Describe the concept of virtualization and its properties. 2. Compare different forms of virtualization. 3. Examine various architectures for implementing virtualization methods. 4. Appraise techniques for virtualizing and managing the hardware components of a computer system.

				5. Apply virtualization concepts at server, client and desktop
3.		IT4082	Program Elective III - Management of Technology	1. Develop an awareness of the range, scope, and complexity of technological innovation, and the issues related to managing technological change. 2. Identify the critical factors and driving forces in technology development and success. 3. Describe the technology life Cycle and process of technological diffusion 4. Describe the technology hype-cycle. Correlate the hype-cycle and life cycle. 5. Identify the disruptive technologies and their characteristics. 6. Identify the need and methodologies of technology forecasting. Identify suitable technology forecasting methods
4.		IT4102	Elective III - ERP Systems	1. Understand the fundamental concepts of ERP systems, their architecture, and working of different modules in ERP. 2. Design the modules used in ERP systems, Customize the existing modules of ERP systems. 3. Demonstrate the process of automation in CRM. 4. Implement the flow of CRM process.
5.		IT4122	Program Elective III - Cyber Laws and Forensics	1. Describe fundamental terms in Cyber Security. 2. Categorize cyber offences. 3. Explain tools and methods used in Cybercrime. 4. Assess cyber crimes in the cyber world against imprisonment and penalty. 5. Construct a strategy for creating awareness about cyber security for E-banking and Legal issues among the social community.
6.		IT4552	Program Laboratory Elective - Asp.Net	1. Develop dynamic web application using ASP.NET. 2. Apply front end technologies to make web application responsive and fast. 3. Develop web application using MVC and Entity framework.

				4. Build web services in ASP.NET.
7.		IT4542	Program Laboratory Elective - R Programming	1. Understand the nuances of programming with R and its implementation for Data Science and Advanced Big Data Analytics. 2. Install RStudio and work on R interface 3. Learn the basics of R programming including objects, classes, vectors, attributes etc. 4. Install various packages and work effectively in the R environment 5. Become proficient in writing a fundamental program and perform analytics with R
8.		IT4562	Program Laboratory Elective - NoSQL	1. Understand concept of NoSQL 2. Programming with MongoDB 3. Creating and Ordering of data sets 4. Understand Tools and utilities
9.		OE451	Open Elective I - Software Project Management	1. Describe the key concepts of software project management and quality issues related to software. 2. Determine the feasibility of the software project prior to implementation. 3. Estimate the effort and cost needed to implement the software. 4. Prepare an activity plan for a project and to estimate the overall duration of the project by analyzing the risks involved in it.
10.		OE452	Open Elective II - IT for Engineers	1. Define the terminology and describe in writing the concepts of Operating Systems, Databases, Networking and Web Technology. 2. Identify and execute OS commands, Networking tools and SQL queries to perform operations. 3. Configure and manage linux and network administration tasks for a given system. 4. Design and develop IT applications. 5. Use IT essentials to solve the given problem.

11.		IT4582	Project Phase II	1. To demonstrate ability of analysis, design and implementations. 2. To improve ability to work in teams. 3. To finalize real life problems to provide software-based solutions. 4. Design and analyze the project and manage the time involved to complete the project within given time constraints by using modern IT tools. 5. Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.

UG Mechanical Engineering

- **Department Name :- Mechanical Engineering**
- **UG Program Name :- B.Tech. Mechanical Engineering**
- **Vision and Mission :-**

Vision:

To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers.

Mission:

- To develop state of the art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.
- To build the competency to transform students into globally competent mechanical engineers by imparting quality education.
- To collaborate with research organizations, reputed educational institutions, industries and alumni for excellence in teaching, research and consultancy practices.

Sr. No.	Program Outcomes
1.	Apply the knowledge of mathematics, science, engineering fundamentals, and mechanical engineering to the solution of complex engineering problems.
2.	Identify, formulate, review research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	Design solutions for complex mechanical engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex mechanical engineering activities with an understanding of the limitations.
6.	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7.	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

	sustainable development.
8.	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	Communicate effectively on complex mechanical engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11.	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12.	Recognize the need for, and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	Use Company standards, national and international standards like IS BS, SAE, ISO, ASTM etc for designing and manufacturing of mechanical components and systems.
2.	Engage professionally in industries or as an entrepreneur by applying manufacturing, design, thermal and management practices.
3.	

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Semester	Course Name	Course Code	Course Outcome
Semester-III	Material Science & Metallurgy	ME2012	Explain different alloys, their properties and applications by referring equilibrium diagrams.
			Determine mechanical properties by destructive testing methods.
			Detect flaws in components by non-destructive testing methods.
			Select suitable heat treatment to achieve desired changes in mechanical properties of steels.
			Select suitable material for given engineering applications.
			Prepare Flow chart for components manufactured by Powder Metallurgy
	Engineering Thermodynamics	ME2032	Apply thermodynamics principles to mechanical engineering applications
			Describe entropy, change in entropy and increase of entropy principle.

Semester	Course Name	Course Code	Course Outcome
			Differentiate between available and unavailable energy with examples.
			Recognize the properties of pure substances and use thermodynamic property tables, charts.
			Apply mathematical fundamental to study the properties of steam gas and gas mixtures
			Explain the air and vapor power cycles and calculate cycle performance.
	Engineering Mechanics	ME2052	. Draw the free body diagram and apply the equations of equilibrium to 2D and 3D rigid bodies
			. Distinguish static and dynamic friction and evaluate the moment of inertia of standard composite section.
			. Apply equations of equilibrium and perform structural analysis on machine components
			. Use energy methods and comment on stability of equilibrium solution
			. Explain particle dynamics and compute various forms of stored energy under gradually and suddenly applied load conditions
			. Recognize the importance of D'Alembert's principle, apply it in plane motion and connected bodies.
	Fluid Mechanics & Fluid Machines	ME2072	1. Define, calculate, measure properties of fluid
			2. Apply continuity equation, Bernoulli's equation, equation of motion and momentum equation for different flow system.
			3. Estimate forces acting on fluid & different energy losses in fluid flow.
			4. Estimate forces acting on bodies submerged in fluid.
			5. Apply basic concept of fluid mechanics for dimensional analysis
	Manufacturing Processes and Machine Tools	ME2092	Select suitable Engineering forming process for production of component of required specification
			Select casting as manufacturing process suitable for the component design and production volume
			Select suitable furnaces in casting process as per requirement.
			Select appropriate joining process for given application.
			Illustrate and identify main parts of machine tools for metal cutting operations.
			Describe the Construction of different components of precision machines.
	Electrical Technology	ME2112	Explain different types of electrical machines, their characteristics and control.
			Analyze different types of electrical machines.
			Explain electric drives and electric heating.
	Environmental Science	SH2172	Study the importance and sensitivity of environment.
			Interpret the over exploitation of natural resources and follow the environmental ethics.

Semester	Course Name	Course Code	Course Outcome
			Explain methods to protect environment and prevent environmental pollution
			Apply their knowledge and skills to solve their environment related problems
	Engineering Mechanics Lab	ME2512	. Explain the various laws studied in engineering mechanics
			. Calculate the forces and deflection in structural member
			. Develop the physical sense towards the engineering mechanics term and establish relation between them
	Thermal Engineering Lab-I	ME2532	Measure pressure & discharge through fluid system.
			Analyze effect of different variables on performance of hydraulic machines.
			Select proper hydraulic machine for proper application.
			Apply conept of model testing in wind tunnel.
	Material Science Lab	ME2552	Illustrate stress strain diagram for Mild steel.
			Use Rockwell Hardness testing machine to measure hardness of material.
			Correlate mechanical properties with microstructures of steel and cast iron.
			Test materials for their impact strength.
			Classify steels by spark testing method.
			Heat treat the given specimen to alter the mechanical properties. Measure Hardenability of given steel using Jominy End Quench Test
	Workshop Practice –I	ME2572	Demonstrate effect of variables such as Voltage,current on welding process.
			Produce given joint by MIG welding process.
			Produce welding run on S.S. by TIG welding.
			Produce welding run on Aluminum by TIG welding.
			Produce given job with proper taper and V threading within dimensional tolerances ± 0.2 m.m. on diameter and ± 0.5 m.m. on length. (Job – A)
	Comprehensive Exam-I	ME2592	Comprehend the knowledge gained in the course work.
			Demonstrate the ability in problem solving.
	Environmental Science Project	SH2612	**1.** Use scientific methods to solve environmental problems. **2.** Evaluate technologies for restoration of degraded environment. **3.** Develop presentation and report writing skills. **4.** Develop as an individual and in group leadership quality.

Semester	Course Name	Course Code	Course Outcome
Semester-IV	Engineering Mathematics – III	SH2062	**1.** Evaluate Differential Equation using appropriate concept.
			2. Analyze system and its mathematical model and select suitable differential equation method to solve the model.
			3. Analyze the problem and apply the appropriate concept of partial differential equations.
			4. Evaluate Laplace as well as Inverse Laplace Transform of function and solve ordinary differential equations and linear time invariant systems.
			5. Develop Fourier series of periodic functions and compute Fourier Integral.
			6. Apply the concepts of Fourier Transform to engineering problems.
	Strength of Materials	ME2022	1. Identify types of stresses and strains induced in any machine component.
			2. Find the principal stress and strain for plain stress system
			3. Draw Shear force and bending moment diagram for different types of beam.
			4. Derive bending stress distribution and shear stress distribution for various cross sections of beam.
			5. Estimate the deflection of beams by analytical and graphical method
			Analyze axially loaded column for different end conditions.
	Applied Thermodynamics	ME2042	**1.** Explain construction and working of different types of steam, gas and water turbines, centrifugal pump & air compressors
			2. Evaluate different efficiencies; power developed and discharge requirement of turbines.
			3. Sketch velocity triangles & estimate performance of pumps.
			4. Explain concept of model testing for performance of turbo machines.
			5. Compute different efficiencies of reciprocating & rotary compressor
			Analyze various energy exchange and energy conversion devices such as nozzle, turbines and condensers.

Semester	Course Name	Course Code	Course Outcome
	Manufacturing Engineering	ME2062	1. Explain the mechanism of metal cutting.
			2. Analyze the effect of various parameters such as process variables, cutting tool materials etc. on the performance of machining.
			3. Explain the importance of the various elements of tool geometry of single and multi-point cutting tools.
			4. Design jigs and fixtures for given components.
			5. Design press tools for cutting and forming press working operations.
			Estimate machining cost.
	Kinematics of Machines	ME2082	1. Select suitable mechanisms for given application.
			2. Analyze the mechanism for velocity and acceleration using different methods.
			3. Design the CAM for given condition
			4. Analyze the controlling force and stability of governor.
			5. Construct turning movement diagram and design the flywheel.
			Synthesize the given mechanism.
	: Computer Programming C++	ME2102	1. Divide the problem into objects and build Object Oriented Program.
			2. Elaborate the concepts of “Inline function”, “Friend Function”, “Function Overloading” and “Operator Overloading”.
			3. Modify/Extend the program by using Inheritance.
			4. Use memory management technique “Constructors” & “Destructors”
			5. Handle different file handling techniques like “Create’, “Open”, “Close” files and perform “Read”, “Write” and “Append” operations.
			Write programme to draw simple geometric shapes
	Machine Drawing Lab	ME2522	**1.** Recognize the significance & importance of BIS conventions
			2. Identify & draw the proportionate dimensioned free hand sketches of various engineering components.
			3. Identify appropriate limits, fits , tolerances, tolerances of form & position, surface finish symbols for given machine components & incorporate the same in the orthographic

Semester	Course Name	Course Code	Course Outcome
			drawing of given machine component.
			Prepare details & assembly of production drawing from given detail drawings
	Kinematics of Machines Lab	ME2542	1. Select suitable mechanism for given application 2. Analyze the mechanism by using different methods. 3. Design the CAM and Flywheel for given condition 4. Analyze the controlling force and stability of governors. 5. Do synthesis of mechanism
	Computer Programming C++ Lab	ME2562	1. Divide the problem into objects and build Object Oriented Program.
			2. Elaborate the concepts of "Inline function", "Friend Function", "Function Overloading" and "Operator Overloading".
			3. Modify/Extend the program by using Inheritance.
			4. Use memory management technique "Constructors" & "Destructors"
			5. Handle different file handling techniques like "Create', "Open", "Close" files and perform "Read", "Write" and "Append" operations.
			6. Write programme to draw simple geometric shapes.
	Workshop Practice – II	ME2582	**1.** Demonstrate effect of variables such as speed, feed and depth of cut on machining process
			2. Produce given job with proper taper fitting and within dimensional tolerances ± 0.2 m.m. on diameter and ± 0.5 m.m. on length. (Job – b)
			3. Produce given job with proper V threading fitting and within dimensional tolerances ± 0.2 m.m. on diameter and ± 0.5 m.m. on length. (Job – c)
			Produce given job of sq. threading of given specifications. (Job – D)
	Comprehensive Exam-II	ME2602	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in problem solving.

Semester	Course	Course Code	Course Outcome
Semester V	Dynamics of Machines	ME3012	Apply the theoretical knowledge to balance the rotary and reciprocating systems
			Identify and investigate the stability of spinning bodies due to the gyroscopic effect
			Apply different principles to convert the physical

Semester	Course	Course Code	Course Outcome
			vibratory system into a mathematical model
			Identify the effect of external excitation on the system and effect of dampers to control the system vibration
			Recognize the suitable method for minimizing or eliminating the vibration from the system
	Design of Machine Elements	ME3032	**1.** Identify the customers need, formulate the problem and draw the design specifications.
			2. Design a machine component using theories of failure.
			3. Design a simple machine components like joints, shafts, keys, couplings
			4. Design a spring and power screw
			5. Select a rope and belt drives for given application
			6. Design a component against fluctuating load.
	Metrology & Control Engineering	ME3052	**1.** Apply knowledge of various tools and techniques to determine geometry and dimensions of components in engineering applications.
			2. Design system to meet desire needs within realistic constraints.
			3. Analyze and interpret data by using QC tools.
			4. Explain feedback control system.
			5. Represent control system mathematically and by using block diagrams and determine their response to various input conditions.
	Heat Transfer	ME3072	1. Explain fundamental concepts heat transfer
			2. Analyze heat conduction, convection and radiation phenomenon
			3. Formulate and Solve problems on different modes of heat transfer.
			Design a heat exchanger
	Workshop Practice – V	ME3512	Demonstrate effect of variables such as speed, feed and depth of cut on machining process
			Produce given job with proper taper fitting and within dimensional tolerances ± 0.1 mm on diameter and ± 0.2 mm on length. (Job A)
			Produce bearing diameter on job a maintaining fit H7g6.
			Produce Gear Teeth - Job B on Milling Machine as per specifications.
			Produce Job C to fit Job A with proper threading fitting on Turret.
			Prepare process sheet for all Jobs
	Dynamics of Machinery Lab	ME3532	To identify and investigate the stability of spinning bodies due to gyroscopic effect.
			To apply the theoretical knowledge to balance the rotary and reciprocating systems.
			To determine natural frequency, damped frequency and

Semester	Course	Course Code	Course Outcome
			resonant frequency of any vibratory system.
			To recognize the whirling speed conditions of shaft and methods to eliminate it.
			To determine natural frequencies and mode shapes of vibratory system with two degree of freedom.
	Metrology and Measurement lab	ME3552	Use Vernier Caliper, Vernier Height Gauge, and Micrometer, V-block for accurate linear and angular Measurement
			Demonstrate and use the tool makers Microscope for the measurement of screw thread terminology
			Measure the straightness using Autocollimator
			Measurement of screw thread parameter using floating carriage micrometer**.**
			Conduct Gauge R & R Study.
			Use load cell for measurement of Force.
			Select suitable tachometer for speed measurement.
	Thermal Engineering Lab-II	ME3572	Analyze heat conduction experimentally
			Compare heat transfer coefficient in natural as well as forced convection environment.
			Determine emissivity and Stefan Boltzmann constant for the case of radiation
			Evaluate the performance of heat exchanger.
	CAD-Modelling	ME3592	List the different CAD software used for mechanical engineering. Create sketches of machine parts. Model machine parts using CAD software. Assemble machine Parts by using CAD tool. Generate detailed drawing views. Create surface features using surfacing tools.
	Comprehensive Exam-III	ME3612	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in problem solving.
	Aptitude Training-I	SH3032	1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. 2. Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests 3. Develop a bridge in analogies, series and visualizing directions. 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
	Summer	ME3632	1. Verify the Technical knowledge in real

Semester	Course	Course Code	Course Outcome
	Internship (4 Weeks)		industrial situations. 2. Develop interpersonal communication skills 3. Discuss activities and functions of the industry in which the internship has done 4. Write technical report.
	Indian Constitution	SH301 :	1. Create awareness about law depiction and importance of Constitution 2. Define Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities. 3. Create Awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind. 4. Recognize distribution of powers and functions of Local Self Government. 5. Comprehend the National Emergency, Financial Emergency and their impact on Economy of the country.
Semester	Course	Course Code	**Course Outcome**
Semester VI	Machine Design	ME3022	**1.** Design machine components subjected to fluctuating loads
			2. Design gears for various applications
			3. Apply principles of interaction of materials processing and design.
			4. Select rolling contact and sliding contact bearing for given machine.
			5. Design machine components subjected to fluctuating loads
			6. Design gears for various applications
	Engines and Refrigeration	ME3042	1. Differentiate SI and CI engine and cycles and Calculate the design and operating parameters of fuel-supply system mixture requirements in engine
			2. Explain the stages of combustion in si and ci engines and effect of various operating parameters on combustion
			3. Explain methods of measurement of different performance parameters and prepare heat balance sheet and identify alternative fuels and compare different pollution norms
			4. Illustrate and analyze the performance of various the refrigeration system.
			5. Plot various refrigeration and air conditioning processes using charts and tables.

Semester	Course	Course Code	Course Outcome
			Design air-conditioning system for various applications
	Biology for Engineers	SH302	13. Apply biological engineering principles, procedures needed to solve real-world problems
			14. Demonstrate the functions of biological systems
			15. Analyze biological phenomena with math and physics to gain important insights
			16. Explain working of different biomedical instruments
			17. Select the sensors for given biological applications
			Explain relevant aspect of movement control process
	Thermal Engineering Lab-III	ME3522	1. Perform testing on I C Engines and refrigeration and Air conditioning systems
			2. Analyze effect of different variables on performance of systems.
			Test the engine emissions and compare with BS norms.
	Software Training-I	ME3542	1. Use software effectively related to design/manufacturing and synthesis of mechanical systems and components.
			Develop solution for the mechanical engineering problem using program/software
	Comprehensive Exam-IV	ME3562	1. Comprehend the knowledge gained in the course work.
			2. Demonstrate the ability in problem solving.
	ME3582 CDIO Project	ME3582	Identify customer need or real-life problems faced by local community related to mechanical engineering and recognize the areas for innovation
			1. Acquire the requisite skills to deal with social issues through innovative and sustainable solutions considering technical, safety and environmental issues.
			2. Apply the principles of design and analysis of mechanical systems/processes to solve critical problems.
			3. Translate the design into the product, process, or system, including manufacturing, coding, testing and validation.
			4. Participate in team work, take responsibilities and develop decision making skills to become effective and creative leaders.
			Write technical report and communicate effectively
	Aptitude	SH3042	1. Develop a thorough conceptual understanding and develop a logical approach towards solving

Semester	Course	Course Code	Course Outcome
	Training-II		Aptitude and Reasoning Problems
			2. Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications.
			3. Understand blood relations and ways of seating arrangements along with various geometrical figures
			4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
			5. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning Problems
			Identify and communicate solution to problems (oral, visual, written) effectively.
			Device a project within a given time frame.

Semester	Course	Course Code	Course Outcome
Semester VII	Industrial Engineering	ME4011	Recognize the position, scope and objectives of Industrial Engineering in organizations.
			Apply industrial engineering tools to improve the productivity
			Decide the plant location and design the appropriate type of layout and recommend Suitable material handling system.
			Use tools like capacity and aggregate planning to Plan and control production
			Design the inventory systems using appropriate applicable models
			Analyze the projects using various project management techniques
	Mechanical system design	ME4031	Select brake and clutch based on functional requirements of automobile transmission systems.
			Use of IS code for selection of pressure vessel.
			Design of IC Engine components.
			Select site for wind turbine and compute efficiency of wind turbine.
			List the different material handling equipment and design conveyor systems.
			Elaborate the significance of the stepped regulation in machine tools and design the machine tool gearbox.
	Mechatronics ME4021	ME4021_1	Demonstrate the importance of integration of Mechanical, Electronics, computers and control in the design of Mechatronics system.
			Describe/identify key elements of sensors and transducers and techniques of interfacing with PLC, Microprocessor, Microcontroller etc.

Semester	Course	Course Code	Course Outcome
			Apply a systematic approach to the design process for Mechatronics systems. (Concurrent engineering).
			Create system modelling of basic models and analyze.
			Demonstrate the practical application of mechatronics systems in areas such as manufacturing, automobile systems and robotics.
			Develop the capacity to think creatively and independently about new design problems and challenges
	Refrigeration and Air Conditioning	ME4041	Illustrate various refrigeration methods
			Analyze performance of refrigeration systems.
			Plot various refrigeration and air conditioning processes using charts and tables.
			Select suitable refrigerant for refrigeration and air-conditioning system.
			Design air conditioning system for various applications.
	PE II Mechanics of composite material	ME4171	Choose suitable composite materials based on field applications
			Explain different fabrication processes and perform cost comparison
			Explain characteristics of the reinforcement and comment on properties of composite
			Design sandwich structures as per the functional requirement
			Predict failure of composite laminates by selecting appropriate failure criteria
			Illustrate the use of advanced materials and their limitations
	PE II Cryogenics	ME4251	Discuss the properties of materials and cryogenic fluids at low temperature.
			Criticize cryogenic Liquefaction systems.
			Describe Cryogenic Refrigeration Systems OR Cry coolers.
			Calculate performance of gas separation systems
			Explain the methods of fluid storage, transfer and insulation of cryogens.
			Summarize the applications of low temperature engineering in various fields.
			Explain vacuum technology and various measurement systems used for temperature, pressure, mass flow rate, fluid level measurement.
	PE II New product	ME4271	Identify the new product opportunities and sources of new product ideas.

Semester	Course	Course Code	Course Outcome
	design & development		Understand the product life cycle and product design process.
			Integrate the customer and end-consumer needs into design process.
			Apply the concepts and tools like DFMA,VE and QFD in design process
			Assimilate the various product characteristics to design a novel product
			Participate in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success.
	Additive Manufacturing	ME4291	Recognize the Importance of AM technologies in Manufacturing
			Classify and select additive manufacturing processes for a given application.
			Design for manufacturing of AM and conduct Process Analysis
			Identify software issues related to additive manufacturing process.
			Identify the Different methods for Post-processing of AM parts
			Recognize the Applications of AM in Automobile, Aerospace, and Bio-medical etc.
	PE III CIMS	ME4311	Describe and classify computer integrated manufacturing systems (CIMS)
			Recognize socio-economic impact of CIMS
			Explain principle of operation of CNC machine
			Describe part family forming methods
			Perform quantitative analysis of Flexible Manufacturing Systems (FMS)
			Analyze various computer integrated planning and control techniques.
			Explain various computer aided quality control (CAQC) methods.
	Mechatronics Laboratory	ME4561	Demonstrate/select proper types of sensors/transducers for given task.
			Design signal conditioning circuits for various signal conditioning processes like signal level change, signal form change, filters, bridge circuits etc.
			Demonstrate ability of control and automation of simple devices such as motors, cylinders using PLC.
			Demonstrate the ability to create microcontroller programs and properly interface them to input and output devices.
	RAC Laboratory	ME4581	Examine various components of refrigeration and air

Semester	Course	Course Code	Course Outcome
			conditioning systems.
			Estimate and compare the performance of various refrigeration systems.
	Advanced Testing Laboratory	ME4671	Develop prototype of any engineering prototype by using 3-D printer
			Synthesize & Test composite
			Determine coefficient of friction or abrasive wear of any type of material.
			Measure SPL of any mechanical system
			Determine damping factor of simple engineering components
			Characterize any engineering material
			Synthesize and Characterize smart material
			Determine the composition of any metal
			Measure surface roughness of a machined component
			Measure cutting forces developed during machining operations
			Measure micro hardness of any material
	Software training I	ME4711	Use effectively modules of the software related to design, analysis and synthesis
			Develop solution for the Mechanical engineering problem using the software.
	Software Training II	ME4721	Use effectively modules of the software related to design, analysis and synthesis
			Develop solution for the Mechanical engineering problem using the software
	Capstone project phase I	ME4731	Convert an open ended problem statement into a statement of work or a set of design specifications
			Decompose problem/task into subtasks, prioritizes subtasks, and establishes a timetable and milestones by which progress may be evaluated
			Select and apply appropriate models, or simulations of the real world and analyzes output of models/simulations to provide information for decisions
			Collaborates with team members of diverse background and perspectives
			Collaborate with team members to achieve a common goal

Semester	Course	Course Code	Course Outcome
Semester VIII	PE III Finite Element Method	ME4051	Apply various approximate methods to solve Linear differential equations appearing in the field of solid mechanics and heat transfer from the perspective of finite element analysis

Semester	Course	Course Code	Course Outcome
			Select suitable element for a particular type of problem and comment on convergence requirement to obtain better accuracy
			Formulate the structural problems and illustrate the use of interpolation function to derive shape functions
			To develop stiffness matrix and also load vectors of problems related to elasticity and heat transfer.
			Estimate primary field variable and use them to calculate secondary variables.
			Compare linear element with higher order element and comment on significance of using higher order element.
	PE III Experimental Mechanics	ME4071	Use polariscope for finding stresses in machine component.
			Analyze the photo elastic data by various methods.
			Determine the strains and stresses in photo elastic coating by using reflection polariscope.
			Use strain gauge for measurement of strains/stresses.
			Design strain gauge transducers.
	PE III Automobile Engineering	ME4091	Summarize different types of automobile power plants, vehicle layout and vehicle body.
			Estimate performance of automobile.
			Explain transmission system.
			Describe braking system.
			Explain steering and suspension system.
			Discuss different electronic and electrical system.
	PE III Industrial hydraulics & pneumatics	ME4111	Describe the structure and function of common hydraulic and pneumatic components such as cylinders, valves, pumps and motors.
			Model hydraulic components, pneumatic components and simple systems quantitatively.
			Create simple hydraulic and pneumatic circuit diagrams for different applications.
			Choose and dimension suitable hydraulic and pneumatic components for different applications.
			Analyze common hydraulic and pneumatic components such as cylinders, valves, pumps and motors.
			Construct simple hydraulic and pneumatic systems.
			Analyze simple hydraulic and pneumatic systems.
	PE III Computational techniques	ME4131	Obtain solution of linear simultaneous and nonlinear system.
			Use technique of interpolation and extrapolation.
			Solve complicated integral and differentiation problems.
			Develop a correlation for experimental data and estimate uncertainty.
			Apply techniques to find solution for ODE.
			Apply techniques to find solution of boundary value

Semester	Course	Course Code	Course Outcome
			problems.
			Explain different fabrication processes and perform cost comparison
			Explain characteristics of the reinforcement and comment on properties of composite
			Design sandwich structures as per the functional requirement
			Predict failure of composite laminates by selecting appropriate failure criteria
			Illustrate the use of advanced materials and their limitations
	New product design & development	ME4271	Identify the new product opportunities and sources of new product ideas.
			Understand the product life cycle and product design process.
			Integrate the customer and end-consumer needs into design process.
			Apply the concepts and tools like DFMA,VE and QFD in design process
			Assimilate the various product characteristics to design a novel product
			Participate in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success.
	ME4311PE III CIMS	ME4311	Describe and classify computer integrated manufacturing systems (CIMS)
			Recognize socio-economic impact of CIMS
			Explain principle of operation of CNC machine
			Describe part family forming methods
			Perform quantitative analysis of Flexible Manufacturing Systems (FMS)
			Analyze various computer integrated planning and control techniques.
			Explain various computer aided quality control (CAQC) methods.
	Finite Element Method Laboratory	ME4551	Identify suitable element based on physics of the problem so that real world problems can be converted to finite element model with accurate approximation.
			Apply and select suitable boundary conditions and loading conditions depending upon the field applications such as structural or heat transfer problem.
			Analyze and suggest the critical load that can be taken by a mechanical member by using FEM software
			Write a computer program using MATLAB code for one and two dimensional problem
	Experimental	ME4571	Use of transmission polariscope for measurement of

Semester	Course	Course Code	Course Outcome
	Mechanics Laboratory		stresses in machine components.
			Apply reflection polariscope technique for measurement of strain/stress in photoelastic coating.
			Use strain gauge technique in various applications
	Automobile Engg Laboratory	ME4591	Explain the structure of an automobile.
			Describe and Design transmission systems of an automobile.
			Demonstrate and select different types of an automobile system.
			Test wheel balancing and wheel alignment.
			Model any automobile system/component.
	Industrial hydraulics & pneumatics Laboratory	ME4611	Demonstrate various components of Hydraulics & Pneumatics System along with standard symbols.
			Design simple circuits & circuits for automation.
			Use software to design & simulate the fluid power circuits.
	Computational techniques Laboratory	ME4631	Obtain solution of linear simultaneous and nonlinear system.
			Use technique of interpolation and extrapolation.
			Solve complicated integral and differentiation problems.
			Develop a correlation for experimental data and estimate uncertainty.
			Apply techniques to find solution for ODE.
			Apply techniques to find solution of boundary value problems
	Tribology	ME4101	Recognize the laws of friction, mechanisms of friction and appreciate the various modes of wear.
			Evaluate hydrostatic and squeeze film lubrication.
			Design hydrodynamic thrust bearing
			Analyzeelasto-hydrodynamic lubrication.
			Select gas lubricated bearings.
	Automation and robotics	ME4141	Recognize manufacturing automation and Advanced Automation Functions
			Perform quantitative analysis of transfer lines for its efficiency and effect of breakdowns.
			Perform quantitative analysis of Assembly lines for its efficiency and effect of defective components.
			Explain need, meaning and classification of robotics and its control systems.
			Explain robot end effectors and sensors.
			Develop robot programs.
			Perform robot economic analysis
	Production and operations mgmt	ME4181	Select appropriate production and operations strategies based on situation
			Estimate the demand using appropriate forecasting techniques.

Semester	Course	Course Code	Course Outcome
			Plan the capacity based on the demand pattern and prepare the manufacturing schedule based on the production plan using various tools and techniques.
			Apply the tools of lean and JIT manufacturing to manufacturing and service operations.
	Capstone Project Phase II	ME4741	Fabricate project or experimental setup or model and analyze output of model/ simulations to provide information's for decisions
			Perform feasibility analysis and uses result to choose candidate solution and evaluates quality of solutions to select the best one
			Produce usable documents of record regarding design process and design state
			Collaborates with team members of diverse background and perspectives
			Collaborate with team members to achieve common Goal

PG Design Engineering

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	MDE1014	Advanced Solid Mechanics	After successful completion of the course, students will be able to, 1. Analyze stresses and strains at a point. 2. Model and analyze mechanical structures using energy methods. 3. Apply different analogies in torsion 4. Analyze and determine pressurized cylinders and rotating disks problems under loading. 5. Solve the problems in contact stresses. 6. Design a component considering plasticity effec
2.	I	MDE1024	Finite Element Methods	After successful completion of the course, students will be able to, 1. Apply the concept of finite element method for solving machine design problems. 2. Formulate and solve manually problems in 1-D structural systems involving bars, trusses, beams and frames. 3. Develop 2-D FE formulations involving triangular, quadrilateral elements and higher order elements. 4. Apply the knowledge of FEM for stress analysis, model analysis, heat transfer analysis, flow analysis and nonlinear analysis
3.	I	MDE1034	Computer Aided Design	After successful completion of the course, students will be able to, 1. Describe the principles of CAD systems, the implementation of these principles, and its connections to CAM and CAE systems. 2. Demonstrate 2D, 3D transformations and projection transformations. 3. Describe various approaches of geometric modeling. 4. Represent 2D and 3D entities mathematically
4.	I	MDE1064	Experimental Mechanics PE I	After successful completion of the course, students will be able to, 1. Determine direction and magnitude of principal stresses by using various techniques of Experimental Stress Analysis. 2. Solve two and three dimensional problems of stress-strain analysis in mechanical engineering. 3. Formulate solutions to general image processing problems
5.	I	MDE1094	Tribology PE II	After successful completion of the course, students will be able to 1. Determine tribological parameters of mechanical systems analytically by using suitable theories of friction and theories of wear. 2. Select hydrostatic step bearing for real life application in mechanical engineering based on

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				axial load applied and lubricant available. 3. Calculate the maximum load carrying capacity and pressure equation for hydrodynamic thrust bearing by using engineering principles. 4. Evaluate elastohydrodynamic lubrication occurred in gears, cams and rolling element bearing by using hertz and ertel-grubin equation. 5. Estimate pressure distribution in gas lubricated bearings by applying reynolds equation for gas lubrication within elastic limits
6.	I	MDE1114	Smart Materials PE II	After successful completion of the course, students will be able to, 1. Describe the behaviour and applicability of various smart materials. 2. Demonstrate knowledge of the physical principles underlying the behavior of smart materials. 3. Describe the basic principles and mechanisms of the stimuli-response for the most important smart materials. 4. Design simple models for smart structures & materials.
7.	I	MDE1124	Design Engineering Lab-I	After successful completion of the course, students will be able to, 1. Solve 1D, 2D and 3D structural analysis problems using the ANSYS software 2. Evaluate dynamic behavior of components 3. Appraise Linear buckling concept in Design of members which are succumbed to buckling 4. Solve structural analysis problems subjected to fatigue load. 5. Apply geometric and material nonlinearity while designing the components 6. Appraise steady state and transient thermal concept in design of members
8.	I	MDE1134	Advanced Stress Analysis Lab	After successful completion of the course, students will be able to, 1. Determine and analyze the stresses and strains in machine component. 2. Analyze the stresses and strains on combined bending and torsion. 3. Experiment on demonstration of photoelastic techniques. 4. Calibration of the photoelastic constant, determination of the stress field in a beam under bending. 5. Determine stress and strain fields using DIC
9.	I	SHP551	Technical Communication	After successful completion of the course, students will be able to, 1. Acquire skills required for good oral and written

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				communication. 2. Demonstrate improved writing and reading skills. 3. Ensure the good quality of oral and written communication
10.	II	MDE1144	Mechanical Vibrations	After successful completion of the course, students will be able to, 1. Derive and interpret equation of motions of multi-degrees of freedom systems. 2. Derive and interpret equation of motions of continuous systems. 3. Select suitable instrument and transducers for vibration measurement. 4. Derive and interpret response of the system subjected to Transient vibrations. 5. Analyze the systems with Non-linear vibrations
11.	II	MDE1154	Advanced Design of Mechanisms	After successful completion of the course, students will be able to, 1. Deduce the four bar coupler point curves. 2. Design mechanism in given application to meet certain motion specifications. 3. Synthesize various mechanisms by using geometric method, algebraic methods and complex number method. 4. Analyze complex mechanism by using graphical methods.
12.	II	MDE1164	Engineering Acoustics	After successful completion of the course, students will be able to, 1. Determine acoustic parameters in terms of decibel levels for pressure, power, intensity and impedance. 2. Calculate sound levels by applying 1-D wave equation for air-borne and structure borne sound. 3. Estimate absorption coefficient for different acoustic materials. 4. Measure sound levels for mechanical systems and reduce it up to audible range by using suitable method.
13.	II	MDE1174	Fracture Mechanics	At the end of the course, the student will be able to: 1. Explain the mechanism of fracture in ductile and brittle materials 2. Explain the micro mechanisms of brittle and ductile fracture 3. Analyze the fatigue and fracture behavior of materials. 4. Apply the knowledge for failure analysis and case studies 5. Estimate crack tip opening displacement (CD) and J-integral.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
14.	II	MDE1184	Product Design and Development	After successful completion of the course, students will be able to, 1. Explore and analyze product development processes used in product design and development. 2. Identify and apply various product development techniques. 3. Analyze, evaluate and apply design consideration like concurrent engineering, aesthetic and ergonomical for industrial product design. 4. Apply different methods, tools and technique to create new product design for consumer product.
15.	I	MDE1194	Rapid Manufacturing Techniques	At the end of the course the student will be able to, 1. Identify suitable time compression techniques for rapid product development. 2. Model complex engineering products and develop process plans for rapid production. 3. Analyze and select a rapid manufacturing technology for a given component. 4. Identify the errors during generation of STL files and minimize them. 5. Optimize FDM process parameters to improve the quality of the parts.
16.	II	MDE1204	Rotor Dynamics	After successful completion of the course, students will be able to, 1. Model the Rotor bearing systems and formulate the governing equations. 2. Describe the role of damping, stiffness and inertia effects. 3. Compute the critical speeds and stability limits. 4. Analyze the rotors using transfer matrix method. 5. Compute the transient response of rotors.
17.	II	MDE1214	Design for Optimization	After successful completion of the course, students will be able to, 1. Identify and apply mathematical models in optimization method. 2. Recognize the suitable method of optimization in non linear programming with and without constraints. 3. Apply optimization method for static applications like shafts and springs. 4. Design dynamic applications like linkage mechanism by using optimization method 5. Use genetic algorithm, ANN and Fuzzy logic to optimize various design parameters.
18.	II	MDE1224	Robotics	After successful completion of the course, students will be able to, 1. Comprehend basic terminologies and concepts associated with Robotics and Automation 2. Demonstrate comprehension of various Robotic sub-systems

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Compute kinematics and dynamics to explain exact working pattern of robots 4. Design and select robots for Industrial and Non - Industrial applications
19.	II	MDE1234	Multi-Body Dynamics	After successful completion of the course, students will be able to, 1. Derive equations of motion for interconnected bodies in multi-body systems with three dimensional motion. 2. Implement and analyze methods of formulating equations of motion for interconnected bodies. 3. Write programs to solve constrained differential equations for analyzing multi-body systems. 4. Simulate and analyze all types of static and dynamic behaviors of the multi-body systems. 5. Lead team projects in academic research or the industry that require modeling and simulation of multi-body systems. 6. Demonstrate an improved technical writing and presentation skills.
20.	II	MDE1244	Research Methodology & IPR	After successful completion of the course, students will be able to, 1. Formulate a research problem. 2. Analyze research related information. 3. Prepare and present research proposal/paper by following research ethics. 4. Make effective use of computers and computing tools to search information, analyze information and prepare report. 5. Describe nature and processes involved in development of intellectual property rights
21.	II	MDE1254	Design Engineering Lab-II	After successful completion of the course, students will be able to, 1. Apply basics of MATLAB programming for Engineering applications. 2. Compute differentiation of single variable using MATLAB. 3. Solve Numerical Integration problems using MATLAB. 4. Solve Linear and Non Linear equations using MATLAB. 5. Solve Linear Least Square Regression problems using MATLAB. 6. Solve Ordinary Differential Equation using MATLAB
22.	II	MDE1264	Vibration and Acoustics Laboratory	After successful completion of the course, students will be able to, 1. Estimate natural frequency, damping factor, modal density of given component experimentally.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				2. Extract experimental mode shapes of plates. 3. Predict fault of machine by vibration and sound measurement
23.	II	MDE1274	Mini Project	After successful completion of the course, students will be able to, 1. Identify structural engineering problems reviewing available literature. 2. Study different techniques used to analyze complex structural systems. 3. Work on the solutions given and present solution by using his/her technique applying engineering principles
24.	II	MDE1284	Seminar	After successful completion of the course, students will be able to, 1. Survey the literature such as books, national/international refereed journals and contact resource persons for the selected topic of Seminar. 2. Learn to write technical reports. 3. Develop oral and written communication skills to present and defend their work in front of Department Post Graduate Committee.
25.	III	MDE2014	Industry Internship	After successful completion of the course, students will be able to, 1. Identify the real applications and practices of courses studied, at industry level 2. Recognize various modeling, analysis and validation techniques adopted at industries 3. Demonstrate the issues at design, manufacturing and assembly levels 4. Summarize and present technical data in report format
26.	III	MOE2010	Artificial Intelligence - Machine Learnin	After successful completion of the course, students will be able to, 1. Describe central machine learning methods and techniques and how they relate to artificial intelligence 2. Differentiate between supervised and unsupervised learning techniques 3. Apply the ML algorithms to a real-world problem, 4. Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. 1. Evaluate a given problem and apply appropriate machine learning technique
27.	III	MOE2020	Creative Thinking: Tools & Technique	After successful completion of the course, students will be able to, 1. Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios 2. Apply different brainstorming techniques in

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				group activities 3. Be proficient in the application of the 6 thinking hats tool in different life scenarios 4. Develop a systematic approach to idea generation through the use of morphological analysis 5. Innovate on an existing product, service or situation applying the SCAMPER method 6. Get confident with the theory of inventive problem solving, called TRIZ 7. Select and apply the appropriate technique based on the opportunity to seize or the problem to tackle
28.	II	MOE2030	MOOC Course	After successful completion of the course, students will be able to, 1.Identify the real applications and practices of courses studied, at industry level 2. Recognize various modeling, analysis and validation techniques adopted at industries. 3. Demonstrate the issues at design, manufacturing and assembly levels. 4. Summarize and present technical data in report format.
29.	II	MDE2040	Condition Monitoring and Signal Processing	After successful completion of the course, students will be able to, 1. Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors. 2. Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. 3. Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure. 4. Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. 5. Identify vibration measurement, lubrication oil analysis
30.	III	MDE2050	Aircraft Conceptual Design	After successful completion of the course, students will be able to: 1. Understand the design process of aircraft and decide the aircraft configuration. 2. Choose type of power plant as per flight regime. 3. Decide the fuselage layout as per type of aircraft. 4. Design the wing for type of aircraft and its wing loading. 5. Accurately evaluate lift, drag and mass for

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				design synthesis process. 6. Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design
31.	III	MDE2024	Dissertation Stage-I	After successful completion of the course, students will be able to, 1. Explain the contributions of various researchers in the field of design engg after carrying out literature survey from reputed journals 2. Recognize the gap in the research and define a problem statement 3. Explain significance and applicability of problem statement 4. Summarize and present technical data in report format
32.	III	MDE2034	Dissertation Stage-II	After successful completion of the course, students will be able to, 1. Outline the work plan for problem statement 2. Identify the proper modelling and analysis tool 3. Reproduce the preliminary results of problem statement 4. Summarize and present technical data in report format
33.	IV	MDE2044	Dissertation Stage-III	After successful completion of the course, students will be able to, 1. Explain the issues related to method adopted in solving the problem 2. Select proper technique in solving the problem 3. Compare the results with available literature
34.	IV	MDE2054	Dissertation Stage-IV	After successful completion of the course, students will be able to, 1. Design new methodology to address the problem 2. Justify the results obtained from new methodology 3. Write technical report and defend work

PG Mechanical Manufacturing Engg

- **Department Name :-Mechanical Engineering**
- **PG Program Name:-Mechanical Manufacturing Engg.**
- **Vision:**

  To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers

- **Mission**
- To develop state-of–the-art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.
- To build the competency to transform students into globally competent mechanical engineers by imparting quality education.
- To collaborate with research organizations, reputed educational institutions, industries and alumni for excellence in teaching, research and consultancy practices

Sr. No.	Program Outcomes
1.	An ability to independently carry out research /investigation and development work to solve practical problems
2.	An ability to write and present a substantial technical report/document
3.	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
4.	To accomplish collaborative and multi-disciplinary scientific research with consideration of professional, legal, and ethical issues.
5.	Manage the projects and its financial aspects on the strength of engineering knowledge and management principles.
6.	Engage in lifelong learning to address contemporary issues through independent and reflective learning.

Programme Educational Objectives for the M. Tech Mechanical Manufacturing Engg.

PEO1: - Graduates will apply knowledge of manufacturing engineering to design, model, simulate and solve problems to develop most efficient manufacturing systems to pursue successful career in the field of Mechanical Engineering.

PEO2: - Graduates will have technical competency in thermal engineering or related areas to become innovators, academicians and provide services to address technical, business and social challenges

PEO3: - Graduates will engage in lifelong learning such as higher studies, research and other continuous professional development activities.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
2.	I	SHP513	Advanced Mathematical Methods in Engineering	After successful completion of this course students should be able to- 1. Evaluate Fourier series for given function and apply it to solve the partial differential equations in Engineering problems. 2. Apply the specific method of solution of partial differential equations for solving the given problems 3. Formulate and solve a boundary value problem (Partial differential equation, boundary and initial conditions). 4. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. 5. Estimate numerically the solution of given algebraic equation. 6. Analyze the variance and explain the different research designs.
3.	I	MMF1010	Advanced Manufacturing Technology	After successful completion of the course, students will be able to, 1. Select appropriate process for manufacturing products. 2. Have appropriate degree of competency in the evaluation of various manufacturing technologies and their applications in modern manufacturing processes. 3. Demonstrate competency in specification and use of materials for die & tool.
4.	I	MMF1020	Digital Manufacturing Systems	After successful completion of the course, students will be able to, 1. Identify the challenges of manufacturingsystems. 2. Develop & implement Flexible ManufacturingSystem. 3. Interpret the Computer Integrated Manufacturing Systems and Reconfigurable ManufacturingSystems. 4. Use lean tools to improve performance of manufacturingsystems.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				5. Use AI in systemdesign.
5.	I	MMF1030	Advanced System components & Integration (Program Elective-I)	At the end of course students must be able to: 1. Identify hardware and software issues for system integration in process and manufacturing automation and be able to offer solutions. 2. Use engineering software tools such as VB & C++, .NET, NetDDE, OPC (including COM & DCOM), web services, HMI, DLLs and APIs. 3. Specify hardware and software components and functions of advanced systems such as robotics and vision, automated work cells, flexible manufacturing systems, and computer integrated manufacturing as related to plant wide automated system integration and IIoT. 4. Implementation of Fuzzy Logic and Neural Network Control Systems, and identify advantages, and disadvantages of such controllers. 5. Select state-of-the art advanced sensors and actuators for process and manufacturing automation systems. 6. Describe and apply wireless standards and applications used in industrial automation projects. 7. Apply process and machine safety standards in the design, integration and maintenance of process automation systems.
6.	I	MMF1040	Artificial Intelligence & Machine Learning Fundamentals (Program Elective-I)	After successful completion of the course, students will be able to, 1. Develop problem solving methodology using AI & MI. 2. Use popular AI & ML technologies like Python, Tensorflow and Keras to develop applications.
7.	I	MMF1050	Mechatronics System Design for Manufacturing (Program Elective-I)	After successful completion of the course, students will be able to, 1. Demonstrate the method and importance of integration of Mechanical, Electronics and Control in the design of Mechatronicssystem. 2. Select key elements of sensors and transducers and interfacing the same with problem under consideration throughPLC. 3. Apply basic knowledge of microprocessor and interface it with computer for real life applications inmanufacturing.
8.	I	MMF1060	Industrial	After successful completion of the course,

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Network & Controllers (Program Elective-I)	students will be able to, 22. Design Industrial Networking architecture. 23. Select networking technologies for industrial automation applications. 24. Follow I/O bus installation and wiring connections guidelines for setting up industrial networks. 25. Design, configure, and program fieldbus networks.Program the communication among industrial automation controllers.
9.	I	MMF1070	Solidification Processes (Program Elective-II)	After successful completion of the course, students will be able to, 1. Design gating &Risering system forcasting. 2. Select the proper advanced castingmethod. 3. Develop plastic shaping process for newproduct. 4. Select suitable manufacturing method for glass & rubber products. 5. Use appropriate welding technique as per application.
10	I	MMF1080	Digital Process Control (Program Elective-II)	After successful completion of the course, students will be able to, 1. Design, model & tune digital PID controllers. 2. Analyze system variables using MATLAB/SIMULINK.
11	I	MMF1090	Machine Vision & Applications (Program Elective-II)	After successful completion of this course students should be able to- **1.**
12	I	MMF1100	Advanced MEMS Fabrication & Microfluidics (Program Elective-II)	After successful completion of the course, students will be able to, 1. Design MEMS device using basic planer & non-planer microfabrication method. 2. Demonstrate use of various methods & techniques for microfluidics actuation control.
13	I	SHP551	Technical Communication	After successful completion of the course, students will be able to, 1. Acquire skills required for good oral and writtencommunication 2. Demonstrate improved writing and readingskills 3. Ensure the good quality of oral and writtencommunication.
14	I	MMF1110	Software Proficiency-I	After successful completion of the course, students will be able to, 1. Develop/ select appropriate orientation of the casting & partingplane. 2. Calculate modulus of the casting & number of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				cavities in themould. 3. Calculation of riser & gating systemdesign. 4. Calculating the yield of thecasting.
15	I	MMF1120	Manufacturing Simulation Lab	After successful completion of the course, students will be able to, 1. Demonstrate the broad applicability of discrete-event simulation to solve complex manufacturing systemsproblems 2. apply the essential steps of the simulationmethodology 3. Learn to use the WITNESS 13/Arena Simulation Software Tool to build credible valid simulation models, design and run simulation experiments, and critically evaluate decision-support simulationresults. 4. Learn analytical techniques for interpreting input data and output results pertinent to simulationmodels. 5. Gain insight into system behavior by measuring the performance characteristics of proposed new manufacturing system or the impact of proposed changes for existing manufacturingsystem.
16	II	MMF2010	Metal Cutting & Tool Design	After successful completion of the course, students will be able to, 1. Analyze fundamental phenomena in metal cutting and grinding, through application of the principles of mechanics, materials, and allied engineering fields. 2. Develop quantitative and qualitative skills necessary to address practical issues pertaining to machining productivity and innovation and machine stability. 3. Design of press tools for given component.
17	II	MMF2020	Robotics & Computer Integrated Manufacturing	After successful completion of the course, students will be able to, 1. Evaluate the different mechanical configurations/systems available for a modern industrial robot used in automated manufacturing. 2. Analyze complex robot kinematic theory and devise kinematic calculations for a determining position of robot tool in space. 3. Program an industrial robot to perform a specifiedtask used in material handling &packaging.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				4. Apply & use machine vision & image processing in real life.
18	II	MMF2030	Material Characterization & Failure Analysis (Program Elective III)	After successful completion of the course, students will be able to, 1. Interpret various materials characterizationtechniques. 2. Select the characterization tool for specificapplication 3. Analyze the characterization results by variousequipment 4. Analyze the reasons for failure and suggest remedialactions
19	II	MMF2040	System Modelling & Simulation (Program Elective III)	After successful completion of the course, students will be able to, **1.** Model any system from different fields. **2.** Implement numerical algorithm to meet simple requirements, expressed in English **3.** Discuss the simulation methods and select the suitable technique on the problems.
20	II	MMF2050	Advanced Concepts in Polymer Processing (Program Elective III)	After successful completion of the course, students will be able to, 1. Explain the fundamental background sciences to processing ofpolymeric materials: rheology, heat transfer and solidificationprocesses. 2. Explainbothpracticalandtheoreticalfundamentalsofinjectionmoldingand extrusion technology, including basic knowledge of the molding process & die design. 3. Design die for injection/blow molded simpleproduct. 4. Use and to interpret data obtained by modern computer-based methods simulating processing.
21	II	MMF2060	Additive Manufacturing (Program Elective III)	After successful completion of the course, students will be able to, 1. Capture digital data from a design the object and make a manufactured model. 2. Define and apply criterion for selecting appropriate additive manufacturing process for any given application. 3. Investigate application domain of additive manufacturing.
22	II	MMF2070	Sustainable Manufacturing Processes (Program Elective IV)	After successful completion of the course, students will be able to, 1. Understand the three pillars of sustainability and how they are manifested in sustainable manufacturing. 2. Incorporate economic, environmental, and

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				social aspects into decision making processes using multi-criteria decision-making methods. 3. Identify the link between manufacturing process models and sustainable manufacturing metrics for product and process improvement 4. Identify manufacturing system level sustainability issues and how they are linked with manufacturing process level issues.
23	II	MMF2080	Logistic & Supply Chain Management (Program Elective IV)	After successful completion of the course, students will be able to, 1. Discuss and describe the key issues in SCM and logisticnetwork. 2. Demonstrate Bullwhip effect in SCM and Develop physical distributionstrategies 3. Decide the location of warehouses and Develop various inventory models based on risk anduncertainty. 4. Design and develop strategic alliances like 3PL, supplier-retailerrelationship
24	II	MMF2090	Lean Thinking and Practices (Program Elective IV)	After successful completion of the course, students will be able to, 1. To understand issues & challenges in implementing & developing lean manufacturing technique & its contribution for improving organizational performance. 2. Analyze how lean techniques can be applied to manufacturing & service industry 3. Developing lean management strategy for Supply chain management. 4. Analyzing how lean technique can create value generation for organization.
25	II	MMF2100	Six Sigma Statistics with Excel and Minitab (Program Elective IV)	After successful completion of the course, students will be able to, 1. Explain Six Sigma Methodology 2. Generate process capability indices 3. Perform ANOVA 4. Perform regression analysis 5. Design experiments 6. Perform measurement system analysis
26	II	MMF2110	Research Methodology & IPR	After successful completion of the course, students will be able to, 1. Formulate a research problem. 2. Analyze research relatedinformation

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Prepare and present research proposal/paper by following research ethics 4. Make effective use ofcomputers and computing tools to search information, analyze information and preparereport. 5. Describe nature and processes involved in development of intellectual property rights and file apatent.
27	II	MMF2120	CAM Lab.	After successful completion of the course, students will be able to, 1. Develop sketches using suitable CADsoftware. 2. Develop part models using suitable CADsoftware. 3. Develop Assembly model using suitable CAD software. 4. Develop 2D drawings using suitable CADsoftware. 5. Generate tool path and part program for plain millingoperation. 6. Generate tool path and part program for pocket millingoperation. 7. Generate tool path and part program for contour millingoperation. 8. Generate tool path and part program for turningoperation.
28	II	MMF2130	Software Proficiency-II	After successful completion of the course, students will be able to, 1. Develop/ select appropriate model required forsimulation. 2. Apply proper constraints and boundaryconditions. 3. Select suitable solver settings of simulationsoftware. 4. Apply different post processing techniques to interpret theresults.
29	II	MMF2140	Mini Project	After successful completion of the course, students will be able to, 1. Identify structural engineering problems reviewing availableliterature. 2. Study different techniques used to analyze complex structuralsystems. 3. Work on the solutions given and present solution by using his/her technique applying engineeringprinciples.
30	III	MMF3010	Industry Internship	After successful completion of the course, students will be able to, 1. Identify the real applications and practices of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				courses studied, at industry level 2. Recognize various modeling, analysis and validation techniques adopted at industries. 3. Demonstrate the issues at design, manufacturing and assembly levels 4. Summarize and present technical data in report format.
31	III	MMF3020	MOOC Course	After successful completion of the course, students will be able to, 1. Identify the real applications and practices of courses studied, at industrylevel 2. Recognize various modeling, analysis and validation techniques adopted at industries. 3. Demonstrate the issues at design, manufacturing and assemblylevels. 4. Summarize and present technical data in reportformat.
32	III	MMF3030	Dissertation Phase-I	After successful completion of the course, students will be able to, 1. Explain the contributions of various researchers in the field of design engg after carrying out literature survey from reputedjournals. 2. Recognize the gap in the research and define a problem statement 3. Explain significance and applicability of problemstatement 4. Summarize and present technical data in report format.
33	III	MMF3040	Dissertation Phase-II	After successful completion of the course, students will be able to, 1. Outline the work plan for problem statement 2. Identify the proper modeling and analysis tool 3. Reproduce the preliminary results of problem statement 4. Summarize and present technical data in report format
34	IV	MMF4010	Dissertation Phase-III	After successful completion of the course, students will be able to, 1. Explain the issues related to method adopted in solving the problem 2. Select proper technique in solving the problem 3. Compare the results with available literature
35	IV	MMF4020	Dissertation Viva-Voce	After successful completion of the course, students will be able to, 1. Design new methodology to address the

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				problem 2. Justify the results obtained from new methodology 3. Write technical report and defend work.
36	III	MTE3021	Dissertation Phase I	After successful completion of this course students should be able to- 1. Explain the contributions of various researchers in the field of thermal engineering after carrying out literature survey from reputed journals 2. Recognize the gap in the research and define a problem statement 3. Explain significance and applicability of problem statement 4. Summarize and present technical data in report format
37	III	MTE3031	Dissertation Phase II	After successful completion of this course students should be able to- 1. Outline the work plan for problem statement 2. Identify the proper modeling and analysis tool 3. Reproduce the preliminary results of problem statement 4. Summarize and present technical data in report format
38	IV	MTE4011	Dissertation Phase III	After successful completion of this course students should be able to- 1. Explain the issues related to method adopted in solving the problem 2. Select proper technique in solving the problem 3. Compare the results with available literature.
39	IV	MTE4021	Dissertation Phase- IV	After successful completion of this course students should be able to- 1. Design new methodology to address the problem 2. Justify the results obtained from new methodology 3. Write technical report and defend work.

PG Thermal Engineering

- **Department Name :-Mechanical Engineering**
- **PG Program Name :-Mechanical Thermal Engineering**
- **Vision:**

  To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers

- **Mission**
- To develop state-of–the-art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.
- To build the competency to transform students into globally competent mechanical engineers by imparting quality education.
- To collaborate with research organizations, reputed educational institutions, industries and alumni for excellence in teaching, research and consultancy practices

Sr. No.	Program Outcomes
7.	To independently carry out research /investigation and development work to solve practical problems
8.	To write and present a substantial technical report/document
9.	To demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
10.	To accomplish collaborative and multi-disciplinary scientific research with consideration of professional, legal, and ethical issues.
11.	To Manage the projects and its financial aspects on the strength of engineering knowledge and management principles.
12.	To Engage in lifelong learning to address contemporary issues through independent and reflective learning.

Programme Educational Objectives for the M. Tech Mechanical Thermal Engineering

PEO1: - Graduates will apply concepts of thermal engineering to design, model, simulate and solve problems to develop energy efficient systems to pursue successful career in the field of Mechanical Engineering and allied sciences.

PEO2: - Graduates will have technical competency in thermal engineering or related areas to become innovators, academicians and provide services to address technical, business and social challenges.

PEO3: - Graduates will involve in lifelong learning such as higher studies, research to maintain professionalism and ethical standards.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SHP5131	Advanced Mathematical Methods in Engineering	After successful completion of this course students should be able to- 7. Evaluate Fourier series for given function and apply it to solve the partial differential equations in Engineering problems. 8. Apply the specific method of solution of partial differential equations for solving the given problems 9. Formulate and solve a boundary value problem (Partial differential equation, boundary and initial conditions). 10. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. 11. Estimate numerically the solution of given algebraic equation. 12. Analyze the variance and explain the different research designs.
2.	I	MTE1011	Classical and Statistical Thermodynamics	After successful completion of this course students should be able to- 4. Explain different behavior of gases and thermodynamic relations 5. Interpret thermodynamics property relations to various mixtures and solutions. 6. Compare thermodynamics equilibrium of system 7. Explain the kinetic theory of gases. 8. Apply the principle of statistical thermodynamics to the various processes. 9. Develop and analyze the various thermodynamic cycles.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
3.	I	MTE1021	Principles of Heat Transfer	After successful completion of this course students should be able to- **1.** Analyze heat conduction and Radiation **2.** Develop a solution to heat convection to external laminar flow **3.** Formulate heat convection to internal laminar flow. **4.** Examine heat convection in turbulent flow **5.** Interpret convection with phase change **6.** Solve heat transfer problem numerically
4.	I	MTE1031	Advanced Fluid Mechanics	After successful completion of this course students should be able to- 8. Explain basic concepts in the fluid mechanics. 9. Analyze practical problems of fluid flow. 10. Explain concepts of boundary layer theory. 11. Evaluate the performance of fluid flow devices in laminar and turbulent flows. 12. Apply the concepts in the analysis of fluid flow problems.
5.	I	MTE1041	Design of Pumps, Compressor and Blower	After successful completion of this course students should be able to- 3. Select suitable pump, blower, fan and compressor for a given application. 4. Design pump, blower, fan or compressor for a given application. 5. Analyze the performance of compressor and pump 6. Model and simulate pump, blower, fan and compressor.
6.	I	MTE1051	Gas turbine and Jet Propulsion	After successful completion of this course students should be able to- 4. Describe the ideal and real thermodynamic cycles of air-breathing engines and Industrial gas turbines. 5. Design the blading, study the velocity triangles and estimate the performance of centrifugal and axial flow compressors. 6. Explain the combustion process and design the combustion chamber of a gas turbine. 7. Design the blading, study the velocity triangles and estimate the performance of axial and radial in-flow turbines. 8. Analyze off-design performance and matching of the components of a gas turbine.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
7.	I	MET1061	Finite Element Method for Thermal Engineering (Program Elective-I)	After successful completion of this course students should be able to- 26. Establish the mathematical model for the complex analysis problems and predict the nature of the solution. 27. Formulate element characteristic matrices and vectors. 28. Identify the boundary conditions and their incorporation into FE equation 29. Analyze simple geometry problems for Thermal and stress analysis. 30. Interpret the analysis results for the improvement or modification of the system.
8.	I	MTE1071	Hybrid & Electric Vehicles (Program Elective-I)	After successful completion of this course students should be able to- 6. Select suitable drive scheme for developing an electric hybrid vehicle. 7. Design and develop basic schemes of electric vehicles and hybrid electric vehicles. 8. Choose proper energy storage systems, electric machine and drive train for vehicle applications. 9. Analyze various communication protocols and technologies used in vehicle networks.
9.	I	MTE1081	Materials for Thermal System (Program Elective-II)	After successful completion of this course students should be able to- 3. Select suitable material for thermal systems 4. Justify use and suitability of thermal materials for different systems 5. Compose advanced materials for different application 6. Explain applications of thermal materials
10.	I	MTE1091	Solar Energy (Program Elective-II)	After successful completion of this course students should be able to- **2.** Estimate and quantify available solar radiation **3.** Design the components of solar energy systems. **4.** Justify economics of the solar energy systems
11.	I	MTE1101	Power Plant Engineering Elective-II)	After successful completion of this course students should be able to- 3. Explain analytical and technological aspects of power plant design, systems and their effects.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				4. Analyze and explain various power plants. 5. Summarize advanced power cycles. 6. Recognize environmental issues. 7. Estimate economics of power plants.
12.	I	MTE1111	Modeling Lab	After successful completion of this course students should be able to- **1.** Model the components of thermal system using suitable software. **2.** Create computational domain for selected geometry. Generate mesh and refine mesh elements of given geometry.
13.	I	MTE1121	Thermal Engineering Lab-I	After successful completion of this course students should be able to- 5. Conduct test and interpret the theoretical and experimental data of conduction and convection experiments. 6. Relate the theory and the experimentation pertaining to thermal system. 7. Examine various thermal systems
14.	I	MTE1131	Computational Methods in Thermal Engineering Lab	After successful completion of this course students should be able to- 6. Develop codes for numerical methods to tackle simple thermal problems 7. Simulate codes of computational methods of given conditions 8. Analyze and validate output of written codes with analytical solution.
15.	I	SHP551	Technical Communication	After successful completion of this course students should be able to- **4.** Acquire skills required for good oral and written communication **5.** Demonstrateimproved writing and reading skills **6.** Ensure the good quality of oral and written communication
16.	II	MTE2011	Computational Fluid Dynamics	After successful completion of this course students should be able to- 4. Derive governing equations for fluid dynamics and heat transfer. 5. Develop finite difference algorithms for fluid flow and heat transfer problems. 6. Develop finite volume algorithms for fluid dynamics equations. 7. Select appropriate grid generation methods for CFD analysis. 8. Apply different CFD Techniques to various fluid flow problems

Sr. No.	Semester	Course Code	Course Name	Course Outcome
17.	II	MTE2021	Design and Analysis of Thermal System	After successful completion of this course students should be able to- **1.** Illustrate basic principles of modeling and optimization of design of thermal systems. **2.** Design thermal systems. **3.** Analyze thermal system.
18.	II	MTE2031	Design of Heat Transfer Equipment (Program Elective III)	After successful completion of this course students should be able to- **1.** Select suitable heat exchanger for particular application. **2.** Design of heat exchanger. **3.** Design and analyse boiler furnace. Analyse different heat transfer equipments.
19.	II	MTE2041	Cryogenics Engineering (Program Elective III)	After successful completion of this course students should be able to- **4.** Apply the basic principles of low temperature engineering. **5.** Explain the behavior of solids and liquid at low temperatures **6.** Analyze cryogenic systems. **7.** Discuss gas separation systems. **8.** Design Heat Exchangers for Cryogenic System.
20.	II	MTE2051	Food Processing, Preservation and Transport (Program Elective III)	After successful completion of this course students should be able to- 5. Analyze mechanism of food spoilage 6. Design suitable food processing and preservation system 7. Select suitable cold storage system 8. Design and analysis transport system of preserved foods 9. Model the preservation system
21.	II	MTE2061	Battery Thermal Management System (Program Elective III)	After successful completion of this course students should be able to- 4. Illustrate major functions and parts of a battery-management system. 5. Design various configurations of battery pack and recent trends in battery pack. 6. Compute stored energy in a battery pack. 7. Measure and control current, temperature, and isolation in battery-management system
22.	II	MTE2071	Heating Ventilation Air Conditioning and Refrigeration Systems	After successful completion of this course students should be able to- 5. Explain different vapor compression refrigeration system and refrigerants. 6. Design of cooling and heating

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			(Program Elective IV)	components of refrigeration system 7. Explain fundamentals of air conditioning and estimate cooling load on the building by considering various heat sources 8. Illustrate various air conditioning systems. 9. Design ducting systems and select air distribution system. 10. Explain air handling units in various applications.
23.	II	MTE2081	Energy Audit and Management (Program Elective IV)	After successful completion of this course students should be able to- 5. Summarize energy scenario and the need for energy conservation. 6. Conduct energy audit of a system 7. Illustrate various techniques of waste heat recovery and cogeneration. 8. Explain the various measures for energy conservation and financial implications for various thermal utilities.
24.	II	MTE2091	Cogeneration and Waste Heat Management (Program Elective IV)	After successful completion of this course students should be able to- 5. Estimate and quantify available waste heat 6. Explore different waste heat recovery systems 7. Explain economics of cogeneration and waste heat recovery systems 8. Illustrate different cogeneration techniques.
25.	II	MTE2101	Advanced Thermal Storage Technology (Program Elective IV)	After successful completion of this course students should be able to- 7. Select thermal storage systems and the storage materials 8. Develop a model and analyze the thermal storage systems 9. Explain applications of thermal storage systems
26.	II	MTE2111	Research Methodology & IPR	After successful completion of this course students should be able to- 6. Formulate a research problem. 7. Analyze research related information. 8. Prepare and present research proposal/paper by following research ethics. 9. Make effective use of computers and computing tools to search information, analyze information and prepare report. 10. Describe nature and processes involved

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				in development of intellectual property rights
27.	II	MTE2121	Computational Fluid Dynamics Lab	After successful completion of this course students should be able to- 9. Formulate problems in fluid flow and heat transfer. 10. Apply initial and boundary conditions to solve heat transfer problems. 11. Use ANSYS-Fluent for solving real life engineering problems
28.	II	MTE2131	Thermal Engineering Lab-II	After successful completion of this course students should be able to- 5. Evaluate COP of different refrigeration systems. 6. Estimate cooling load needed for given space. 7. Design a refrigeration and air conditioning system for given application. 8. Calculate efficiency and effectiveness of different types of heat exchangers.
29.	II	MTE2141	Mini Project	After successful completion of this course students should be able to- 4. Solve a live problem using software/analytical/Experimental/computational tools. 5. Write technical reports. 6. Develop skills to present the findings.
30.	III	MTE3011	Industry Internship	After successful completion of this course students should be able to- **1.** Identify the real applications and practices of courses studied, at industry level **2.** Recognize various modeling, analysis and validation techniques adopted at industries. **3.** Demonstrate the issues at design, manufacturing and assembly levels. **4.** Summarize and present technical data in report format.
31.	III	MOE2010	Artificial Intelligence – Machine Learning	After successful completion of this course students should be able to- **1.** Describe central machine learning methods and techniques and how they relate to artificial intelligence **2.** Differentiate between supervised and unsupervised learning techniques **3.** Apply the ML algorithms to a real-world problem, **4.** Optimize the models learned and report

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				on the expected accuracy that can be achieved by applying the models. **5.** Evaluate a given problem and apply appropriate machine learning technique
32.	III	MOE2020	Creative Thinking: Tools & Techniques	After successful completion of this course students should be able to- **1.** Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios **2.** Apply different brainstorming techniques in group activities **3.** Be proficient in the application of the 6 thinking hats tool in different life scenarios **4.** Develop a systematic approach to idea generation through the use of morphological analysis **5.** Innovate on an existing product, service or situation applying the SCAMPER method **6.** Get confident with the theory of inventive problem solving, called TRIZ **7.** Select and apply the appropriate technique based on the opportunity to seize or the problem to tackle
33.	III	MOE2030	MOOC Course	After successful completion of this course students should be able to- **1.** Identify the real application and practices of the courses studied, at the industry level. **2.** Recognize various modeling ,analysis and validation techniques adopted at industries. **3.** Demonstrate the issue at design, manufacturing and assembly level
34.	III	MOE2040	Condition Monitoring and Signal Processing	After successful completion of this course students should be able to- **1.** Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors. **2.** Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. **3.** Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				4. Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. **5.** Identify vibration measurement, lubrication oil analysis.
35.	III	MOE2050	Aircraft Conceptual Design	After successful completion of this course students should be able to- **1.** Understand the design process of aircraft and decide the aircraft configuration. **2.** Choose type of power plant as per flight regime. **3.** Decide the fuselage layout as per type of aircraft. **4.** Design the wing for type of aircraft and its wing loading. **5.** Accurately evaluate lift, drag and mass for design synthesis process. **6.** Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design.
36.	III	MTE3021	Dissertation Phase I	After successful completion of this course students should be able to- 5. Explain the contributions of various researchers in the field of thermal engineering after carrying out literature survey from reputed journals 6. Recognize the gap in the research and define a problem statement 7. Explain significance and applicability of problem statement 8. Summarize and present technical data in report format
37.	III	MTE3031	Dissertation Phase II	After successful completion of this course students should be able to- 5. Outline the work plan for problem statement 6. Identify the proper modeling and analysis tool 7. Reproduce the preliminary results of problem statement 8. Summarize and present technical data in report format
38.	IV	MTE4011	Dissertation Phase III	After successful completion of this course students should be able to- 4. Explain the issues related to method adopted in solving the problem 5. Select proper technique in solving the problem

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				6. Compare the results with available literature.
39.	IV	MTE4021	Dissertation Phase- IV	After successful completion of this course students should be able to- 4. Design new methodology to address the problem 5. Justify the results obtained from new methodology 6. Write technical report and defend work.

Science & Humanities

Department of Sciences and Humanities

Sl. No.	Semester	Course Code	Course Name	Course Outcomes
1	I	SH 1034	Engineering Chemistry	Relate to the basic concepts of chemistry in engineering
				Select the correct instrumental techniques for the examination of materials.
				Examine water quality for industrial and domestic sector and suggest remedial measures
				Illustrate construction, working and applications of batteries and fuel cells
				Identify causes of corrosion and its remedial measures
				Compare types and quality of fuels and lubricants
2	I	SH 1054	Engineering Mathematics I	Solve problems on improper and multiple integrals.
				Sketch the curve and use it to solve the problems on rectification and multiple integral.
				Prove the results of partial differentiation.
				Apply partial differentiation for problems on Jacobian, Errors and approximations, maxima and minima.
3	I	SH1292	Electrical Engineering	Solve magnetic circuits, d.c. and a.c. electric circuits.
				Explain construction, working and application of transformers.
				Explain construction, working and application of different types of commonly used rotating machines.
				Classify power converters on the basis of their applications.
				Select suitable capacity of wires, cables switchgear and illumination system for low voltage electrical installations.
4	I	SH1331	Programming for Problem Solving	Explain the basic terminology and concepts of C programming language.
				Construct Algorithm and Flow Chart for the given problem.
				Write, Compile and execute ‘C’ programs for a given problem.
				Examine the given C Program to predict the output
5	I	SH1533	Engineering Chemistry Lab	Examine the materials by using analytical instruments.
				Identify the quality of water for industrial and domestic purposes.
				Apply the knowledge of electrochemistry for design of various cells and batteries.
				Select proper Lubricant for different machines according to working condition.
				Inspect the quality of fuel.

Sl. No.	Semester	Course Code	Course Name	Course Outcomes
6	I	SH1911	Programming for Problem Solving Lab	Describe orally the basic terminology and concepts of C programming language.
				Implement a 'C' program for given problem statement
				Test the implemented 'C' programs by removing syntax & logical errors for getting expected output on various input.
7	I	SH 1832	English Proficiency Lab. I	Demonstrate reception skills of language
				Communicate using oral and written mode.
				Make use of English language with grammatical accuracy.
				Articulate correctly the frequently used words using phonemic transcriptions
8	I	SH1851	Engineering Practice Lab. I	Acquire skills in basic engineering practice.
				Use of hand tools and power tools.
				Develop sheet metal model for specific application.
				Understand the various operations performed in machine shop.
				Perform different joining operations
				Perform pipe fittings operations.
9	II	SH 1311	Engineering Physics	Compare the behaviour of mechanical system under damping and external periodic force
				Use principle of interference in thin reflecting films with uniform and non-uniform thickness
				Solve problems of 1-d potential box using principles of quantum physics
				Illustrate the types of semiconductor, hall effect, basics of laser production with application and fiber optics communication
10	II	SH1024	Engineering Mathematics II	Use the concepts of matrices that serve as an essential basis for several computational techniques
				Solve the problems on ordinary differential equations analytically and numerically.
				Make use of different methods to solve simultaneous algebraic linear equations.
				Apply the relevant numerical method for interpolating the polynomial.
11	II	SH1133	Engineering Graphics	Draw the projections of line, plane and regular solids with respect to reference planes as per given conditions
				Generate sectional view, true shape of sections and development of lateral surfaces of regular solids
				Prepare orthographic views of engineering components.
				Develop isometric view from orthographic views.

Sl. No.	Semester	Course Code	Course Name	Course Outcomes
12	II	SE1012	Basics of Electronics Engineering	Recognize basic analog and digital devices used for different electronic applications.
				Explain working principle of diode, transistor, operational amplifiers logic gates and processors.
				Apply the principles of analog and digital electronics.
				Analyse the different analog and digital electronic circuits.
13	II	SE1052	Basics of Civil Engineering	Apply fundamental knowledge of civil engineering.
				Identify building components and materials used in construction along with concepts of suitability and safety of buildings.
				Use basic principles of planning in the building design and processes involved in the property transactions.
				Determine horizontal and vertical distances using modern surveying instruments.
				Illustrate the infrastructural facilities.
14	II	SE1132	Green Technology	Explain the basic principles of green chemistry and ecology.
				Design Green Building with Green Management.
				Provide solutions to the environmental challenges associated with fossil fuels and other energy resources
				Provide solutions to the environmental challenges associated with waste generation in different scenarios.
				Describe various green innovations for sustainability.
15	II	SE1451	Creativity, Design Thinking and Entrepreneurial Mindset	Learn structured approach to creativity, problem identification and problem solving in a new venture context
				Apply design thinking approach to identify innovation opportunities and develop solutions
				Identify, validate and define specific innovation opportunities through Jobs-to-be-Done methodology
				Develop mindset of a successful entrepreneur.
16	II	SE147	Introduction to Artificial Intelligence	Explain the different terminologies used in Artificial Intelligence.
				Identify engineering and societal problems that can be efficiently solved by artificial intelligence techniques.

Sl. No.	Semester	Course Code	Course Name	Course Outcomes
				Demonstrate the search algorithms to solve problems.
				Apply Python Programming in AI based applications.
				Illustrate the concepts of machine learning.
				Describe the robot tasks, architecture and usage in real world.
17	II	SH1513	Engineering Physics Lab	Develop the skill of performing the experiments relevant to theories in optics, ultrasound, semiconductors, oscillations and magnetic materials
				Use different measuring tools and techniques to conduct the experiments
				Interpret the collected data from experiment to determine the relevant physical quantity.
				Write a lab report which communicates scientific information in a clear manner.
18	II	SH1553	Engineering Graphics Lab	Apply the basic concepts of engineering drawing
				Draw and modify drawings using basic AutoCAD commands.
				Annotate the drawings using basic AutoCAD commands.
19	II	SE1512	Basics of Electronics Engineering Lab	Demonstrate use of various electronic components & equipment's for building applications.
				Build the circuits using Diode, Transistor Electronics Devices.
				Construct various applications using Operational Amplifier like Amplifiers.
				Test the basic logic gates, adders &substractors.
20	II	SE1552	Basics of Civil Engineering Lab	Draw dimensioned sketch/plan of building
				Plan building using principles and bye laws.
				Perform horizontal and vertical measurement.
				Use modern surveying techniques.
21	II	SE1632	Green Technology Lab	Illustrate the concept of green technology in energy and building sector.
				Prepare energy and water budget for a building.
				Design rainwater harvesting for a small catchment area.
				Analyze air quality by using HC/CO analyzer.
22	II	SE1671	Creativity, Design Thinking and Entrepreneurial Mindset	Learn structured approach to creativity, problem identification and problem Solving in a new venture context.
				Apply design thinking approach to identify innovation opportunities and develop solutions.

Sl. No.	Semester	Course Code	Course Name	Course Outcomes
			Lab	Develop mindset of a successful entrepreneur
23	II	SE169	Introduction to Artificial Intelligence Lab	Identify Real Time Problems with their AI solutions.
				Demonstrate and explore the functionalities in different programming frameworks & S/W technologies.
				Solve problems using python programming concepts.
				Implement supervised learning algorithms using python programming to solve the real time problems.
24	II	SH 1621	English Proficiency Lab. II	Organize content for written messages in specific forms
				Demonstrate writing skills through letters, circulars, notices and memos.
				Apply appropriate style and format of report writing to prepare a report or parts of report.
				Apply techniques of online communication to communicate effectively in its various forms like e-mail writing, conferencing and social media.
25	II	SH1641	Engineering Practice Lab II	Make wooden job.
				Make Sheet metal job.
				Make job by various machining processes.
				Make job by joining processes.
26	II	SH1891	Engineering Exploration and Design Project	Explain the role of an engineer as a problem solver
				Design engineering solutions to complex problems utilizing multi-disciplinary systems approach.
				Examine a given problem using process of engineering problem analysis.
				Build simple systems/prototypes using engineering design and development process.
				Analyze engineering solutions from ethical and sustainability perspectives.
				Apply basics of engineering project management skills in project development.

Master of Business Administration (MBA)

- **Department Name :- Management Studies (MBA)**

- **PG Program Name :-Master of Business Administration (MBA)**
- **Vision: -** Achieving excellence in academics and research to develop globally competent and socially responsible managers.
- **Mission:-**
    - To leverage innovation and excellence in academic design, delivery and assessment to ensure ethical and holistic development of students for employability, entrepreneurship and higher education.
    - To design and keep the curricula updated, based on changing needs of industry and society worldwide.
    - To build and maintain world-class infrastructure, for sustained learning, development and research.
    - To provide an environment that encourages creativity, analysis and critical thinking.

Sr. No.	Program Outcomes
1.	Apply knowledge of management theories and practices to solve business problems.
2.	Foster Analytical and critical thinking abilities for data-based decision making
3.	Ability to develop Value-based Leadership ability.
4.	Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business.
5.	Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.
6.	Be capable of self-education and clearly understand the value of lifelong learning.
7.	Be familiar with modern statistical and software tools to analyze business problems.
8.	To examine critically for self-assessment and take corrective measures accordingly without external feedback.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	Semester I	MGC1012	Principles of Management	1. Interpret classical & moderntheories. 2. Apply functions of management in real worldscenarios 3. Communicate effectively about managementdecisions. 4. Analyze recent trends in live management casestudies. 5. Evaluate the current business landscape andtrends.
2.	Semester I	MGC1032	Managerial Economics	1. Evaluate microeconomic and macroeconomic variables and its implication in business decision making. 2. Identify the competitive and global market for making larger presence and leadership. 3. Assess and evaluate macroeconomic variables for selection of best alternatives to maximize profit and value of an organization 4. Identify issues related to development

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				and governance issue that hinder the development 5. Analyse the sectoral development and policies initiated by the governments to improve.
3.	Semester I	MGC1052	Financial Accounting and Analysis	1. Comprehend the fundamental aspects concerning financial accounting. 2. Prepare various accounts and financial statements. 3. Analyse and interpret the financial statements by associating the tools and techniques for effective decision-making. 4. Apply accounting theory and information as a tool for solving managerial problems
4.	Semester I	MGC1072	Legal & Business Environment	1. Develop an understanding about micro & macro elements of businessenvironment. 2. To analyse the major and minor factors affecting the functioning ofbusiness. 3. To provide an overview of important laws that have a bearing on the conduct of business inIndia. 4. Analyse the international environment and strategies adopted by firms toexpand globally. 5. Analyse the dynamics of business environment and its impact on the conduct ofbusiness.
5.	Semester I	MGC1092	Marketing Management	1. Discuss Core concept of marketing and the role of marketing in business andsociety. 2. Develop marketing strategies based on product, price, place andpromotion. 3. Analyse marketing problems and provide solution based on a critical examination of marketinginformation.
6.	Semester I	MGC1112	Organizational Behaviour	1. Analyze the conceptual anchors of Organizationalbehavior 2. Identify personal dimensions of personality. Job satisfaction,motivation andlearning 3. Demonstrate the group dynamics and itsapplicability 4. Explain organizational change and culture effect on working relationships 5. Apply various leadership styles and conflict management strategies used

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				inorganizations.
7.	Semester I	MGC1132	Quantitative Analysis	1. Apply basic mathematical and statisticaltools. 2. Summarize data visually andnumerically. 3. Demonstrate analytical skill for solving businessproblems. 4. Interpret results from decision makingperspectives
8.	Semester I	MGC1152	Indian Ethos and Business Ethics	1. Interpret the variable values inmorality 2. Propose strategies for maximizing personal growth and productivity ofemployees. 3. Apply value-based management and ethical practices in all functional areas ofmanagement 4. Develop ethical decision-makingcapabilities Comprehend and practice the way of righteousness in the Indian mythologicalliterature
9.	Semester I	MGC1172	Business Communication	1. Write business letters in a proper, formalformat 2. Demonstrate the methods of oral presentation both in a formal and informal environment 3. Review the importance of communication relative to securing employment, with emphasis on using both verbal and non-verbal communication and theirimpact 4. Prepare the student with the communication tools-verbal, non-verbal and written-and the practical applications inherent ineach
10.	Semester I	MGC1192	Advanced Excel	1. Customize the formatting of spreadsheet inExcel. 2. Protect data in worksheets &workbooks 3. Design the structure of varioustemplate.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				4. Consolidate & analyze data from multiple sheets & createreports.
11.	Semester I	MGC1212	Microsoft Power Point	1. Demonstrate applying themes and layouts toslides. 2. Demonstrate inserting pictures, graphics, shapes, and otherthings. 3. Demonstrate working with sound and videos, master slides, smartart. 4. Use existing PowerPoint presentations using advanced editing tools such as theme, layout, timing, andanimation.
12.	Semester II	MGC1022	Corporate Finance	1. Discuss important aspects of financial management that can help an entity to operate more effectively. 2. Apply financial theory while identifying the sources of finance and calculate the cost of capital for effective decision-making. 3. Apply capital structure theories and leverage analysis to frame optimal capital structure. 4. Evaluate investment proposals by applying capital budgeting techniques. 5. Estimate the working capital requirement for solving managerial problems.
13.	Semester II	MGC1042	Operations Management	1. Demonstrate fundamentals of operations management in afirm. 2. Take decisions related to facility locations &layout. 3. Analyze different aspects relating to designing & developingprocesses. 4. Apply various aspects in Operations Planning andControl. 5. Evaluate various modern practices in operations management..
14.	Semester II	MGC1062	Human Resource Management	1. Effectively manage and plan key human resource functions withinorganizations 2. Identify and analyze problems in the field of HRM and provide innovativesolutions 3. Appreciate the implications of increasing globalization for the management of human resources 4. Evaluate and implement the new trends inHRM
15.	Semester II	MGC1082	Business Research Methods	1. Apply the major types of researchdesigns 2. Formulate clearly defined research

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				questions 3. Analyze and summaries key issues and themes from existingliterature 4. Evaluate and conductresearch 5. Understand the ethical issues associated with the conduct ofresearch
16.	Semester II	MGC1102	Managing for Sustainability	1. Demonstrate a multi –stakeholder perspective in viewing CSRissues. 2. Analyse the impact of CSR implementation on corporateculture. 3. Evaluate the concept of corporategovernance. 4. Analyse the main factors and structures of corporate governance and show how their interaction and functioning differs across national economies. 5. Discussopenissuesconcerningthefutureevolutionofcorporategovernanceinthecontext ofglobalization..
17.	Semester II	MGC1122	Management Information System	1. Explain the role and significance of management information systems inbusiness. 2. Apply the decision support tools of information system to solve businessproblems. 3. Identify the causes of information system success andfailure. 4. Implement the information system in various functional areas ofmanagement. 5. Demonstrate the better usage of e-business, e-governance, AIetc.
18.	Semester II	MGC1142	Strategic Management	1. Comprehend the basic concepts and principles of strategicmanagement 2. Analyze the competitive situation and strategic dilemma in dealing withdynamic businessenvironment 3. Demonstrate the knowledge and abilities in formulating strategies and strategicplans 4. Evaluate challenges faced by managers in implementing and evaluating strategiesbased on the nature of business, industry, and culturaldifferences.
19.	Semester II	MGC1162	International Business	1. Describe the foundation of international business. 2. Discuss the business operations of international organizations and

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				multinational corporations. 3. Analyze forms of foreigninvolvement. 4. Discuss and apply international tradetheory
20.	Semester II	MGC1182	Soft core (General Aptitude Skills)	1. Evaluate critically key issues concerns with real life situation. 2. Apply innovative thinking skill to solve theproblems. 3. Demonstrate various principle involved in solving mathematicalproblems. 4. Evaluate assumptions used in analyzing quantitativedata
21.	Semester II	MGC1202	Laboratory Courses SPSS	1. Develop proficiency in handling SPSS software. 2. Analyse data sets using various descriptive and inferential statistical tools
22.	Semester II	MGC1222	Capstone Project Phase-I	1. Identify a Social / Business problem. 2. Prepare a Synopsis for developing or solution for the identified problem. 3. Design the survey tool.
23.	Semester III	MGC2012	Entrepreneurship Development	1. Identify the values, attitudes and motivation for a plunge inentrepreneurship. 2. Impart basic entrepreneurial skills and understanding to run a business efficiently and effectively. 3. Developandstrengthentheirentrepreneurialqualityandmotivationtostarttheirownsmall-scalebusiness/enterprise. 4. Analyze the entrepreneurial ecosystem and design strategies accordingly.
24.	Semester III	MGC2052	Capstone Project Phase II	1. To learn in a real world context. 2. Prepare the research design and preparation of tool of data collection 3. Use acquired theoretical knowledge into practical experienceandrevealanunderstandingoftheideas,conceptsandskillsgainedthrough their MBA program. 4. Identify and formulate innovative approaches, models and supports actions that enhance innovation
25.	Semester III	MGC2072	Summer Internship	1. Apply knowledge and skills learned in the classroom in a work setting.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Program	2. Developagreaterunderstandingaboutcareeroptionswhilemoreclearlydefiningpersonal careergoals. 3. Analyze the activities and functions of businessprofessionals. 4. Develop and refine oral and written communication skills. 5. Identify areas for future knowledge and skilldevelopment
26.	Semester III	MGM2012	Sales and Distribution Management	1. Develop the knowledge of Selling and Distribution process in anorganization. 2. Develop proficiency in industry in actual selling process and the management of selling personnel. 3. Demonstrate the knowledge needed to generate a leads and increase the sales in terms of volume and in monitoryterms. 4. Analyzecriticalandstrategicthinking,improveanalyticskillsandtechniques,andenhance effective decision-making in sales andDistribution. 5. Identify the management challenges to construct & design Distribution Channel to find appropriate way to reach to thecustomers.
27.	Semester III	MGM2032	Services Marketing	1. Identify the special management issues and unique challenges involved in marketing and managingservices 2. Understand the expectations of customers and know how to translate this knowledge into genuine value forcustomers 3. Interpret service behavior and service consumption in the light of service-dominant marketing logic and articulate the outcome to service marketingmanagement 4. Appreciate, modify, and/or extend new theories and concepts pertaining to explaining the characteristics of customers' purchasing and consumption behavior of services and service firms' marketingbehavior 5. Apply new approaches to managing customer satisfaction and loyalty 6. Understand current research trends in services marketing andmanagement

Sr. No.	Semester	Course Code	Course Name	Course Outcome
28.	Semester III	MGM2052	Retail Marketing	1. Acquireandapplyrelevantknowledgeandskillstomanageretailmanagementissues 2. Formulate creative yet feasible solutions for customer care, store care, merchandise care and retailstrategies. 3. Discuss and analyze the latest strategies required for the development of retail marketing. 4. Identify and evaluate challenges and opportunities concerning the applications ofthe latest retailstrategies. 5. Explain the factors relating to visual merchandising, such as store layouts and presentation.
29.	Semester III	MGM2072	Consumer Behavior	1. Assess the relevance of consumer behavior to the entire marketingprocess. 2. Analyze the causes giving rise to consumer behavior with thetheories. 3. Explain the impact of consumer behavior on the development of marketing strategies including marketing communication, segmentation and targetmarketing. 4. Apply the concepts and theories covered in the course to devise effective solutions in enhancing businessperformance.. 5. Collaborate with other classmates productively on the group work, communicate and present informationeffectively..
30.	Semester III	MGM2092	Customer Relationship Management	1. Explain and characterize the major concepts and framework of customer relationship management 2. Discuss the conceptual foundations of relationship marketing and its implications for further knowledge development in the field ofbusiness 3. Get an insight into how CRM practices and technologies enhance the achievement of marketing,salesandserviceobjectivesthroughoutthecustomerlife-cyclestagesofcustomer acquisition, retention and development whilst simultaneously supporting broader organizationalgoals 4. Equip both a conceptual understanding and the knowledge pertaining to

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				practical application of critical skills necessary for building and managing partnering relationships with customers andsuppliers.. 5. Understand the benefits delivered by CRM, the contexts in which it is used, the technologies that are deployed and how it can beimplemented
31.	Semester III	MGM2112	Digital Marketing	1. Develop a deeper understanding of the changing digital marketing landscape 2. Apply the latest digital marketing trends and skill sets needed for today's marketer. 3. Distinguish between the functions of various digital communication channels and select solutions appropriate to the needs of the organization and the endusers. 4. Analyze the impact digital technologies have on consumer behavior; consumer research and customerrelationships 5. Apply to web based marketing tools with the view of incorporating new media into traditional media and marketingplanning.
32.	Semester III	MGM2132	Management of Marketing Communications	1. Learnandunderstandthebasicconceptsandterminologyinadvertising,withanemphasis onIMC 2. Analyze factors and importance of reaching the target audience through the development of effective media coverage planning, including preparation and justification of an advertisingbudget. 3. Refinecriticalthinkinganddecision-makinginadvertisingcampaigndevelopmentthrough class activities andassignments. 4. Carryout advertising monitoring, evaluating, & feedback systems in order to ascertain campaigneffectiveness. 5. Participate in the development of creative solutions to address advertising and marketing communicationschallenges.
33.	Semester III	MGM2152	Strategic Marketing management	1. Apply strategic concepts and theories and their application in marketing environments. 2. Compare and contrast the key principles of marketing strategy

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Think strategically about marketing issues and provide recommendations 4. Research and analyze marketing strategies in different contexts 5. Identify and resolve well-defined problems reaching substantiated conclusions employing methods of analysis specific to marketing. 6. Employ strategies and processes which assist independent learning
34.	Semester III	MGH2012	Compensation Management	1. Apply the knowledge to solve compensation related problems in organizations 2. Design rational and contemporary compensation systems in modern organizations 3. Design and maintain a pay system within the organization 4. Analyze and develop incentive programs 5. Explain the legally required employee benefits.
35.	Semester III	MGH2032	Performance & Rewards Management	1. Identify and retain talent in an organization to deliver high performance. 2. Design an organization's performance management process. 3. Compare and contrast various organizational performance management programs and best practices 4. Plan effective performance management policies and practices to improve organisational and employee performance. 5. Evaluate the relationship amongst the components of total rewards.
36.	Semester III	MGH2052	Organization Development & Change	1. Apply theories and current research concerning individuals, groups, and organizations to the process of change 2. Identify organizational situations that would benefit from OD interventions 3. Discuss the process of change as applied to organizational culture and human behavior 4. Explain the differences between insider and outsider approaches to consulting and OD interventions

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				5. Analyze ongoing activities within an organization and design the selected OD interventions.
37.	Semester III	MGH2072	Industrial Relations & Labour Laws	1. Acquire a theoretical, practical and ethical perspective on many aspects of industrial relations. 2. 2. Apply IR competencies to contribute to organizational capability & employee well being. 3. 3. Explain the various forms and causes of Industrial disputes. 4. 4 Assess the collective bargaining process, including preparation, negotiation, and settlement. 5. 5 Understand the statutory provisions concerning the grievance procedure in India.
38.	Semester III	MGH2092	Human Resource Planning	1. Analyze the theory and concepts of human resource planning. 2. Identify the evolution of HRP throughout the organization. 3. Apply models and methods used in forecasting. 4. Describe the applications of a succession analysis & planning. 5. Evaluate the organization's planning program.
39.	Semester III	MGH2112	Strategic & International Human Resource Management	1. Discuss the strategic and functional roles of HRM in various international contexts, especially in areas such as recruitment and selection, performance management& training. 2. Identify opportunities and challenges pertaining to international HRM; 3. Develop competency in dealing with cross cultural situations; 4. Analyze external forces (e.g. globalization, socio cultural changes, political and economic changes) that have the potential to shape international HRM. 5. Develop generic and transferable skills-especially in diagnosing international HRM issues
40.	Semester III	MGH2132	Training & Development	1. Understand the role and functions of training and development in organizations. 2. Identify principles and their implications for the effectiveness of training programs.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Assess training needs & evaluate employee training programmes. 4. Outline the issues and steps involved in designing and implementing a training program. 5. Design, training and development programs that can be delivered in the form of individual and group.
41.	Semester III	MGH2152	Cross Cultural Management	1. Analyze the impact of culture on businesspractices. 2. Analyze the impact of national culture on organizationalcultures. 3. Apply strategies for managing international teams andprojects 4. Develop strategies for working in virtual and co-located multiculturalteams. 5. Assess and leverage the impact of culture in management and other business functions
42.	Semester III	MGH2172	Conflict & Negotiation Management	1. Analyze the key practical and theoretical concepts of managing and resolvingconflicts. 2. Describe the nature of small and large scaleconflicts. 3. Articulate the theoretical and practical components of negotiation and mediation and explain the link between effective negotiation skills and effectiveleadership. 4. Analyze the types of conflict managementstyles. 5. Explain the link between effective negotiation skills and effectiveleadership
43.	Semester III	MGF2012	Indian FinancialSystem	1. Elaborate the key role played in a modern society by financial markets & its intermediaries. 2. Elaborate the key role played in a modern society by financial markets & its Intermediaries 3. Apply the knowledge of the relative standing of the major financial services in India for various business organizations. 4. Evaluate the functioning of banking & NBFC in current scenario and discuss the various important aspects concern with banking and non-banking organisations. 5. Demonstrate the concept of mutual fund also focus on other relative aspects of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				mutual fund industry.
44.	Semester III	MGF2032	Financial Markets & Institutions	1. Interpret the role and determinants of interest rates and interaction of interest rates with money supply. 2. Assess the various theoretical concepts underlying money and capitalmarkets. 3. Analyze the working of various markets for securities (including debt markets, equity markets, derivative markets) and its role in financialmarkets. 4. Comprehend significant aspects of bankingbusiness. 5. Compare and contrast the various non-bank operations.
45.	Semester III	MGF2052	International Finance	1. Explainthefundamentalofinternationalbusiness,financeaswellasinternationalfinancial markets 2. Describe the various important aspects concern with foreign exchange marketsand Apply the knowledge of exchange ratemechanism 3. Explain the risks in international operations & apply the techniques to cover it. Also understand the various exchange control regulations. 4. Describe long term asset and liability management. Also evaluate project and provide suggestions to the organization. 5. Demonstrate short term asset and liability management in international business
46.	Semester III	MGF2072	Working Capital Management	1. Evaluate the importance of effective working capital Mgt. 2. Investigate funds flow cycles and their impact on working capital managementobjectives. 3. Formulate appropriate working capital management policies to achievecorporate objectives. 4. Apply corporate cash management, accounts receivable management, bank relations, and inventory management techniques to maximize the share holders'value. 5. Evaluate comparative working capital

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				management policies and their impact onthe firm's profitability, liquidity, risk and operatingflexibility.
47.		MGF2092	Funds Management in Banking and Insurance	1. Get an insight into the liquidity management in commercial Banking businessand discuss the necessity of adequate capitalfund. 2. Explain different types of reserves & different factors affecting on itsrequirement. 3. Understand the different aspects related with Management of Bankloan. 4. Evaluate the performance of Bank on the basis of deposit mobilization,credit deployment &profitability. 5. Discuss different functions & principles of life & non-life insurance. Also describe role of insurance & risk management policies related with non-lifeinsurance.
48.	Semester III	MGF2112	Mergers, Acquisition and Corporate Restructuring	1. Identify the key issues and concepts of mergers, acquisitions andCorporate Restructuring. 2. Analyze typical valuation strategies, pre and post-merger issues andchallenges 3. Assess the funding alternatives available and the various aspects of financial restructuring in case of mergers,acquisitions. 4. Discuss the revival of sick units with special reference to the Law and itsProcedure 5. Examine the impact of changing business scenario worldwide onCorporate Restructuring.
49.	Semester III	MGF2132	Funds Management Banking and Insurance	1. Get an insight into the liquidity management in commercial Banking business and discuss the necessity of adequate capitalfund. 2. Explain different types of reserves & different factors affecting on itsrequirement.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				3. Understand the different aspects related with Management of Bankloan. 4. Evaluate the performance of Bank on the basis of deposit mobilization, credit deployment &profitability. 5. Discuss different functions & principles of life & non-life insurance. Also describe role of insurance & risk management policies related with non-lifeinsurance.
50.	Semester III	MGF2152	Cost Analysis andControl	1. Discover the importance of analyzing and managing costs 2. Explain Activity-Based Costing (ABC) and Activity-Based Management (ABM) 3. Justify the importance of process costing and cost allocation 4. Develop important tools for planning and decisionmaking 5. Evaluate and manage performance through strategic costmanagement
51.	Semester III	MGB2032	HR Analytics	1. Explain basic concepts of HRAnalytics 2. Apply Data Analytic techniques using softwarepackages 3. Identify and use key HR Metrics. 4. Forecast budget numbers for HRcosts 5. Measure workforce productivity andperformance 6. Explore and visualizedata
52.	Semester II I	MGB2052	Core Python Programming	1. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries inPython 2. Express different Decision-Making statements andFunctions 3. Interpret Object oriented programming inPython 4. Summarize different File handlingoperations 5. Create and execute Python programs
53.	Semester III	MGB2072	R Programming	1. AccessonlineresourcesforRandimportnewfunctionpackagesintotheRworkspace 2. Import, review, manipulate and summarize data--sets inR 3. Explore data--setsto create testable hypotheses and identify appropriate statistical tests

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				4. Apply appropriate statistical tests usingR 5. Create and edit visualizations withR
54.	Semester III	MGB2092	Financial Analytics	1. Explore, Analyse stock market using Analytics Tools 2. Apply quantitative methods of financial decisions inbusinesses 3. Evaluate opportunities in financial /investmentsdecisions. 4. Analyse real-life proposals for financial investment in a meaningfulmanner
55.	Semester III	MGB2112	Data Mining	1. Discuss basic concept of data mining 2. Identify appropriate data mining algorithms to solve real worldproblems 3. Compare and evaluate different data mining techniques likeclassification, prediction, clustering and association rulemining 4. Describe complex data types with respect to spatial and webmining.
56.	Semester III	MGB2132	Business Intelligence	1. Explain role of mathematical models in businessintelligence 2. Describe link between strategy and businessanalytics 3. Apply various statistical methods on availabledata 4. Design physicaldatabase 5. Apply Business Intelligence System in various areas of management.
57.	Semester III	MGB2012	Marketing Analytics	1. Apply marketing theories to given research problems and types of customerdata. 2. To critically evaluate business problems and determine the most appropriate analyticaltechnique 3. Design an appropriate course of action based on empirical evidence.by gaining insights from the analysis ofdata 4. Formulate and confidently communicate (oral and written) research findings that is understandable to marketingmanagers.
58.	Semester III	MGO2012	Materials Management & Inventory	1. Analyze need & importance of materials management in afirm.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			Control	2. Apply methods of classification, codification, specifications & standardization of materials. 3. Manage different issues relating to storesdepartment. 4. Take decisions relating to inventory control by using differenttechniques. 5. Demonstrate the role and importance valueanalysis. 6. Take make or buy decisions relating to materialsmanagement.
59.	Semester III	MGO2032	Operations Planning and Control	1. Analyze need & importance of operations planning and control in afirm. 2. Forecast demand of the products by applying various methods of demandforecasting. 3. Apply aggregate planning and master production scheduling for taking managerial decision. 4. Analyze the need & importance of resource requirementsplanning. 5. Take decisions based on materials requirement planning & resource requirements planning.
60.	Semester III	MGO2052	Global Operations Strategy	1. Emphasize the key role of operations strategies in bringing about the growth and profitability oforganizations. 2. Understand & apply different models in relation with operationsstrategies. 3. Describe different key drivers used for globaloperations. 4. Understand & apply competency based, resource based and process based operations strategies.
61.	Semester III	MGO2072	Managing Six Sigma	1. Understand the concept & philosophy of SixSigma. 2. Apply quality function deployment technique for creating customer drivenorganization. 3. Manage six sigma teams for achieving betterresults. 4. Apply different tools & techniques for managing SixSigma. 5. Manage risk involved in the six sigma projects.
62.	Semester III	MGO2092	Purchase Management	1. Analyze the role & importance of purchase management in afirm.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				2. Apply different criteria for vendor analysis &selection. 3. Apply different purchase strategies for achieving betterresults. 4. Describe the role & importance of buyer – sellerrelationship. 5. Evaluate various modern purchasepractices
63.	Semester III	MGO2112	Lean Manufacturing System	1. Analyze different control techniques used under lean manufacturing. 2. Describe different steps for applying lean in manufacturing and service sectors. 3. Describe the interrelationship of lean manufacturing with just in time system. 4. Analyze the role & importance of cellular manufacturing system in relation with lean manufacturing.
64.	Semester III	MGO2132	Maintenance Management	1. Apply maintenance planning & scheduling technique for better results. 2. Apply total productive maintenance system in a firm. 3. Describe computerized maintenance management system. 4. Manage different issues relating to safety and accident prevention.
65.	Semester III	MGO2152	Manufacturing Systems Management	1. Analyze the role & importance of benchmarking quality improvement system. 2. Analyze the planning & implementation of flexible manufacturing systems in a firm. 3. Apply theory of constraints tools in manufacturing for better performance. 4. Apply business process reengineering system and green manufacturing practices for improving overall productivity.
66.	Semester III	MGR2012	Rural Banking andMicrofinance	1. Identify and evaluate the complexities of Rural Credit Banking Policies. 2. Analyze the role of Credit Cooperatives. 3. Analyze the Functions of Commercial Banks. 4. Evaluate progress, performance & problems of RRBs, Small Finance Bank & Payment Bank. 5. Assess the role of microfinance as a tool of socio economicdevelopment. 6. Conduct Social Assessments of MFIs,

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				Loan Disbursement andRepayment.
67.	Semester III	MGR2032	Rural Society and Polity	1. Analyzedevelopmentofruraleconomy&ruralsocietyandInterdependencebetween Rural and UrbanSectors. 2. Develop relationship among Rural Communities, Rural Institutions and RuralEnvironment. 3. Analyze problems of Schedule Cast, Schedule Tribe andWomen. 4. Assess the impact of Social Inclusion on development. 5. Analyze the Differences related to gender, Women in Development (WID) and Works and GenderRelation. 6. Evaluate Participatory approaches to rural development and socialdevelopment.
68.	Semester III	MGR2052	Society Up liftment Policies	1. Identify and evaluate the complexities of Growth Vs Development, Rising Expectations & Development, Dilemmas in Development, Challenges & Opportunities in Rural Economy 2. Analyze the impact of Rural Child Development Programme. 3. Evaluate the National Rural Health Missionprogramme. 4. Analyze the role of Rural Housing Programme on socio economic development of ruralareas. 5. Analyze the impact of Rural Women Empowermentprogramme.
69.	Semester III	MGR2072	ICT in Development	1. Understand and analyze importance of Information, Communication and Technology in development. 2. Assess role of ICT in Sustainable developmentgoals. 3. DevelopanddesignICTasaninfrastructure anditsrelationshipinmanagingdevelopment issues. 4. Identify opportunities in E-inclusion and its importance indevelopment. 5. Analyze National E GovernancePolicy. 6. Examine the impact of ICT in Rural Project Framework.
70.	Semester III	MGR2092	Agribusiness	1. Analyze global Agribusiness Environment and scope of community

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				basedindustry. 2. Estimate demand and plan procurement method. 3. Identify opportunities in organised foodretailing 4. Analyze problems in Agri Input Markets 5. Analyze ICT application in AgricultureTrade. 6. Create linkage with apex agriculture and farming welfare institution for getting financial assistance and support from latest research.
71.	Semester III	MGR2112	Managing Cooperatives	1. Differentiate the cooperatives with other business models. 2. Analyze the functions of short, medium and long term credit cooperative structure and its role in financial inclusion. 3. Identify the challenges in management of cooperatives and suggest better solution for that. 4. Measure the legal aspects integrated with cooperative business. 5. Develop case study on cooperatives business models.
72.	Semester III	MGR2132	Social Marketing and Social entrepreneurship	1. Identify social marketing projects. 2. Manage Social marketing programme. 3. Assess the models of social Entrepreneurship and Enterprise. 4. Analyze impact of social impact investors
73.	Semester III	MGR2152	Governance and Development	1. Identify the role of environment in Governance. 2. Analyze Governance issues in Modern state and societies. 3. Evaluate Board of Director Roles and responsibilities for better corporate governance. 4. Assess Accountability and Transparency in Governance in CBOs.
74.	Semester III	MGT2012	Engineering Management	1. Identify the problem and find the optimal solution for thatproblem. 2. Make Plan for and organize technicalactivities. 3. Manage production and serviceactivities 4. Understand communication process and Management informationsystem
75.	Semester	MGT2032	Enterprise Productivity	1. Understand and explain Enterprise level

Sr. No.	Semester	Course Code	Course Name	Course Outcome
	III			and micro levelproductivity 2. Apply different type technology to increaseproductivity 3. Understand and Explain different productivitymodels 4. Apply different productivity models inbusiness
76.	Semester III	MGT2052	Technology Management	1. Understand role of technology and corecompetence 2. Explain technology cycle and understand technology change 3. Identifying and evaluating the impact ofrelevant changing technology and managing thosechanges. 4. Analyse trend and understand role ofTIFAC 5. Identify different patterns of technologicalchanges
77.	Semester III	MGT2072	R & D Management	1. Understand different Managerial aspects of Innovation function. 2. Develop innovative strategy inbusiness. 3. Measure Performance of R&Dmanagement 4. Do R & Dproject. 5. Understand Intellectual PropertyRights
78.	Semester III	MGT2092	Value Engineering	1. Evaluate cost, worth andvalue. 2. Create value engineering jobplan 3. Evaluate value engineeringprojects 4. Initiate value engineeringprogramming 5. Use tools of value analysis
79.	Semester III	MGT2112	Engineering Systems Simulation	1. Understand system stimulation 2. Random numbers 3. Explain engineering systems modeling and simulation 4. Conduct simulation experiments 5. Analyze simulation output
80.	Semester III	MGT2132	Big Data Analytics	1. Explain Challenges of Conventional Systems 2. Explain Stream Data Model and Architecture 3. Use The Hadoop Distributed File System 4. Develop a Map Reduce Application 5. Set up a Hadoop Cluster
81.	Semester III	MGT2152	Manufacturing Systems	1. Explain fundamentals of manufacturing and automation

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				2. Analyze flow lines without storage and with storage buffer 3. Develop and implement FMS 4. Understand functions and components of CIM system 5. Plan and Schedule Functions in CIM System
82.	Semester III	IP2032	Industry Internship Phase-I	
83.	Semester III	ED 2032	EDP Phase-I (Prefeasibility report)	
84.	Semester III	MGE2011	Taxation Planning and Management	1. Apply analytical reasoning tools to assess how taxes affect economic decisions for all taxpayingentities. 2. Develop a fundamental understanding of the components of taxable income determinationacrosstaxableentitiessothat thestudentbuildsafoundationforeffectivel y learning future tax laws in order to implement future tax compliance and planning strategies 3. Draw supportable conclusions regarding tax issues by using research skills (including accessing and interpreting sources of authoritative support) to identify and evaluate strengths, weaknesses andopportunities 4. Communicate tax conclusions and recommendations in a clear and concise manner to relevantstakeholders. 5. Develop technological skills necessary to undertake tax planning, compliance and researchstrategies.
85.	Semester III	MGE2021	Healthcare and Hospital Management	1. Building competencies and provides expertise for hospital & healthcare management, operations and administration through learning of Hospital core and SupportServices. 2. Providethestudentsanintensive,stimul atingandchallenginglearningexperien ceinthe management and administration of Hospitals. 3. Acquaint the Students about Health Policy and Health CareSystems. 4. Acquaint the Students about different important services needed in aHospital.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
86.	Semester III	MGE2031	Mentoring and Coaching	1. Evaluate the benefits of coaching and mentoring to anorganization 2. Assess how coaching and mentoring programmes support businessobjective. 3. Develop guidelines and protocols for programmes based on accepted coachingand mentoring theory andpractice. 4. Conduct formal and informal coaching conversations and begin to understand formal coachingrelationships. 5. Evaluate the impact to an organisation of establishing coaching and mentoringculture
87.	Semester III	MGE2041	Warehouse Management	1. Taking decisions related to designing warehouse layout. 2. Effectively analyze different processes performed for managingwarehouses. 3. Develop an understanding and application of warehouse managementsystem. 4. Demonstrate the role & importance of inventory & transportation in warehouse Management.
88.	Semester III	MGE2051	Mall Management	1. Analyze the concepts and aspects needed for mallmanagement. 2. Apply the operational and tenant management principles formalls. 3. Evaluate the marketing and promotional principals for themalls. 4. Illustrate the statutory requirements for the malloperations.
89.	Semester III	MGE2061	Change Management	1. Describe in general terms a number of change management theories and how they might apply inpractice. 2. Articulate what change management is and why it is important in thecontemporary businessenvironment. 3. Discriminate between different types of change process for different purposes and outcomes. 4. Identify the steps in putting together an effective change managementplan. 5. Apply critical thinking and problem solving skills to the analysis and resolutionof changeproblems
90.	Semester	MGE2071	Commodity	1. Explore the fundamental concepts of

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	III		Markets	commodity market & derivativemarket. 2. Apply their knowledge of financialmarkets. 3. Analyze the dynamics of commodityexchange. 4. Explain various types ofcommodities. 5. Comprehend the workings of commodity market & derivativemarket.
91.	Semester III	MGE2081	Food Retail Management	1. Identify variables for vast International Food Markets. 2. Analyses trends in Food Retailing. 3. Measure the brand value of Food Retail organizations and theirproducts. 4. Analyses the challenges present in Food Retail operation and develop CRM strategyfor food retailcompanies. 5. Apply appropriate law of conducting food business. 6. Analyze the opportunities and threat associated with GMOFoods.
92.	Semester III	MGE2091	Human Resource Audit	1. Gain knowledge about a systematic methodology for evaluatingHRD. 2. Demonstrate knowledge in examining the adequacy and appropriateness ofthe HRD systems, structures, styles, culture, and competencies. 3. Design & prepare Human Resource AuditReport 4. Identify the gaps between the current state and thestandard. 5. Conduct the Human Resource Audit for theorganization
93.	Semester III	MGE2101	Small scales industries management	1. Understand small businesses and supporting organizations for itssetup. 2. Identify Business Opportunities and plan according tosurvey. 3. Prepare project and develop the report according to planned idea and market. 4. Analyze the basic aspects of business and understand better to prepare for the same. 5. To understand the Legal laws governing the business andenvironment. 6. Analyze the other business considerations which are also important.
94.	Semester III	MGE2111	Total Quality Management	1. Understand the fundamental principles of Total Quality Management. 2. Develop an understanding on various

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				ISO standards and quality systems. 3. Apply the tools and techniques of quality management to manufacturing and services processes. 4. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implementable solutions tothose.
95.	Semester III	MGE2121	Search Engine Optimization	1. Promote the search engine ranking of site by implementing the bestpractices. 2. Apply SEOstrategies through inbound marketing. 3. Analyze new SEO innovations and changing search enginetrends. 4. Apply Google Analytics and other metrics and tools to monitor progress in achieving search engine marketinggoals.
96.	Semester III	MGE2131	E-retailing	1. Identify and explain fundamental e-Retailing Online Merchandising Techniques. 2. Recognize and discuss the major E-Payment Security Challenges and Solutions. 3. Assess and discuss issues including Impact of E-retailing on traditional transportation system and opportunities. 4. Demonstrate an understanding of Concept of online pricing and dynamics pricing for E- retailing. 5. Analyze the impact of E-retailing on inventory security and Quality management
97.	Semester III	MGE2141	Tourism Management	1. Useknowledgeandskillsassociatedwithproblemsolving,creativeandcriticalthinking, reflection and decision making to function effectively in the classroom, community and industry. 2. Lead with the knowledge that the foundation of tourism is based on the respect for the host culture with the responsibility to perpetuate the unique values, traditions, and practices of thatplace. 3. To develop a range of leadership skills and abilities such as motivating others, leading changes, and resolvingconflict 4. Gain supervisory skills and

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				competencies necessary to meet the needs of the ever demanding Travel and TourismIndustry. 5. Recognizetheimportanceofoutstandinggguestservicequality,server-guestrelationships, andethics
98.	Semester III	MGE2151	Export – Import Procedure & Documentation	1. Provide an overall perspective on import & exportmanagement. 2. Develop an understanding towards export and import procedure anddocumentation. 3. Develop analytical skills for processing of export order. 4. Identify & managing risk involves in the import & export transactions
99.	Semester III	MGE2161	Supply Chain Management	1. Understand the fundamental concepts and importance of Supply Chain Management. 2. Apply methods for managing demand & supply position in supply chainnetwork. 3. Manage inventory in Supply chainnetwork. 4. Plan and design transportation networks relating to supply chain management. 5. Demonstrate the role & importance of logisticsmanagement
100.	Semester IV	IPMB2YYY	OnlineCourse - I/Selflearning course-I	
101.	Semester IV	IP204	Project Management (OnlineCourse)	31. Prepare business Plan for selected business. 32. Make risk analysis& market analysis of selected project. 33. Make risk analysis& market analysis of selected project 34. Make financial appraisal of selected project.
102.	Semester IV	IP206	Internship & Project	**3. Internship** After the successful completion of the IIP- II the student should be able to 1. Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) 2. Develop an attitude to adjust with

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				the company culture, work norms, code of conduct. 3. Recognize and follow the safety norms, Code of conduct. 4. Demonstrate the ability to observe, analyse and document the details as per the industry practices. 5. Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies. 6. Develop the leadership abilities, communication. 7. Demonstrate project management and finance sense **4. Project** After the successful completion of the project, the student should be able to; 1. Identify the project/problem in the domain of a program relevant for the company. 2. Compile the information to the pertaining to the problem identified. 3. Analyse the information using the statistical tools/ techniques. 4. Develop the feasible solution for given problem. 5. Analyse the impact of the project on the performance of company/department
103.	Semester IV	ED3002	Project Management	1. Prepare business Plan for selected business. 2. Make risk analysis& market analysis of selected project. 3. Make risk analysis& market analysis of selected project 4. Make financial appraisal of selected project.
104.	Semester IV	ED3004	New Venture Finance : Startup Funding For Entrepren	1. Apply the strategic aspects of entrepreneurial finance. 2. Identify various sources of finance from sources like venture capital, angel financer, private equity and hedge funds and their working procedures, 3. Conduct valuation of companies by

Sr. No.	Semester	Course Code	Course Name	Course Outcome
			eurs	venture capitalist 4. Compare different sources of finance and select the appropriate source for financing needs.
105.	Semester IV	ED3006	Entrepreneurship Development Program (EDP)	1. Apply knowledge of management, economics, marketing and finance for formulation of business plan, starting & managing new business.
106.	Semester IV	ED3008	Entrepreneurship Development Project	1. Apply knowledge of Management for preparation of project report. 2. Make commercial, technical and financial appraisal of project.