

•**Department Name** :- Automobile Engineering

•**UG Program Name** :- B.Tech in Automobile Engineering

• **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.	Graduates will demonstrate basic knowledge in mathematics, science and engineering.
2.	Graduates will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results.
3.	Graduates will demonstrate the ability to design an automotive system or a thermal system or a process that meets desired specifications and requirements.
4.	Graduates will demonstrate the ability to function in engineering and science laboratory teams, as well as in multidisciplinary design teams.
5.	Graduates will demonstrate the ability to identify, formulate and solve automotive/mechanical engineering problems.
6.	Graduates will demonstrate an understanding of their professional and ethical responsibilities.
7.	Graduates will be able to communicate effectively in both verbal and written forms.
8.	Graduates will have the confidence to apply engineering solutions in global and societal contexts.
9.	Graduates will be capable of self-education and clearly understand the value of lifelong learning.
10.	Graduates will be educated to have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
11.	Graduates will be familiar with modern engineering software tools and equipments to analyze automotive engineering problems.
12.	Graduates will demonstrate the ability to manage engineering projects within given time

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.	1	SH131	Engineering Physics	Use the principles of interference, diffraction and polarization in thin reflecting films, diffraction gratings and polarimeter respectively.
				Apply the knowledge of architectural acoustics for acoustically good halls and principle of magnetostriction and piezoelectric methods for production of ultrasound.
				Apply the newton's laws of motion to calculate forces acting on objects.
				Describe the behavior of a damped and driven harmonic oscillator.
				Use the knowledge of semiconducting materials in semiconductor devices.

2.	1	SH1053	Engineering Mathematics	Apply the properties of special functions to evaluate integral.
				Sketch the curve with full justification.
				Evaluate double integral and change the order of the integration.
				Evaluate area bounded between two curves, mass of lamina, moment of inertia.
				Prove the results of partial differentiation.
				Apply partial differentiation for evaluating and proving the results based on errors and approximations, maxima and minima.
3.	1	SE1011	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.
				Solve the numerical based on electronics devices and number system,
				Analyze the different analog and digital electronic circuits.
4.	1	SH1132	Engineering Graphics	Determine the location and orientation of point, line, and plane with respect to reference planes to draw their projection.
				Develop the projection of various types of solids in various conditions.
				Develop section views and true shape section of various types of solids
				Identify the need of development of lateral surfaces and apply the same in engineering drawing.
				Develop orthographic views of an object to convert pictorial view into two-dimension (2d) view.
				Develop isometric view to convert two-dimension (2d) view to pictorial view.
5.	1	Sh1053	Engineering Mathematics	Apply the properties of special functions to evaluate integral.
				Sketch the curve with full justification.
				Evaluate double integral and change the order of the integration.

				Evaluate area bounded between two curves, mass of lamina, moment of inertia.
				Prove the results of partial differentiation.
				Apply partial differentiation for evaluating and proving the results based on errors and approximations, maxima and minima.
6.	1	SH187	Engineering Physics Lab	Apply the theory of semiconductors to calculate band gap energy and carrier concentration.
				Apply theory of newtons rings and diffraction grating to calculate radius of curvature of plano convex lens and wavelength of given source of light respectively.
				Compare b-h curve for different ferromagnetic materials and measure hysteresis loss in it.
				Determine the numerical aperture of optical fiber
				Use ultrasonic interferometer to calculate velocity of ultrasound in given liquid
				Use laurent's half shade polarimeter to calculate specific rotation of optically active solution.
				Illustrate the phenomena of resonace in forced oscillations
7.	1	SH1552	Engineering Graphics Lab	Determine the location and orientation of point, line, and plane with respect to reference planes to draw their projection.
				Develop the projection of various types of solids in various conditions.
				Develop section views and true shape section of various types of solids
				Identify the need of development of lateral surfaces and apply the same in engineering drawing.
				Develop orthographic views of an object to convert pictorial view into two-dimension (2D) view.
				Develop isometric view to convert two-dimension (2D) view to pictorial view.
8.	1	SH189		Explain the role of an engineer as a problem solver

			Engineering Explorations and Design Project	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.
9.	1	SH1831	English Proficiency Lab_I	Demonstrate reception skills of language
				Communicate using oral and written modes.
				Make use of English language with grammatical accuracy.
				Articulate correctly the frequently used words using phonemic transcriptions
10.	9 1	SE1052	Basics of Electronics Engineering Lab	Demonstrate the importance of various electronic components and equipment's for various applications.
				Test performance and applications of electronic devices, gates.
				Develop technical writing skills and teamwork abilities for working effectively in groups.
				Design and simulate analog and digital circuits using simulation tools.
11.	2	SH1033	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.
				Describe construction, working and applications of batteries and fuel cells.
				Identify causes of corrosion and its remedial measures.
				Compare types and quality of fuels by different instruments and select the proper lubricant and lubrication method.

12.	2	SH133	Programming For problem Solving -	Explain the basic terminology and concepts of c programming language.
				Write algorithm and draw flow chart for the given problem.
				Write a c programs to solve given problems
				Analyze the given c program to predict the output.
				Evaluate the c program to resolve the errors.
13.	2	SH1291	Electrical Engineering	Solve 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 switch gear and illumination system for low voltage electrical installations.
14.	2	SH191	Programming for problem Solving lab -	Describe orally the basic terminology and concepts of c programming language
				Write an algorithm and flow chart for the given problem.
				Write a 'c' programs for a given problem
				Compile the 'c' program to remove the syntactical error
				Debug the c program to remove the logical errors and execute the code to get correct output
15.	2	SH162	English Proficiency Lab	Organize content for written messages in specific forms.
				Demonstrate writing skills through letters, circulars, notices, memos and emails.
				Apply report writing skills through exercises on parts of report.
				Apply techniques of online communication in its various forms like e-mail writing, and conferencing.
16.	2	SH1532	Engineering Chemistry Lab -	Examine the materials by using analytical instruments.

				<p>Measure quality of water on different parameters for industrial and domestic purposes.</p> <p>Select proper lubricant for different machines according to working condition.</p> <p>Inspect the quality of fuel using proximate analysis.</p> <p>Improve written and oral communication and cooperative learning skills.</p>
17.	2	SH1023	Engineering Mathematics II	<p>Use the concepts of matrices that serve as an essential basis for several computational techniques.</p> <p>Solve the problems on ordinary differential equations analytically and numerically.</p> <p>Make use of different methods to solve simultaneous algebraic linear equations.</p> <p>Apply the relevant numerical method for interpolating the polynomial.</p>
18.	2	SH143	BASIC MECHANICAL ENGINEER	<p>Explain different power generation systems.</p> <p>Select appropriate energy conversion device for the given application.</p> <p>Classify vehicles on the basis of different parameters.</p> <p>Compare two stroke and four stroke i. c. engines.</p> <p>Describe different transmission devices in a given system.</p> <p>Choose suitable material and manufacturing processes for given application.</p>
19.	3	SH2032	Engineering Mathematics - III	<p>Solve differential equations using various properties.</p> <p>Apply appropriate method of solution to the given differential equation.</p> <p>Apply techniques of solution of higher order linear ordinary and partial differential equation to solve specific engineering problems.</p> <p>Solve engineering problems using laplace transform.</p> <p>Apply rules of vector differential calculus to evaluate gradient, divergence and conservative vector field.</p>

				Apply fourier transforms to solve the differential equations in engineering problems.
20.	3	CE2032	Engineering Mechanics	Classify various forces and their effects to analyze real life problems.
				Analyze engineering problems applying conditions of equilibrium
				Apply fundamental concepts of kinematics and kinetics to the analysis of practical problems
21.	3	SH2172	Environmental Science -	Explain the importance and sensitivity of environment.
				Interpret over exploitation of natural resources and follow environmental ethics
				Explain methods to protect environment and prevent environmental pollution
				Apply their knowledge and skills to solve their environment related problems
22.	3	[AE2112	Thermal Engg. Lab - AE2112	Test lubricant properties like grease penetration number, drop point, aniline point, carbon residue, flash point, fire point, cloud point and pour point.
				Evaluate the performance of air conditioning test bench and heat pump test rig.
				Demonstrate fire-tube and water-tube boilers.
23.	3	[AE2032	Applied Thermodynamics -	Explain energy, heat and work interaction.
				Use the steam table and mollier chart to compute thermodynamics interactions
				Apply the laws of thermodynamics to various flow and non-flow thermodynamic processes.
				Analyze the performance of various power cycles
				Describe various methods of refrigeration and air-conditioning
24.	3	AE2132	Fluid Mechanics & Fluid Machinery Lab -	Verify and apply bernauli's theorem
				Determine coefficient of discharge of fluid flow measuring devices.
				Calculate various types of losess through pipe flow.
				Draw performance characteristic curves for pumps and compressors.

				Evaluate various efficiencies of pumps and compressors.
25.	3	CE2172	Engineering Mechanics Lab.	Verify law of polygon of forces, law of triangle of forces and principle of moment.
				Compare coefficient of friction of various surfaces in contact.
				Correlate theoretical and practical results of support reactions and centroid of plane lamina.
				Analyze a simple truss
26.	3	AE259	Mini Project on Envir. Sci. - [AE259]	Utilize scientific methods to solve environmental problems.
				Evaluate technologies for restoration of degraded environment
				Develop presentation and report writing skills
				Develop as an individual and in group leadership quality
27.	3	AE2052	Fluid Mechanics & Fluid Machinery -	Determine various fluid and flow properties.
				Calculate various types of losses through pipe.
				Apply boundary layer concept for external flow.
				Analyze performance of pump and compressor.
				Select pump or compressor for a particular application.
28.	3	AE2092	Workshop Practice I	Demonstrate tool grinding and lathe machine.
				Perform, turning, parting, knurling and threading operations on lathe.
				Describe working of milling, grinding and shaping machine.
29.	3	AE2072	Material Science and Metallurgy - [AE2072]	Explain the importance of engineering materials and crystal structures.
				Analyse different phases in a compound at any temperature.
				Suggest appropriate heat treatment process & mechanical testing method for a given application.
				Suggest suitable material for a particular application.
30.	4	[AE2042]	Heat Transfer - [	Compute heat transfer for given application.



				Develop mathematical analogy for heat conduction problems for wall and extended surfaces.
				Analyze forced and free convection heat transfer.
				Analyse radiation heat transfer phenomenon
				Illustrate boiling and condensation phenomenon.
				Estimate size and rating of heat exchanger.
31.	4	AE2082	Mechanics of Materials -	Apply knowledge of stresses and strains for structural analysis.
				Analyse suitability of appropriate section for mechanical applications
				Compare different columns on the basis of end conditions.
				Analyze the circular shaft subjected to pure torsion.
				Apply energy method for structural analysis of solid body.
32.	4	AE2102	Workshop Practices -II	Perform different welding process on given materials.
				Perform different sheet metal operations
				Perform cnc operations as per given drawing using cnc machine
				Perform 3d printing operations using a 3d printer
				Perform electrical discharge machining (edm) process on given material
33.	4	AE2162	Heat Transfer Lab - [AE2162]	Evaluate thermal conductivity of metal rod and insulating powder.
				Evaluate heat transfer from composite walls and rectangular fin.
				Measure heat transfer coefficient for natural and forced convection phenomenon.
				Measure emissivity of radiating surfaces and Stefan-Boltzmann constant.
34.	4	AE2182	Software Skill lab-I	Develop base feature for modeling of parts.
				Develop 3d model of automotive components.
				Assemble components using functional constraints.

				Prepare production drawing in drafting workbench.
35.	4	AE2062	Electrical Drives and Controls	Explain importance and working of electric drives
				Analyze performance of dc and ac machine
				Explain conventional and static dc and ac drives for speed control
				Describe stepper and servo motor and its drive system along with applications
36.	4	AE2022	Theory of Machines -	Analyze kinematic parameters of gears in mesh for typical power transmission application.
				Develop profile of the cam to get required follower motion for a given application.
				Analyze characteristic curves of centrifugal governors for their stability.
				Analyze rotating and reciprocating components of machines to compute the magnitude and direction of balancing mass.
				Design suitable mechanism for different applications in a machine.
37.	4	AE2222	Object Oriented Programming -	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
				Illustrate dynamic memory management techniques using pointers, constructors and destructors.
				Implement the concept of function overloading, operator overloading, virtual functions, inheritance.
				Develop solution for given problem using file handling and oops principles
				Use graphics c++ inbuilt functions to draw graphical objects
38.	4	AE2142	Kinematics and Dynamics of Machines Lab -	Design a gear tooth profile for given engineering application.
				Determine gyroscopic couple and verify gyroscopic law.
				Plot polar diagram based on the experimental readings on hook's joint.
				Design a cam profile for any application.

				Plot characteristic curves for centrifugal governors
				Determination of moment of inertia of rigid bodies.
				Apply balancing methods to balance rotating and reciprocating components.
				Analyze vibration characteristics of single degree of freedom systems.
				Determine critical speed of shafts.
39.	4	AE2122	Electric Drives and Controls Lab. -	Perform various speed control experiments on dc & ac drives
				Find out the characteristics & parameters of ac & dc machines.
				Analyze performance of ac & dc machine
40.	5	AE3051	Automotive Chassis Systems	Elaborate the constructional details and operations of chassis systems like steering system, suspension system etc.
				Interpret the underlying mechanics of the chassis systems
				Apply steering geometry for a given vehicular application.
				Select/configure components or subsystems for integration into main chassis system.
				Explain various advanced chassis systems like adaptive suspensions, TCS etc.
41.	5	AE3071	Automotive Transmission	Demonstrate the need of transmission and its classification
				Describe the construction and working of various types of clutches and gear boxes
				Explain the working of advanced transmission systems.
				Describe the working of final drive.
				Select appropriate transmission system.
42.	5	AE3131	Internal Combustion Engines	Perform a primary thermodynamic analysis of otto and diesel cycle engines.
				Select appropriate engine for specific application.

				Select proper fuel system and subsystems for i c engine.
				Conduct performance testing of the i c engine and portray operating characteristics of i c engines.
				Select proper lubricant and lubrication system for engine.
43.	5	AE3531	Automobile Engineering Lab 1	Identify and list elements of various transmission and chassis systems
				Draw sketches /schematics of transmission and chassis systems.
				Describe the operating principles, functions, constructional details and working of transmission and chassis systems.
				Compare various configurations/sub types of transmission & chassis systems.
				Select appropriate configuration/types for transmission and chassis system requirements in automotive applications.
44.	5	AE3511	Theory of Machines Lab. - [AE3511]	Generate a gear tooth profile for any application.
				Determination of gyroscopic couple and verification of gyroscopic law.
				Plot polar diagram based on the experimental readings on hook's joint.
				Generate a cam profile for any application.
				Plotting of characteristic curves for porter governor.
				Determination of moment of inertia of rigid bodies.
				Apply balancing methods to balance rotating and reciprocating components.
				Analyze vibrations of single degree of freedom systems.
				Determine critical speed of shafts.
45.	5	[AE3611	I C Engine Lab -	Demonstrate the construction and working of fuel supply system and its components, lubrication, cooling systems.
				Handle instruments like tachometer, thermometer, Digital temperature indicator etc.

				<p>Conduct the test on single cylinder and multicylinder petrol, diesel engine plot the characteristics curves and interpret the curves</p> <p>Calculate bp, ip, fp, air - fuel ratio and various engine efficiencies.</p> <p>Conduct the test and prepare heat balance sheet</p>
46.	5	AE3551	Metrology and Quality Control Lab -	<p>Identify various of manual &amp; instrumental errors &amp; take proper cares to prevent them while using measuring instrument</p> <p>Measure angle of tapered components, template &amp; thread form using tool maker's microscope, sine bar and with standard balls and rollers.</p> <p>Measure, analyze &amp; interpret the data obtained from different measurements</p> <p>Plot "x bar" &amp; "r" charts &amp; comment on whether the manufacturing process is in control or not. if not, suggest the means to bring the process in statistical control</p>
47.	5	AE3591	Practicing School I -	<p>Acquaint with garage environment and process to be carried out</p> <p>Handle various tools and equipment used in garages.</p> <p>Diagnose minor faults of vehicle.</p> <p>Summarize the uses of advanced tools and equipment.</p> <p>Communicate and present his ideas / work in front of peers and superiors.</p>
48.	5	AE3091	Industrial Organization and Management -	<p>Explain the basic functions of management.</p> <p>Describe the basic concepts of functional areas of management.</p> <p>Apply basic concepts of management in an industry.</p> <p>Gain an insight into entrepreneurship management.</p>
49.	5	AE3111	Metrology and quality controm	<p>Select appropriate instrument/s for specific measurement</p> <p>Explain principle, working of various measuring instruments</p> <p>Construct and draw the control charts</p>

				Design gauges and special inspection fixtures as per the requirement
				Analyse and interpret the data obtained from the different measurements, processes and present it in the graphical form, statistical form
50.	5	AE3011	Dynamics of Machines -	Analyze kinematic parameters of gears in mesh for typical power transmission application.
				Explain the effect of gyroscopic effect on naval ship, aero plane etc.
				Determine dynamic forces and torques acting on reciprocating 55engine mechanism.5
				Analyze rotating and reciprocating components of machines to compute the magnitude and direction of balancing mass.
				Formulate mathematical models of systems and determine the natural frequency of undamped and damped free vibrations of single degree freedom systems.
				Determine the response of vibrating systems under forced harmonic excitations.
51.	6	AE3021	Machine Design -	Illustrate the fundamental concepts of machine design.
				Design joints for different loading conditions.
				Design shaft, keys, and couplings to transmit the required amount of torque.
				Design gears using different design considerations.
				Design springs and levers for various applications.
52.	6	AE3081	Alternative Fuels and Emission -	Propose modifications in ic engine systems for alternative fuels
				Select suitable fuel cell as automotive power plant
				Identify the causes of vehicle emission.
				Elaborate the emission measurement using emission norms and standard procedures.
				Describe vehicle emission control technologies.
53.	6	AE3061	Automotive Electrical and Electronics -	Select automotive electrical systems like battery, alternator, starting systems, ignition systems for particular application.

				Illustrate advanced electrical and electronic systems used in modern road vehicles.
				Select sensors and actuators used for automotive systems.
54.	6	AE3121	Vehicle Body and structure -	Apply various concepts of aesthetics & ergonomics while designing a vehicle body.
				Apply various concepts of aerodynamics while designing a vehicle body.
				Classify different types of bus body constructions as per application.
				Classify different types of commercial vehicles as per application.
				Select materials for different components of a vehicle.
				Design vehicle body for different loading conditions.
55.	6	AE3101	Automotive Dignostics -	Describe the importance and significance of automotive maintenance and records.
				Select advanced equipments and machines used in automotive maintenance.
				Troubleshoot and carry out basic maintenance of automotive systems.
				Discuss the developments in automotive maintenance technology.
56.	6	AE3141	Control Engineering -	Explain various control systems.
				Model the control system mathematically for formation of Block diagram.
				Apply linearization technique to non linear control systems.
				Analyze control systems using different mathematical tools.
				Verify stability of given control system using different techniques.
				Represent control systems using state space technique.
57.	6	AE3521	Auto Engg. Lab-2 -	Compare various vehicle body layouts and interpret the differences therein
				Apply the concepts of human ergonomics for vehicle body engineering

				Demonstrate the construction and working of various automotive electrical systems.
				Diagnose/test various automotive electrical components and systems using testing instruments.
				Diagnose the automotive electronic system faults with the help of ecu diagnostic system.
58.	6	AE3601	Auto diagnostic lab -	Identify problems in ic. engine systems by performing engine tune up
				Illustrate critical inspection parameters while engine top overhaul
				Perform wheel alignment and wheel balancing
				Test spark plug and fuel injector to check performance as per their specification
				Diagnose clutch, gearbox, braking system, differential and axles for its trouble shooting
				Measure wear of engine components
59.	6	AE3581	Mini Project/ technical theme -	Identify the problem on the basis of literature survey
				Ability to provide creative solution to engineering problem
				Work as individual or member of team
				Prepare cad model of engineering system using suitable software
				Communicate findings by verbally and non-verbally
60.	6	AE3621	Measurement and Control Lab	Measure mechanical parameters using appropriate measuring instruments
				Calibrate the measuring instruments.
				Analyse performance of control systems using matlab programming.
61.	6	AE3641	Seminar	Identify the problem on the basis of literature survey
				Ability to provide creative solution to engineering problem
				Work as individual or member of team
				Prepare cad model of engineering system using suitable software



				Communicate findings by verbally and non-verbally
62.	7	AE4011	Engine Design -	Apply fluctuating stress theories for real life problems
				Select proper type of engine for given requirement.
				Design engine components like cylinder, cylinder block, piston, connecting rod, crank shaft etc
				Design cooling and lubrication systems.
				Select proper bearings.
63.	7	AE4051	Finite Element Methods -	Discretize the physical domain using appropriate elements and check the quality of mesh
				Develop FEA codes for analysis of structural problems
				Analyze thermal problems using FEA.
				Use isoparametric formulation for irregular geometries.
				Analyze natural frequency of structure.
64.	7	AE4531	Engine Design Lab. -	Measure dimensions of given engine components.
				Prepare cad models and assembly of measured engine components.
				Design the components of engine for given requirements.
				Develop the cad model of designed engine components.
65.	7	AE4551	Vehicle Testing and Emission Lab. -	Explain the measurement system for automotive testing.
				Analyze performance of two and four wheelers.
				Select appropriate sensor for measurement of noise and vibrations in the vehicles.
				Determine modal parameters of automotive components.
				Analyze Performance of automotive engines.
				Analyze I. C. Engine emissions

				Compare I. C. Engine emissions with air fuel ratio
66.	7	AE4571	Project Phase - I -	Carry out literature survey and identify as well as select a problem.
				Comprehend and analyse an engineering problem and report findings to provide an appropriate solution.
				Design an experimental setup or develop an analytical model to analyze the system under consideration.
				Communicate problem, methodology and outcomes in a systematic and effective way in the form of a technical report.
				Work as a member and a team leader in engineering teams / multidisciplinary teams
				Demonstrate an ability to use different tools and techniques to arrive at a solution to the given problem.
				Demonstrate ethical behavior while completing the project work within given constraints and while delivering the expected outcomes
67.	7	AE4021	Automotive System Design -	Design of clutch for automotive application.
				Design gear box for automotive application.
				Design leaf spring and coil spring for automotive suspension.
				Design braking system (internal expanding shoe type) for a vehicle.
				Design front axle, differential, propeller shaft & final drive for automotive application.
68.	7	AE4041	Vehicle Dynamics -	Calculate dynamic longitudinal and transverse axle load transfer for a vehicle in motion.
				Determine the acceleration and braking performance of a vehicle when provided with specifications.
				Evaluate handling characteristics of a vehicle for a given set of data.
				Apply ride concepts while designing a suspension system for a vehicle.
69.	7	AE4522	Automotive System Design Laboratory - [	Design automotive clutch assembly
				Design automotive gear box assembly.

				Draw / Sketch clutch and gear box details and assembly using suitable modeling software.
70.	7	AE4561	Software Proficiency -	Explain user interface of the software.
				Develop appropriate model required for simulation.
				Apply proper constraints and boundary conditions
				Select suitable solver settings of simulation software.
				Apply different post processing techniques to interpret the results.
				Optimize the engineering problems using simulation software.
71.	7	AE4541	Ethics in Engineering Profession -	Demonstrate knowledge of ethical practices and professional expectations.
				Analyse and evaluate practices carried out in the industry on the basis of ethicality
72.	7	AE4231	Transport Management -	Describe the motor vehicle act & central motor vehicle rules.
				Illustrate motor vehicle insurance & taxation.
				Analyze the passenger & goods transport operations.
				Identify advanced techniques in traffic management.
73.	7	AE4061	Electric and Hybrid Vehicles -	Appreciate the need of evs and hevs in today's transportation context and identify various elements evs and hevs.
				Describe and compare ev and hev technology in general.
				Design an electric vehicle for given requirements.
				Design a hybrid electric vehicle for given requirements.
				Elaborate fuel cell technology for vehicular application.
74.	7	AE4171		Classify motor vehicle insurances

			Motor Insurance Practices -	Discuss applications of insurance principles in vehicle insurance
				Describe various forms in motor vehicle insurance
				Discuss mact in detail
75.	8	AE431	Hydraulics and Pnumatics -	Identify various components of pneumatic and hydraulic control systems.
				Draw hydraulic and pneumatic circuits using appropriate symbols for different components.
				Design hydraulic and pneumatic circuits for given engineering application.
				Select hydraulic and pneumatic circuits for different engineering applications.
76.	8	AE4141	Product design and development -	Appreciate the product development process in general
				Establish target and final specifications of proposed product.
				Generate, screen and test concepts for proposed product
				Iv) Apply various techniques like industrial design, dfx for a proposed product.
				V) perform economic analysis of proposed product.
77.	8	AE4101	Vehicle maintenance management -	Distinguish between preventive and breakdown maintenance and its management.
				Prepare automotive dealership layout and its requirements.
				Apply concepts of management in parts ordering and servicing.
				Illustrate management tools for showroom and service sector automobile industry.
				Interpret and summarize multi-brand workshop management
78.	8	OE402	Renewable energy sources	Identify the need of requirement of renewable energy source
				Summarize the various available energy sources.
				Illustrate different technologies essential for conversion of renewable energy sources.

				Evaluate the performance of energy conversion systems for maximum efficiency
				Compare the various renewable energy technologies.
				Select appropriate renewable energy technology for specific application
79.	8	AE462	Hydraulic and Pneumatic lab	Draw symbols to represent hydraulic and pneumatic components.
				Select hydraulic and pneumatic components to suit a particular engineering application.
				Demonstrate working of various hydraulic circuits using hydraulic trainer kit.
				Demonstrate working of various pneumatic circuits using pneumatic trainer kit.
				Develop hydraulic and pneumatic circuits to address the requirements of a particular engineering application.
				Analyse hydraulic and pneumatic circuits to meet the requirements of an engineering application.
80.	8	AE464	Product design and development lab - [AE464]	Apply product planning tools like benchmarking, pugh diagram and qfd for automotive product development
				Use fema/femac tool for automotive product development.
81.	8	AE4111	Automotive Safety	Comprehend application of passive and active safety for vehicle.
				Describe importance of ergonomics in automotive safety and human response to impact
				Design vehicle safety systems
				Describe various regulations of vehicle safety and safety testing methods.
82.	8			Apply principle of collision to vehicle crash mechanism
83.	8	OE403	Reliability Engineering -	Explain fundamental concepts and measures of reliability.
				Apply methods for estimating the reliability of designs and for analyzing reliability data.

				Create reliability block diagram for a given system to predict and enhance the reliability of a particular system
				Apply engineering knowledge and specialist techniques to prevent or to reduce the failures or frequency of failures.
				Apply the appropriate methodologies to determine time and strength based reliabilities.
				Explain terms involved in software reliability.

- **Department Name: Automobile Engineering**
- **PG Program Name: M.Tech Automobile Engineering**
- **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 demonstrate, evaluates, analyze and synthesize knowledge in the field of automotive technology.
2.	An ability to analyze automotive engineering problems leading to independent research.
3.	An ability to offer solution to technical problems considering environment sustainability, road safety and societal requirements.
4.	An ability to identify research problem, and provide appropriate solutions.
5.	An ability to use the advanced techniques, skills, and modern engineering tools.
6.	An ability to collaborate, work harmoniously in teams and address multidisciplinary issues.
7.	An ability to apply engineering management tools and principles to research projects.
8.	An ability to communicate the research findings confidently and effectively.
9.	An ability to learn continuously, independently and update knowledge & skills.
10.	An ability to demonstrate ethical behaviour and contribute to the community for sustainable development.
11.	An ability to improve quality of work by criticizing one's own work.

Sr. No.	Program Specific Outcomes
1.	NIL
2.	NIL
3.	NIL

<b>Sr. No.</b>	<b>Semester</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcome</b>
1.	1	<b>MAE1010</b>	<b>Course Motor Vehicle Technology -</b>	Out line the different vehicle layouts as per requirements of automotive applications.
				Explain the fundamentals, principle of operation of different automotive systems.
				Describe the constructional details and working of various transmission and chassis systems.
				Analyse the underlying mechanics of the various chassis systems.
				Select/configure components or subsystem for diverse vehicular application.
2.	1	<b>MAE1140</b>	<b>Auto engg Lab -</b>	Identify and list elements of various automotive systems
				Draw sketches /schematics of automotive systems
				Describe the operating principles, functions, constructional details and working of automotive systems.
				Compare various configurations/subtypes of automotive systems
				Select appropriate configuration/types for automotive systems as per requirements in automotive applications.
3.	1	<b>MAE1160</b>	<b>CAE Lab -</b>	Develop/ select appropriate model required for simulation
				Apply proper constraints and boundary conditions
				select suitable solver settings of simulation software.
				Apply different post processing techniques to interpret the results.
				Apply optimization tools from simulation software.
4.	1	<b>MAE1120</b>	<b>Finite element methods -</b>	Formulate finite element equation using weighted residual approach
				Formulate finite element equation using variational approach.
				Analyze vector and scaler field problems using fem.



				Analyze the dynamic behavior of structure using fem.
				Use Isoparametric formulation for irregular geometries
				Formulate axisymmetric problems.
5.	1	<b>MAE1150</b>	<b>Vehicle Testing and Simulation lab. -</b>	Analyses performance of two and four wheelers
				Determine modal parameters of automotive components.
				Select appropriate sensor for measurement of noise and vibrations
				Analyse effect of catalyst convertor on engine emissions
				Use of appropriate gas analyser or smoke meter to measure principal emissions
6.	1	<b>MAE1020</b>	<b>Automotive Design -</b>	Choose and configure engine and chassis systems for proposed vehicle and design engine components.
				Carry out thermal and mechanical design of engine subsystems.
				Design clutch, gear box and drive train elements for specific vehicle.
				Analyse and select steering geometry and design steering mechanism and components.
				Design suspension linkages, springs and shock absorber
				Design brake linkage and brake system
7.	1	<b>MAE1040</b>	<b>Automotive Product Design and Development -</b>	I) appreciate the product development process in general
				ii) establish target and final specifications of proposed product.
				iii) generate, screen and test concepts for proposed product
				iv) apply various techniques like industrial design, dfx for a proposed product.
				v) perform economic analysis of proposed product.
8.	1	<b>MAE1130</b>		1. formulate a research problem.

			<b>Research Methodology and IPR -</b>	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, analyze information and prepare report.
				5. describe nature and processes involved in development of intellectual property rights.
9.	2	<b>MAE2010</b>	<b>Vehicle Dynamics -</b>	Estimate axle loads under any combination of accelerations, grades, aerodynamic forces.
				Evaluate vehicle acceleration performance with engine power and traction limit constraints.
				Analyze braking performance of vehicle over the range of operating conditions.
				Evaluate handling characteristics of vehicle.
				Evaluate ride characteristics of vehicle.
10.	2	<b>SHP513</b>	<b>Advanced Mathematical Methods in Engineering -</b>	Evaluate fourier series and fourier transforms for given function and apply it to solve the partial differential equations in engineering problems.
				Apply the specific method of solution of partial differential equations for solving the given problems.
				Formulate and solve a boundary value problem (partial differential equation)
				Use the relevant method for solving the simultaneous linear equations and compute the eigen values.
				Estimate numerically the solution of given algebraic equation.
				:Analyze the variance and explain the different research designs.
11.	2	<b>MAE2120</b>	<b>Mechatronics -</b>	1. Describe/identify basic elements of mechatronic systems.
				2. Describe/identify key elements of sensors and transducers and techniques of interfacing with plc, microprocessor and microcontroller etc.

				3. Apply a systematic approach to the design mechatronics systems.
				4. Design mechatronics systems in areas such as manufacturing, automobile systems and robotics.
12.	2	<b>MAE2070</b>	<b>Automotive Emission and Control Technology (PE-IV)</b>	Outline the overview of emission control technologies in si engine.
				Explain effect of engine design parameters and engine operating variables on si engines.
				Analyze the pollutant formation mechanisms in ic engine emissions.
				Illustrate the knowledge of emission norms, standard test procedures and emission measurements techniques.
				Analyze different emission control technologies in ic engines.
13.	2	<b>AUT2153</b>	<b>CFD Lab -</b>	Select appropriate domain for cfd simulation.
				Select suitable meshing technique for cfd simulation
				Apply proper domain and boundary conditions.
				Simulate steady state and transient fluid flow and heat transfer problems.
				Simulate multiphase flow problems.
				Use cfd results for making design decisions.
14.	2	<b>SH551</b>	<b>Technical Communication -</b>	Construct written message meaningfully.
				Apply norms of technical writing in preparing reports.
				Demonstrate improved writing and reading skills.
				Make use of oral mode of english language meaningfully and effectively.
15.	2	<b>MAE2020</b>	<b>Design of Electric and Hybrid Electric Vehicles -</b>	Appreciate the relevance of evs and hevs for road transportation.
				Design an ev for given requirements and estimate its performance..

				Design an hev in terms of architecture, control strategy and various elements for said requirements.
				Describe the fuel cell technology and model the fcev for the road application
16.	1	<b>MAE1010</b>	<b>Motor Vehicle Technology -</b>	Out line the different vehicle layouts as per requirements of automotive applications.
				Explain the fundamentals, principle of operation of different automotive systems.
				Describe the constructional details and working of various transmission and chassis systems.
				Analyse the underlying mechanics of the various chassis systems.
				Select/configure components or subsystem for diverse vehicular application.
17	3	<b>AUT6011</b>	<b>Field Training</b>	1 Acquire sufficient knowledge in the respective industry.
				2 Explain the various departments in the industry.
				3 Identify problems in the process in industry.
				4 Suggest some remedies for the identified problems.
18	13	<b>AUT6031</b>	<b>Dissertation Phase I</b>	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
19	3	<b>AUT6051</b>	<b>Dissertation Phase II</b>	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
20	4	<b>AUT6021</b>	<b>Dissertation Phase III</b>	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
21	4	<b>AUT6041</b>	<b>Dissertation Phase IV</b>	1	Design new methodology to address the problem
				2	Justify the results obtained from new methodology
				3	Write technical report and defend work.

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

**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.

**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.	<p style="text-align: center;"><b>PROGRAM OUTCOMES</b></p> <p><b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</p>
2.	<p><b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.</p>
3.	<p><b>Design/development of solutions:</b> 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.</p>
4.	<p><b>Conduct investigations of complex problems:</b> 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.</p>
5.	<p><b>Modern tool usage:</b> 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.</p>

6.	<b>The engineer and society:</b> 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.	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	<b>Communication:</b> 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.	<b>Project management and finance:</b> 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.	<b>Life-long learning:</b> 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.
<b>Sr. No.</b>	<b>Program Specific Outcomes</b>
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.
3.	

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	CE2012	Building Planning and Design	1. Choose appropriate building materials for building construction applications. 2. Prepare a functional design of components for residential buildings.

				<ol style="list-style-type: none"> <li>3. Plan and design residential buildings.</li> <li>4. Choose the appropriate type of plumbing, electrification system and building finishes for residential buildings.</li> </ol>
2.		CE2032	Engineering Mechanics	<ol style="list-style-type: none"> <li>1. Classify various forces and their effects, to analyze real life problems.</li> <li>2. Analyze engineering problems applying conditions of equilibrium</li> <li>3. Apply fundamental concepts of Kinematics and Kinetics to the analysis of practical problems</li> <li>4. Determine Centroid &amp; Moment of Inertia of the geometrical plane lamina</li> </ol>
3.		CE2052	Strength of material	<ol style="list-style-type: none"> <li>1. Analyze structural members for various types of stresses and strains.</li> <li>2. Determine shear and bending stresses for determinate beams.</li> <li>3. Construct shear force and bending moment diagrams for determinate beams.</li> </ol>
4.		SH2052	Engineering Mathematics III	<ol style="list-style-type: none"> <li>1. Solve problems on linear differential equations with constant coefficients.</li> <li>2. Apply linear differential equations (LDP) to deflection of beams and Columns</li> <li>3. Solve problems on linear partial differential equations with constant coefficients</li> <li>4. Determine Fourier series of given function</li> <li>5. Compute Karl Pearson's coefficient of correlation and determine regression lines</li> <li>6. Use probability distributions to solve the engineering problems</li> </ol>
5		CE2072	Surveying	<ol style="list-style-type: none"> <li>1. Calculate reduced levels and prepare contour maps.</li> </ol>



				<ol style="list-style-type: none"> <li>2. Calculate the angular and linear measurements by using tachometry and trigonometry</li> <li>3. Design and Set out the curve on field.</li> <li>4. Illustrate the principles of advanced surveying techniques.</li> </ol>
6		SH2172	Environmental Science (Mandatory Course)	<ol style="list-style-type: none"> <li>1. Study the importance and sensitivity of environment.</li> <li>2. Interpret the over exploitation of natural resources and follow the environmental ethics.</li> <li>3. Explain the methods to protect environment and prevent environmental pollution.</li> <li>4. Apply their knowledge and skills to solve their environment related problems.</li> </ol>
7		CE2092	Building Planning and Design lab	<ol style="list-style-type: none"> <li>1. Explain properties and uses of different building materials.</li> <li>2. Draw various building components using AutoCAD software.</li> <li>3. Prepare submission drawing of residential building using AutoCAD.</li> <li>4. Prepare working drawings of residential building using AutoCAD.</li> <li>5. Draw line plan of various public buildings.</li> </ol>
8		CE2112	Surveying Lab	<ol style="list-style-type: none"> <li>1. Calculate reduced levels and prepare contour maps by using theodolite.</li> <li>2. Design and Set out the curve on field.</li> <li>3. Perform setting out for various construction works.</li> <li>4. Apply tachometry and trigonometry concepts to calculate distances &amp; elevations.</li> </ol>

				5. Prepare the layout map by using the Total Station.
9		CE2132	<b>Strength of material lab</b>	<ol style="list-style-type: none"> <li>1. Demonstrate behavior of material under axial shear and bending forces.</li> <li>2. Identify various types of stresses in various structural elements.</li> <li>3. Determine various strengths of different construction materials</li> </ol>
10		CE2172	Engineering Mechanics Lab	<ol style="list-style-type: none"> <li>1. Verify law of polygon of forces, law of triangle of forces and principle of moment.</li> <li>2. Compare coefficient of friction of various surfaces in contact.</li> <li>3. Correlate theoretical and practical results of support reactions and Centroid of plane lamina.</li> <li>4. Analyze a simple truss.</li> </ol>
11		SH2602	<b>Environment Project</b>	<ol style="list-style-type: none"> <li>1. Develop as an individual and in group leadership quality.</li> <li>2. Identify and analyse social problems in Civil Engineering.</li> <li>3. Develop presentation skill through oral and report writing.</li> <li>4. Acquire theoretical knowledge regarding various problems in Civil Engineering.</li> </ol>
12		SH****	Open Elective –II Choice Based Soft Skill Program-I	<ol style="list-style-type: none"> <li>1. Adequate knowledge of basic grammar of English language.</li> <li>2. Intermediate level vocabulary of English language.</li> <li>3. Communicate moderately using English language.</li> </ol>
13		CE2022	Engineering Geology	<ol style="list-style-type: none"> <li>1. Identify common Earth materials and interpret their composition, origin, and uses.</li> <li>2. Recognize and interpret geological structures, and be able to apply their knowledge and skills to interpret earth processes.</li> </ol>

				<ol style="list-style-type: none"> <li>3. Classify hydro geological properties of various rocks.</li> <li>4. Describe the processes operating at and beneath the Earth's surface.</li> <li>5. Compare the suitable sites for construction of dam, tunnel in different geological formation and geological structures.</li> <li>6. Interpret spatial relationships of geological and geographical features.</li> </ol>
		CE2042	Concrete Technology	<ol style="list-style-type: none"> <li>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</li> <li>2. Describe various properties of concretes in fresh and hardened state</li> <li>3. Design concrete mixes of given grade using mix design procedures recommended by IS Code and ASTM,ACI code</li> <li>4. Describe the properties of special types of concretes based on their material composition and method of manufacture</li> <li>5. Illustrate various mechanisms causing the deterioration of concrete /elements of concrete structures</li> </ol>
14		CE2062	<b>Fluid Mechanics</b>	<ol style="list-style-type: none"> <li>1. Analyze different physical properties of fluid.</li> <li>2. Calculate various forces acting on submerged and floating bodies.</li> <li>3. Discriminate fluid kinematics and fluid dynamics.</li> <li>4. Illustrate flow through pipe and flow through open channel.</li> </ol>

				<ol style="list-style-type: none"> <li>5. Prepare dimensional analysis using different theories and models.</li> <li>6. Explain terms used in hydraulic pumps.</li> </ol>
15		CE2082	Mechanics of Structures	<ol style="list-style-type: none"> <li>1. Analysis of circular shafts subjected to torsion.</li> <li>2. Compute slopes and deflections at various locations for determinate beams.</li> <li>3. Design axially loaded columns.</li> <li>4. Construct ILD for determinate beams and 2D trusses.</li> <li>5. Determine strain energy stored in the material due to gradual, sudden and impact loads.</li> </ol>
16		CE2102	Human Values and Professional Ethics	<ol style="list-style-type: none"> <li>1. Practice the moral value in engineering profession.</li> <li>2. Resolve the moral issues in the profession.</li> <li>3. Justify the moral judgment concerning the profession.</li> </ol>
17		CE2122	Applications of Programming Language in Civil Engineering	<ol style="list-style-type: none"> <li>1. Formulate simple programs for arithmetic, logical and loops problems(in C language)</li> <li>2. Formulate simple programs for arithmetic, logical and loops problems(Microsoft excel)</li> <li>3. Test and execute the programs and correct syntax and logical errors.</li> </ol>
18		CE2142	Engineering Geology Lab	<ol style="list-style-type: none"> <li>1. Recognize and describe common geological formations related to civil engineering.</li> <li>2. Identify the different Rock types.</li> <li>3. Implement various methods for water conservation techniques.</li> </ol>

				4. Use of electrical resistivity method for determining depth of bedrock or groundwater.
19		CE2162	<b>Fluid mechanics Lab</b>	<ol style="list-style-type: none"> <li>1. Determine metacentric height, type of flow, major losses, minor losses, coefficient of discharge, coefficient of contraction, and coefficient of velocity of liquid.</li> <li>2. Design most economical open channel section.</li> <li>3. Measure velocity of flow using wind tunnel.</li> </ol>
20		CE2182	Concrete Technology Lab	<ol style="list-style-type: none"> <li>1. Explain standard procedures for testing properties of various ingredients of concrete and concrete mixes/specimens</li> <li>2. Perform tests on ingredients of concrete and on fresh and hardened concrete to determine their properties using standard procedures</li> <li>3. Design the concrete mix for a given grade of concrete using guidelines of IS code</li> <li>4. Prepare the test set up for conducting various tests on concrete mixes / specimens</li> <li>5. Evaluate the quality of concrete specimens / elements using NDT equipments</li> </ol>
21		CCE2202	Comprehensive Exam II	
22		SH****	<b>Open Elective – III</b> <b>Choice Based Soft Skill Program-II</b>	

23		CE2222	<b>Internship</b>	<ol style="list-style-type: none"> <li>1. Make aware the responsibility of student on work site.</li> <li>2. Seek knowledge, information and details at site from live situations at field.</li> <li>3. Correlate practical and theoretical information and understand the concept of experienced learning.</li> </ol>
24		CE3012	Design of Steel Structures	<ol style="list-style-type: none"> <li>1. Refer and use design codes and hand book for design of steel structural elements.</li> <li>2. Determine the load carrying capacity of the sections for different actions.</li> <li>3. Analyze the members for design loads.</li> <li>4. Design steel structural members.</li> <li>5. Design the connections.</li> </ol>
25		CE3031	Geotechnical Engineering	<ol style="list-style-type: none"> <li>1. Identify different properties of soil</li> <li>2. Describe flow of water through soil</li> <li>3. Identify suitable laboratory and field compaction methods.</li> <li>4. Describe phenomenon of consolidation of soil.</li> <li>5. Calculate shear strength of soil.</li> <li>6. Determine bearing capacity of soil</li> </ol>
26		CE3052	Irrigation and Hydraulic Structures	<ol style="list-style-type: none"> <li>1. hydrological cycle.</li> <li>2. Explain importance of ground water resource.</li> <li>3. Design and analyse gravity dam.</li> </ol> <p>Design canal and canal regulator structure</p>
27		CE3072	Environmental Engineering	<ol style="list-style-type: none"> <li>1. Identify and value the effect of the pollutants on the environment: atmosphere, water and soil.</li> <li>2. Select the most appropriate technique for the treatment of water,</li> </ol>

				<p>wastewater solid waste and contaminated air.</p> <ol style="list-style-type: none"> <li>28Design strategies to control, reduce and monitor pollution.</li> <li>Explain impact of humans on environment and environment on humans</li> </ol>
29		CE3092	Transportation Engineering	<ol style="list-style-type: none"> <li>Analyse different components of geometric design</li> <li>Determine traffic volume for design of road infrastructure</li> <li>pavement design and different tests on highway materials no.1</li> <li>Design rail transportation system</li> </ol>
30		CE3132	Environmental Lab	<ol style="list-style-type: none"> <li>Analyse water and wastewater characteristics</li> <li>Prepare a layout of water and wastewater treatment plant</li> <li>Design of water and wastewater treatment plant.</li> </ol>
31		CE3152	Transportation Engineering Lab	<ol style="list-style-type: none"> <li>Characterize the pavement materials</li> <li>quality control tests on pavement materials</li> <li>Perform the mix design for bituminous mix</li> <li>Calculate thickness of different layers of pavement</li> </ol>
32		SH3012	Constitution of India	<ol style="list-style-type: none"> <li>Explain how India has come up with a Constitution which is the combination of the positive aspects of other Constitutions</li> <li>Explain the basic of governance of our nation and interpretation of the preamble.</li> </ol>

				<ol style="list-style-type: none"> <li>3. Explain the different aspects covered under the different important Articles.</li> <li>4. Explain the basic law and its interpretation. Understand the important amendments which took place and their effects.</li> <li>5. Explain the basic that along with enjoying the rights one needs to fulfill one's duties</li> </ol>
33		CE3192	Structural Analysis	<ol style="list-style-type: none"> <li>1. Deflection of joint of determinate and indeterminate trusses.</li> <li>2. Analyse three hinged and two hinged parabolic and circular arches.</li> <li>3. Apply plastic analysis theory for beams.</li> <li>4. Calculate bending stresses in beams due to unsymmetrical bending.</li> <li>5. Analyse frames using approximate methods.</li> <li>6. Analyse the material by applying theories of failure.</li> </ol>
34		CE3232	Composite Materials (Program Elective-I)	<ol style="list-style-type: none"> <li>1. Explain the methods of manufacturing, properties and applications of various composites materials.</li> </ol>



35		CE3212	<p>Construction Safety and Quality Management</p> <p>(Program Electiv-I)</p>	<ol style="list-style-type: none"> <li>2. Understand the various safety concepts and requirements applied to construction projects.</li> <li>3. study the of construction accidents, safety programmes, contractual obligations, and design for safety</li> <li>4. Study the various construction safety problems and safety programs.</li> <li>5. Study the various laws related to safety in construction industry</li> <li>6. Study the importance of workers compensation insurance.</li> </ol>
36		CE3272	<p>Instrumental Monitoring of Environment and Modeling</p>	<ol style="list-style-type: none"> <li>1. To analyse the principles of volumetric and instrumental analytical methods in environmental monitoring</li> <li>2. To use statistical methods for evaluating and interpreting data of environmental interest</li> <li>3. To discriminate various electrochemical methods</li> <li>4. To summarize various material characterization techniques and its principles</li> </ol>
37		CE3292		<ol style="list-style-type: none"> <li>1. Describe need and types of tunnel</li> </ol>

			Tunnel Docks and Harbour Engineering	<ol style="list-style-type: none"> <li>2. Compare tunnel construction technologies</li> <li>3. Discuss importance of safety and ventilation</li> <li>4. Select location for construction of docks and harbours</li> <li>5. Discuss components of docks and harbours</li> <li>6. Explain dredging operations</li> </ol>
38		CE3312	Urban Transportation System	<ol style="list-style-type: none"> <li>1. Identify the transportation problems in urban area</li> <li>2. Perform the transportation survey in urban area</li> <li>3. Calculate the travel demand in future</li> <li>4. Understand different urban transportation planning methods</li> <li>5. Predict route and schedule for mass transit system</li> <li>6. Understand different methods of preparation of transportation plan</li> </ol>
39		CE3022	Theory of Structures	<ol style="list-style-type: none"> <li>1. Analyse the indeterminate beams by using consistent deformation method</li> <li>2. Analyse the indeterminate beams by using three moment theorem</li> <li>3. Analyse the beam, truss, portal frame and two hinged arches by using energy method and Construct BMD</li> <li>4. Analyse the continuous beam, portal frames by slope deflection method &amp; construct BMD and SFD</li> <li>5. Analyse the continuous beam, portal frames by moment</li> </ol>

				<p>distribution method &amp; construct SFD and BMD</p> <p>6. Analyse the continuous beam, portal frames by flexibility and stiffness matrix method &amp; construct BMD</p>
40		CE3042	Estimation & Costing	<ol style="list-style-type: none"> <li>1 Explain/ Discuss/ Describe the types and basic requirements of detailed estimate.</li> <li>2. Prepare detailed estimate of load bearing structure, framed structure, factory shed, road, canal and culvert.</li> <li>3. Prepare rate analysis of construction items</li> <li>4. , Prepare tenders documents and contracts.</li> <li>5. Prepare valuation report of the property.</li> </ol>
41		CE3062	Design of Reinforced Concrete Elements	<ol style="list-style-type: none"> <li>1. Analyze and design singly, doubly reinforced and flanged beams.</li> <li>2. Analyze and design R.C.C. slab and R.C.C. staircase.</li> <li>3. Analyze and design R.C.C. columns, isolated pad footing and combined footing.</li> </ol>
42		CE3061	Estimating and Costing	<ol style="list-style-type: none"> <li>1. Explain/ Discuss/ Describe the types and basic requirements of detailed estimate.</li> <li>2. Prepare detailed estimate of load bearing structure, framed structure, factory shed, road, canal and culvert.</li> </ol>

				<ol style="list-style-type: none"> <li>3. Prepare rate analysis of construction items</li> <li>4. , Prepare tenders documents and contracts.</li> <li>5. Prepare valuation report of the property.</li> </ol>
43		CE3062	Design of Reinforced Concrete Elements	<ol style="list-style-type: none"> <li>1. Analyze and design singly, doubly reinforced and flanged beams.</li> <li>2. Analyze and design R.C.C. slab and R.C.C. staircase.</li> <li>3. Analyze and design R.C.C. columns, isolated pad footing and combined footing.</li> </ol>
44			Design of Industrial Structures (PE 2)	<ol style="list-style-type: none"> <li>1. Design industrial buildings, beam columns</li> <li>2. Design open web sections</li> </ol> <p>Design steel towers, water tanks, truss bridge</p>
45		CE3182	Repair and Rehabilitation of Structures	<ol style="list-style-type: none"> <li>1. Diagnose the causes of distress and deterioration of concrete structure</li> <li>2. Describe the procedures of various repair techniques or methods</li> <li>3. Prepare a report on condition assessment of buildings</li> <li>4. Suggest appropriate materials and techniques for repair and strengthening of structures/elements</li> </ol>
46		CE32202	Financial Management	<ol style="list-style-type: none"> <li>1. Revise to application oriented Analyse the financial condition of firm.</li> <li>2. Revise</li> </ol>

				Suggest method of financing
47		CE3222	Disaster Preparedness and planning	<ol style="list-style-type: none"> <li>1. Analyze effects of natural and manmade disasters.</li> <li>2. Demonstrate disaster management program.</li> <li>3. Analyze vulnerable conditions and risk assessment.</li> <li>4. Construct layout for sanitary landfill site and composting site</li> <li>5. Describe stakeholders role in disaster response.</li> </ol>
48		CE3242	Air Quality Monitoring and Modelling	<ol style="list-style-type: none"> <li>1. Explain structure of the atmosphere Air Pollution, Scales of air pollution</li> <li>2. Interpret on sources of air pollution natural and artificial, air pollution Episodes</li> <li>3. Explain effect of different air pollutants on man, animals and plants.</li> <li>4. Design Stack height and explain meteorology, transport and control mechanism</li> </ol>
49		CE3262	Introduction to Railway and Bridge Engineering	<ol style="list-style-type: none"> <li>1. Design rail transport system.</li> <li>2. Analyse need modern rail system.</li> <li>3. Perform site investigation for bridge.</li> <li>4. Apply standards to railway bridge system</li> </ol>
50		CE3302	Design of bridges	<ol style="list-style-type: none"> <li>1. Understand the load distribution and IRC standards.</li> <li>2. Design the slab and T beam bridges.</li> </ol>

				<p>3. Design Box culvert, pipe culvert</p> <p>4. Use bearings, hinges and expansion joints</p>
51		CE332	Design of Earthquake Resistant Structures	<p>1. Evaluate responses for single degree of freedom system for free and force vibration by various methods.</p> <p>2. Practice about computation of lateral loads developed due to earthquake force by equivalent static method and SFD and BMD as per IS 1893 2016.</p> <p>3.</p> <p>4. Design ductile detailing of RCC structural elements.</p> <p>5. Apply principles of planning, structural systems for seismic resistant to structures.</p>
52		CE4012	CE4012 Design of Reinforced Concrete Elements	<p>1. Analyze and design singly, doubly reinforced and flanged beams.</p> <p>2. Analyze and design R.C.C. slab and R.C.C. staircase.</p> <p>3. Analyze and design R.C.C. columns, isolated pad footing and combined footing.</p>
53		CE4041	Infrastructure Engineering II	<p>1. Design rail transportation system</p> <p>2. Analyze need of modern rail system</p> <p>3. Perform site investigation for bridge</p> <p>Apply standards to railway bridge system</p>

54		CE4031	Irrigation and Hydraulic Structures	<ol style="list-style-type: none"> <li>1. various hydraulic conditions.</li> <li>2. Draw typical plan of various hydraulic structures Analyze and design Hydraulic structures</li> <li>3. Compute storage capacity of various types of reservoir and their design aspects.</li> <li>4. Calculate control levels of reservoir.</li> <li>5. Analyze and design gravity and earthen dam for.</li> </ol>
55		CE4051	Earthquake Resisting Structures	<ol style="list-style-type: none"> <li>1. Evaluate dynamic response for SDOF system for different loads.</li> <li>2. Calculate lateral loads developed due to earthquake force by linear methods.</li> <li>3. Examine different methods available for reducing effects of dynamic loads</li> </ol>
66		CE4071	Construction Methods and Equipment's	<ol style="list-style-type: none"> <li>1. Plan equipment utilization for earthwork operation,</li> <li>2. Perform economic analysis of equipments,</li> <li>3. Select earthwork equipment based on production and site requirements,</li> <li>4. Decide plant capacity required for a project,</li> <li>5. Justify the construction method selected for particular task</li> </ol>
67		CE4091	Estimating and Costing lab	<ol style="list-style-type: none"> <li>1. Prepare estimate for public buildings.</li> <li>2. Discuss specifications for various items of public buildings.</li> <li>3. Analyse rates for various item of public buildings</li> </ol>
68		CE4111	Construction Contracts and Valuation Lab	<ol style="list-style-type: none"> <li>1. Apply rights and responsibilities of parties of contracts.</li> <li>2. Prepare contract document.</li> <li>3. Explain different types of values and methods of valuation.</li> </ol>

				4. Prepare valuation report for the open land and different buildings
69		CE4061	Design of Concrete Structures Lab (Mini Project)	<ol style="list-style-type: none"> <li>1. Estimate primary and combination design loads on building consulting appropriate standards and handbooks</li> <li>2. Design the component parts of the building manually</li> <li>3. Model the same building using any standard software</li> <li>4. Design the building.</li> <li>5. Demonstrate effective team membership/leadership through a group project</li> </ol>
70		CE4232	Employment Enhancement Skills	<ol style="list-style-type: none"> <li>1. Develop technical competence in a Soft skill in the Civil Engineering field,</li> <li>2. Apply the techniques and soft skills for Civil Engineering practice.</li> <li>3. Develop oral and written presentation skills for soft skill project.</li> <li>4. Design and interpret data by soft skill Civil Engineering projects</li> </ol>
71		CE4271	Advanced Engineering Geology (Program Elective I)	<ol style="list-style-type: none"> <li>1. Evaluate geological formations and site suitability for construction of major civil structures</li> <li>2. Apply geophysical methods for subsurface exploration</li> <li>3. Examine the geo-environmental hazards</li> </ol>
72		CE4201	Finite Element Analysis	<ol style="list-style-type: none"> <li>1. Apply variational and direct approach method for 1D, 2D problems.</li> </ol>



			(Program Elective II)	<ol style="list-style-type: none"> <li>2. Develop stiffness matrix for linear spring, bars, beam and truss (1D, 2D &amp; 3D problem).</li> <li>3. Explain terminology used in FEM</li> <li>4. Generate relationship between natural and cartesian coordinate system.</li> <li>5. Formulate element stiffness matrix for axisymmetric elements.</li> </ol>
73		CE4121	Advanced Structural Design – (Program Elective II)	<ol style="list-style-type: none"> <li>1. Analyze and design RC structures and their components like building frames, flat slab, retaining walls, water tanks and piles.</li> <li>2. Use relevant codes and apply codal provisions for analysis and design of RC structures and their components.</li> <li>3. Analyze the slabs of irregular shapes by yield line theory and design rectangular and circular slabs for yield moments.</li> <li>4. Show detailing of reinforcement in structural components of building frames, flat slab, retaining walls, water tanks and piles.</li> </ol>
74		CE4151	Solid and Hazardous Waste management (Program Elective I)	<ol style="list-style-type: none"> <li>1. Determine solid waste properties and quantity for municipal and hazardous waste.</li> <li>2. Illustrate health effects by municipal, hazardous waste.</li> <li>3. Design Physicochemical and biological treatment and landfill site for solid waste.</li> </ol>
75		CE4241	Geo-informatics for Engineering (Program Elective II)	<ol style="list-style-type: none"> <li>1. Apply GIS tool for solving civil engineering industry problem</li> <li>2. Perform infrastructural planning</li> <li>3. Analyse spatial data and query analysis</li> <li>4. Develop base and thematic maps</li> </ol>

				5. Develop projects and device solution for the area
		CE4311	Advanced Foundation Engineering (Program Elective I)	<ol style="list-style-type: none"> <li>1. Interpret wells, caissons foundation &amp; cofferdams in soil.</li> <li>2. Discriminate soil structure interaction between static &amp; dynamic analysis.</li> <li>3. Illustrate the application of various modern techniques in construction of foundation.</li> <li>4. Justify the appropriate method for the design of foundation</li> </ol>
76		CE4211	Advanced Construction Materials (Program Elective-I)	<ol style="list-style-type: none"> <li>1. Summarize the properties of various advanced &amp; special materials of construction.</li> <li>2. Recommend the use of appropriate building materials to suit the construction requirements.</li> <li>3. Illustrate the application methods of various building materials for construction works.</li> </ol>
77		CE4231	Project Appraisal (Program Elective-I)	<ol style="list-style-type: none"> <li>1) Apply project appraisal performance measurements to a project,</li> <li>2) Analysis project on basis of market &amp; demand, technical feasibility, financial feasibility &amp; cash flow.</li> <li>3) Interpret social cost benefit analysis of Civil Engineering project.</li> <li>4. Estimate environmental &amp; social impact of project</li> </ol>
78		CE4251	Construction Safety (Program Elective I)	<ol style="list-style-type: none"> <li>1. Suggest safety precautions to be taken during the execution of various construction works.</li> <li>2. Analyze possible hazards and accidents in construction projects.</li> <li>3. Interpret various legal aspects of safety in construction</li> </ol>
79		CE4361	Fundamentals of Urban Planning (Program Elective II)	<ol style="list-style-type: none"> <li>1. Explain principles and necessity of town planning.</li> <li>2. Interpret all public Amenities useful for town planning.</li> </ol>

				<ol style="list-style-type: none"> <li>3. Compare most efficient traffic management system for town planning.</li> <li>4. Choose public utility services for rapid transportation.</li> <li>5. Criticize planning on various Central Acts and State Acts.</li> </ol>
80		CE4381	Optimization Techniques (Program Elective II)	<ol style="list-style-type: none"> <li>1. Identify the necessity and scope of optimization techniques.</li> <li>2. Analyse the managerial problem through models and arrive at an optimal solution or decision.</li> <li>3. Explain the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.</li> <li>4. Construct and analyse Mathematical Decision Model.</li> <li>5. Explain applications of Queuing theory.</li> </ol>
81		CE4241	Disaster Management (Program Elective II)	<ol style="list-style-type: none"> <li>1. Analyze effects of natural and manmade disasters.</li> <li>2. Demonstrate disaster management program.</li> <li>3. Analyze vulnerable conditions and risk assessment.</li> <li>4. Construct layout for sanitary landfill site and composting site</li> <li>5. Describe stakeholders role in disaster response.</li> </ol>
82		CE4261	Building Services and Maintenance (Program Elective II)	<ol style="list-style-type: none"> <li>1. Develop asset management plan,</li> <li>2. Perform structural assessment of civil engineering structures,</li> <li>3. Decide repairs and preventive actions required for buildings,</li> <li>4. Develop detailed maintenance plan,</li> <li>5. Select structural strengthening method and material,</li> </ol>
83		CE4291	Green Technologies in Civil Engineering	<ol style="list-style-type: none"> <li>1. Explain the economic benefits of a green building</li> <li>2. Classify the terms and the construction methodologies</li> </ol>

			(Program Elective I)	<p>between “traditional building” and “green building”.</p> <p>3. Evaluate the status of building for various green building rating system</p>
84		CE4461	Industrial Waste Treatment (Program Elective I)	<p>1. Explain the economic benefits of a green building</p> <p>2. Classify the terms and the construction methodologies between “traditional building” and “green building”.</p> <p>3. Evaluate the status of building for various green building rating system</p>
85		CE4191	Design of Flyovers and Bridges (Program Elective-I)	<p>1. Design superstructure and sub-structure for different types of bridges</p> <p>2. Design different types of bearings for bridges</p> <p>3. Design of long span bridges</p>
86		CE 4321	Probability and Statistics (Program Elective II)	<p>1. Use statistical methodology and tools in the engineering problem-solving process.</p> <p>2. Compute and interpret descriptive statistics using numerical techniques.</p> <p>3. Apply the basic concepts of probability, random variables, probability distribution, and joint probability distribution.</p> <p>4. Compute point estimation of parameters, explain sampling distributions, and understand the central limit theorem.</p> <p>5. Construct confidence intervals on parameters for a single sample</p>

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

**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.

**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.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	CCM1014	Construction Project Management	<ol style="list-style-type: none"> <li>1. Implement project management framework.</li> <li>2. Define scope of project and develop different time schedules of project.</li> <li>3. Identify and control project cost, quality, human resources and communications.</li> <li>4. Explain project management information system</li> </ol>
2.	I	CCM1024	Construction Equipment's & Techniques	<ol style="list-style-type: none"> <li>1. Compute productivity of various earthmoving equipment's,</li> <li>2. Analyze economics of project execution</li> <li>3. Select optimum equipment for construction of particular task,</li> <li>4. Develop method statement for construction task,</li> <li>5. Select equipment and method based on method statement</li> </ol>
3.	I	CCM1034	Ground improvement Techniques	<ol style="list-style-type: none"> <li>1. Classify the basic principles of various ground improvement techniques applied for Civil Engineering.</li> <li>2. Assess the most appropriate ground improvement techniques to be used in specific circumstances.</li> <li>3. Describe the laboratory and in situ tests for soil improvement projects.</li> </ol>

				<ol style="list-style-type: none"> <li>4. Justify the surface compaction for the soil improvement</li> <li>5. Illustrate the concept of admixture stabilization.</li> <li>6. Discuss the concept of in-situ reinforcement.</li> </ol>
4.	I	CCM1044	Operation Research	<ol style="list-style-type: none"> <li>1. Formulate and analyze the managerial problem through OR models and arrive at an optimal solution or decision.</li> <li>2. Discuss the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.</li> <li>3. Apply various methods to select and execute optimal strategies to win the game.</li> <li>4. Explain various dynamic programming models and their applications in solving a decision-problem.</li> <li>5. Explain applications of Queuing theory and waiting theory to industries</li> </ol>
6.	I	CCM1054	Resource Management	<ol style="list-style-type: none"> <li>1. Codify materials,</li> <li>2. Select vendor for material purchase,</li> <li>3. Manage inventory,</li> <li>4. Describe employee development and welfare,</li> <li>5. Design performance appraisal matrix,</li> </ol>
7.	I	CCM1064	Total Quality Management	<ol style="list-style-type: none"> <li>1. Discuss TQM in detail.</li> <li>2. Discuss seven QC tools of continuous improvement and solving problems.</li> </ol>

				<ol style="list-style-type: none"> <li>3. Discuss analysis of registration requirements.</li> </ol>
8.	I	CCM1074	Bridge Construction	<ol style="list-style-type: none"> <li>1. Describe impact of bridge construction on society,</li> <li>2. Classify bridges,</li> <li>3. Select bridge type based on site condition, Maintain bridges</li> </ol>
9.	I	CCM1084	Construction Materials	<ol style="list-style-type: none"> <li>1. Describe necessity of new material development,</li> <li>2. Describe Material property analysis and modification as required,</li> <li>3. Select proper material for the job.</li> </ol>
10.	I	CCM1094	Project Formulation and Appraisal	<ol style="list-style-type: none"> <li>1. Perform technical and financial analysis of construction projects,</li> <li>2. Perform BC ratio analysis,</li> <li>3. Select project based on appraisal,</li> <li>4. Administer the project execution</li> </ol>
11.	I	CCM1104	Construction waste management	<ol style="list-style-type: none"> <li>1. Focus on the principles of sustainable construction and demolition waste management and resource efficiency</li> <li>2. Examining the environmental impact of building materials;</li> <li>3. Formulating and designing pre-construction and site waste management plans</li> </ol>
12.	I	CCM1114	Research Methodology & IPR	<ol style="list-style-type: none"> <li>1. Formulate a research problem.</li> <li>2. Analyze research related information</li> <li>3. Prepare and present research proposal/paper by following research ethics</li> <li>4. Make effective use of computers and computing tools to search</li> </ol>



				<p>information, analyze information and prepare report.</p> <p><b>5.</b> Describe nature and processes involved in development of intellectual property rights</p>
13.	I	SHP551	Technical Communication	<p><b>1.</b> Acquire skills required for good oral and written communication</p> <p><b>2.</b> Demonstrate improved writing and reading skills</p> <p><b>3.</b> Ensure the good quality of oral and written communication</p>
14.	I	CCM1124	Quantity Surveying Lab	<p><b>1.</b> Develop drawings as per software requirement</p> <p><b>2.</b> Compute quantities of building items</p> <p><b>3.</b> Additionally compare output with manual calculations.</p>
15.	I	CCM1134	Project Planning Lab I	<p>1. Acquire knowledge of Microsoft project,</p> <p>2. Compute resource requirement for building construction</p> <p>3. Plan the project duration and resources,</p> <p>4. Update the plan based on various constraints,</p>
16.	II	SHP526	Statistical Analysis	<p><b>1.</b> Identify, formulate and analyze the engineering problem; and apply Mathematical concepts effectively to engineering fields.</p> <p><b>2.</b> Explain and identify random variables, discriminate between discrete and continuous random variables; and fit probability distributions.</p> <p><b>3.</b> Apply the techniques of Data Interpolation to solve specific engineering problems.</p> <p><b>4.</b> To understand the concept of Regression analysis; and apply the techniques of Correlation to</p>

				<p>solve specific engineering problems.</p> <ol style="list-style-type: none"> <li>To understand the concept of Game Theory and Decision Theory; and apply the techniques of Decision Theory to solve specific engineering problems.</li> </ol>
17.	II	CCM2014	Project Economics & Financial Management	<ol style="list-style-type: none"> <li>Describe foundation of engineering economy.</li> <li>Select the best project of different alternatives.</li> <li>Analyze projects using different techniques.</li> <li>Identify and suggest sources of finance.</li> <li>Analyze different financial statement.</li> <li>Prepare and maintain different site accounts for civil engineering projects.</li> </ol>
18.	II	CCM2024	Construction Contracts	<ol style="list-style-type: none"> <li>Discuss types of contract and its features.</li> <li>Discuss duties and responsibilities of arbitrator.</li> </ol>
19.	II	CCM2034	Special Construction Methods	<ol style="list-style-type: none"> <li>Select proper technique and equipment for a project,</li> <li>Decide type of pile foundation for a project,</li> </ol> <p>Perform/plan site investigation</p>
20.	II	CCM2044	Health and Safety Management	<ol style="list-style-type: none"> <li>Identify hazards to employees on construction site</li> <li>Determine safe practices necessary for a project site</li> </ol>

				<p><b>3.</b> Illustrate the causes of accidents and preventive measures</p> <p>Develop safety plan for a project.</p>
21.	II	CCM2054	Lean Construction	<p><b>1.</b> Describe theory of production management.</p> <p><b>2.</b> Identify craft production &amp; mass production from construction industry.</p> <p>Apply lean construction techniques to construction projects.</p>
22.	II	CCM2064	Construction Project Development	<p>1. Implement project management framework.</p> <p>2. Define scope of project and develop different time schedules of project.</p> <p>3. Identify and control project cost, quality, human resources and communications.</p> <p>Explain project management information system</p>
23.	II	CCM2074	Value Engineering	<p><b>1.</b> Perform value analysis,</p> <p><b>2.</b> Explain life cycle process of a project,</p> <p><b>3.</b> Apply VE methods,</p> <p>Perform valuation</p>
24.	II	CCM2084	Building Maintenance	<p><b>1.</b> Identify design factors influencing services selection,</p> <p>Assess buildings for their maintenance</p>
25.	II	CCM2094	Project Planning Lab II	<p>1. Discuss significance of primavera software in project management.</p> <p>2. Plan construction project in primavera software.</p> <p>3. Carry-out recourse optimization.</p> <p>4. Analyze construction projects through primavera.</p>

26.	II	CCM2104	Geographic Information System Lab	<ol style="list-style-type: none"> <li>1. Use instrument/software for task performance.</li> <li>2. Apply software knowledge to a project</li> </ol>
27.	II	CCM2114	Mini project	<ol style="list-style-type: none"> <li>1. Identify research problem/Idea</li> <li>2. Prepare and present statement of Purpose,</li> <li>3. Perform analysis work</li> <li>4. Develop a model</li> <li>5. Generate report and</li> <li>6. Present the work carried out</li> </ol>
28.	III	CCM3014	Industry Internship	<ol style="list-style-type: none"> <li>1. Identify training area</li> <li>2. Prepare on site work report of training,</li> <li>3. Perform analysis work</li> <li>4. Communicate with agencies</li> <li>5. Generate report and</li> <li>6. Present the work</li> </ol>
29.	III	CCM3024	MOOCS Course	<ol style="list-style-type: none"> <li>1. Identify need of lifelong learning</li> <li>2. Gain knowledge of advance course in construction industry.</li> </ol>
30.	III	CCM3034	Dissertation Phase-I	<ol style="list-style-type: none"> <li>1. Identify research problem through literature survey,</li> <li>2. Prepare research design for above problem</li> <li>3. Generate synopsis report</li> <li>4. Present the work carried out</li> </ol>
31.	III	CCM3044	Dissertation Phase-II	<ol style="list-style-type: none"> <li>1. Prepare the set up for experimentation/software</li> <li>2. Perform experimental/software analysis for validation of research work</li> <li>3. Draft a report</li> <li>4. Present the work carried out</li> </ol>
32.	IV	CCM4014	Dissertation Phase-III	<ol style="list-style-type: none"> <li>1. Perform experimental/software analysis for developing research work</li> </ol>

				<ol style="list-style-type: none"> <li>2. Communicate with outside agencies</li> <li>3. Generate report</li> <li>4. Present the work carried out</li> </ol>
33.	IV	CCM4024	Dissertation Viva-Voce	<ol style="list-style-type: none"> <li>1. Perform experimental/software analysis for developing research work</li> <li>2. Communicate with outside agencies</li> <li>3. Generate report</li> <li>4. Publish a research paper in journals/conference</li> <li>5. Prepare dissertation report</li> <li>6. Present the work carried out</li> </ol>

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- **PG Program Name: Structural Engineering**
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To mentor students in pursuit of higher education, entrepreneurship and global professionalism

Sr.No.	Programme Outcomes
1	Independently carry out research/invention and development work to solve practical structural engineering problems
2	Write and present a substantial technical report /documentation.
3	Demonstrate a degree of mastery over the structural engineering problems

Sr.No.	Programme specific Outcomes
1	To design civil engineering structures and execute the projects.
2	To use modern tools and techniques, skills, instrumentation and software packages necessary to predict and solve complex engineering problems.
3	To perform efficiently with others as part of collaborative and/or multidisciplinary team with ethics.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	I	CES1012	Advanced Structural Analysis	1. Construct of ILD for reactions, S.F. and B.M. for indeterminate structures

				<p>2. Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition</p> <p>3. Analyze the beam-columns</p> <p>4. Analyze the skeleton structures using stiffness analysis</p> <p>5. Use direct stiffness method understanding its limitations</p>
2	I	CES1022	Advanced Solid Mechanics	<p>1. Analyze bodies for stresses and strains.</p> <p>2. Analyze prismatic bars and tubes subjected to torsion</p> <p>3. Analyze beams and thick cylinders for elasto-plastic loading.</p>
3	I	CES1032	Structural Dynamics & Earthquake Engineering	<p>1. Analyze and study of the response of single and multi-degree freedom systems by fundamental theory and equations of motion.</p> <p>2. Analyze and study of the response of single and multi-degree freedom systems by numerical methods.</p> <p>3. Develop mathematical solutions to predict system response subjected to dynamic loads.</p> <p>4. Explain causes, measurements and sources of earthquakes.</p> <p>5. Evaluate lateral loads developed on multi-storeyed structures by the Response Spectrum Analysis Method and Static Equivalent Method</p>
4	I	CES1042	Structural Design Lab -I	<p>1. Analyze and design of the steel structures such as truss, Towers, Steel Building Frame and Hoarding Board etc. using standard software packages.</p> <p>2. Interpret the results of analysis and design obtained from the software.</p> <p>3. Prepare drawings of detailing of structural elements</p>

5	I	CES1052	Advanced Concrete Technology Lab	<p>1.Determine properties of ingredients and different types of concretes (ordinary &amp; special) using standard procedures.</p> <p>2.Design ordinary and special concretes using existing and new methods of mix design.</p> <p>3.Perform various durability and non-destructive tests on concrete elements / structures using standard and advanced tools / equipment for assessing the quality.</p> <p>4.Examine the concrete elements / structures by carrying out condition survey and recommend appropriate methods / techniques for their repair / strengthening works</p>
6	I	CES1062	Mini Project I	<p>1.Identify research problem</p> <p>2.Prepare and present statement of Purpose</p> <p>3.Perform analysis work.</p> <p>4.Communicate with outside agencies.</p> <p>5.Write report and Present the work carried out.</p> <p>6.Develop self-learning ability.</p>
7	I	CES1072	Advanced Design of Steel Structures (PE I)	<p>1.Design plate girder, beam columns, portal frames, cold formed light gauge steel sections, composite sections.</p> <p>2.Design welded and bolted connection.</p>
8	I	CES1082	Structural Health Monitoring	<p>1.Carry out non-destructive testing of various elements of the structure for strength evaluation of existing structures.</p> <p>2.Demonstrate various techniques for strengthening the existing structures.</p> <p>3.Explain the assessment procedure for evaluating a damaged structure</p>
9	I	CES1092	Advanced Concrete Te Numerical Methods for Structural	<p>1.Illustrate the micro-structural aspects associated with concrete/concrete ingredients and their effect on concrete quality, strength and durability properties.</p>



			Engineers chnology	<p>2.Design special concretes using existing and new methods of mix design.</p> <p>3.Explain various types of special concretes, their properties and methods of manufacturing and placing.</p> <p>4.Discuss various special processes and new techniques involved in various concreting jobs.</p> <p>5.Analyze qualities of fresh and hardened concrete / concrete elements using appropriate destructive or non destructive testing methods for evaluating quality.</p> <p>6.Identify and discuss various mechanisms affecting durability of concrete / concrete structures /elements.</p>
10	I	SHP517	Numerical Methods for Structural Engineers	<p>1.Estimate the error.</p> <p>2.Apply the relevant numerical method for interpolating the polynomial</p> <p>3.Develop the equation to be fitted and fit the curve for given data</p> <p>4.Estimate numerically the solution of given algebraic equation.</p> <p>5.Use the relevant method for solving the simultaneous linear equations and compute the Eigen values.</p> <p>6.Construct the fuzzy set for given linguistic variable and apply fuzzy logic.</p>
11	I	SHP551	Technical Communication	<p>1.Acquire skills required for good oral and written communication</p> <p>2.Demonstrate improved writing and reading skills</p> <p>3.Ensure the good quality of oral and written communication</p>
12	II	CES2012	Finite Element Analysis in Structural Engineering	<p>1.Use Finite Element Method for structural analysis.</p> <p>2. Execute the Finite Element Program/ Software.</p>

				3. Solve continuum problems using finite element analysis.
13	II	CES2022	Research Methodology & Intellectual Property Rights (IPR)	<ol style="list-style-type: none"> <li>1. Formulate a research problem.</li> <li>2. Analyze research related information</li> <li>3. Prepare and present research proposal/paper by following research ethics</li> <li>4. Make effective use of computers and computing tools to search information, analyze information and prepare report.</li> <li>5. Describe nature and processes involved in development of intellectual property rights</li> </ol>
14	II	CES2032	Structural Design Lab - II	<ol style="list-style-type: none"> <li>1. Analyze and design of the RCC structures such as building, retaining wall, flat slab and foundations using standard software packages.</li> <li>2. Interpret the results of analysis and design obtained from the software.</li> <li>3. Prepare drawings of detailing of structural elements.</li> </ol>
15	II	CES2042	Structural Dynamics and Earthquake Engineering Lab	<ol style="list-style-type: none"> <li>1. Interpret the response of structures due dynamic loading.</li> <li>2. Examine damping effect on beam model.</li> <li>3. Conduct model testing for dynamic loading.</li> <li>4. Conduct model testing for free and forced vibrations</li> </ol>
16	II	CES2052	Mini Project II	<ol style="list-style-type: none"> <li>1. Identify research problem</li> <li>2. Prepare and present statement of Purpose</li> <li>3. Perform analysis work.</li> <li>4. Communicate with outside agencies.</li> <li>5. Write report and Present the work carried out.</li> <li>6. Develop self-learning ability.</li> </ol>

17	II	CES2062	Advanced Earthquake Engineering (PE-II)	<p>1. Apply ductility requirements for the design of structural components.</p> <p>2. Assess seismic performance of non-structural components and structural components, load bearing structures and identify effective measures to mitigate potential damage.</p> <p>3. Apply clauses given in IS codes to design of water tanks for earthquake force.</p> <p>4. Apply new techniques for controlling the vibrations of the structures.</p> <p>5. Evaluate and explain vibration behaviour of continuous elements/systems.</p>
18	II	CES2072	Theory and Applications of Cement Composites (PE-II)	<p>1. Formulate constitutive behavior of composite materials – Ferrocement, SIFCON and Fibre Reinforced Concrete - by understanding their strain- stress behavior.</p> <p>2. Classify the materials as per orthotropic and anisotropic behavior.</p> <p>3. Estimate strain constants using theories applicable to composite materials.</p> <p>4. Analyze and design structural elements made of cement composites.</p>
19	II	CES2082	Structural Optimization (PE-II)	<p>1. Use variational principle for optimization</p> <p>2. Apply optimization techniques to structural steel and concrete members.</p> <p>3. Design using frequency constraint.</p>
20	II	CES2092	Design of Bridges and Flyovers (PE-III)	<p>1. Study various components and loadings on bridge</p> <p>2. Analyse and design of super-structure of various bridges and flyovers</p> <p>3. Analyse and design of sub-structure of various bridges and flyovers</p>

21	II	CES2102	Design of Pre-stress Concrete Structures (PE-III)	<p>1.Explain the concept of pre-stressing, behavior of the pre-stressed structures vis-à-vis that of the RCC structure.</p> <p>2.Choose the decision with respect to the choice of pre-stressed section over RCC.</p> <p>3.Describe the application of these techniques in civil engineering construction.</p> <p>4.Analyze the various pre-stressed components of the structures and design the same.</p> <p>5.Design the various pre-stressed components of the structures and design the same.</p>
22	II	CES2112	Theory of Thin Plates and Shells (PE-III)	<p>1.Analyze various problems using different theories based on plates and shells.</p> <p>2.Derive equilibrium equations related with different theories of plates and shells</p>
23	II	CES2122	Design of Advanced Concrete Structures (PE-IV)	<p>1.Analyze the special R.C.C. structures.</p> <p>2. Design and prepare detail structural drawings</p>
24	II	CES2132	Design of Industrial Structures (PE-IV)	<p>1.Design the Steel Gantry Girders.</p> <p>2.Design the Steel Portal, Gable Frames.</p> <p>3.Design Steel Bunkers and Silos.</p> <p>4.Design Chimneys and Water Tanks.</p>
25	II	CES2142	Design of formwork (PE-IV)	<p>1.Select proper formwork, accessories and material.</p>

				<p>2. Design the form work for Beams, Slabs, columns, Walls and Foundations.</p> <p>3. Design the form work for Special Structures.</p> <p>4. Explain the working of flying formwork.</p> <p>5. Judge the formwork failures through case studies.</p>
26	III	CES3012	Internship	<p>1. Identify training area</p> <p>2. Prepare on site work report of training</p> <p>3. Perform analysis work</p> <p>4. Communicate with agencies</p> <p>5. Generate report and Present the work carried out</p>
27	III	CES3022	Self-Learning: MOOC / Certificate course	<p>1. Develop technical competence in skills of structural engineering field.</p> <p>2. Apply the techniques for structural engineering practice.</p> <p>3. Develop oral and written presentation skills for structural engineering projects.</p> <p>4. Design and interpret data for structural engineering projects.</p>
28	III	CES3032	Dissertation Phase-I	<p>1. Identify research problem from literature survey</p> <p>2. Prepare research design for identified problem</p> <p>3. Prepare synopsis report</p> <p>4. Present the work plan to be carried out</p>
29	III	CES3042	Dissertation Phase-II	<p>1. Prepare the set up for experimentation/ develop/ learn software.</p> <p>2. Perform experimental/software analysis for validation of research work.</p>

				3. Generate report of work carried out. 4. Present the work carried out.
30	IV	CES4012	Dissertation Phase-III	1. Perform experimental/software analysis for developing research work 2. Generate report work carried out. 3. Present the work carried out.

**Department Name :-Computer Science & Engineering**

**UG Program Name :- B. Tech in Computer Engineering**

**Vision and Mission :-**

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

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

<b>Sr. No.</b>	<b>Program Outcomes</b>
13.	Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex engineering problems.
14.	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.
15.	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.
16.	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.
17.	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.
18.	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.
19.	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.
20.	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
21.	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
22.	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.
23.	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.
24.	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.

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

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	III	CS2012	Computer Organization	<ol style="list-style-type: none"> <li>1. To conceptualize basics of organizational and architectural issue, functional unit of processor in digital computer and apply in computer organization and architecture</li> <li>2. Construct the ability to perform computer arithmetic operations such as binary, signed, decimal, hexadecimal, floating point numbers.</li> <li>3. Interpreting memory organization that uses banks for different word size operations and cache mapping techniques including translation, allocation.</li> <li>4. Ability to understand input/output organization, data transfer techniques for the computer.</li> <li>5. To analyze processor performance improvement using instruction level parallelism in digital computer.</li> </ol>
		CS2032	Data Structure and Algorithms	<ol style="list-style-type: none"> <li>1. Compare between linear and non linear data structures</li> <li>2. Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables.</li> <li>3. Apply appropriate abstract data types and algorithms to solve particular problems</li> <li>4. Determine a suitable data structure and algorithm to solve a real world problem.</li> </ol>
		CS2052	Digital Electronics	<ol style="list-style-type: none"> <li>1. Apply the concepts of various number systems, Boolean algebra to solve relevant problems</li> <li>2. Design digital logic circuits</li> <li>3. Design and implement combinational and sequential logic circuits</li> <li>4. To understand the basic microprocessor architecture, its functionality and interfacing with i/o devices</li> <li>5. To understand the assembly program instruction set and to implement the assembly program</li> <li>6. To understand the interfacing of microprocessor with various devices</li> </ol>
		CS2072	Discrete Mathematics	<ol style="list-style-type: none"> <li>1. Express mathematical statements using logical connectives.</li> <li>2. Analyze and perform operations associated with sets.</li> <li>3. Distinguish between relations and functions.</li> <li>4. Describe the concept of lattices and Boolean algebra.</li> <li>5. Describe the concept of lattices and Boolean algebra.</li> <li>6. Apply graph theory concepts to solve problems of connectivity.</li> </ol>
		CS2092	Operating System	<ol style="list-style-type: none"> <li>1. Differentiate various operating systems.</li> <li>2. Discuss concept of process and threads.</li> <li>3. Explain synchronization techniques.</li> <li>4. Explain concept of deadlock and avoidance of it.</li> <li>5. Discuss memory management in operating system.</li> <li>6. Differentiate disk and file management in various operating systems.</li> </ol>
		CS2112	Advanced C Programming	<ol style="list-style-type: none"> <li>1. Learn advanced C topics like command line arguments, file handling, pointers, dynamic memory allocation, and macros</li> </ol>



				<ol style="list-style-type: none"> <li>2. Implement, compile and debug complex C programs.</li> <li>3. Solve tricky questions on C programming.</li> <li>4. Analyze given c program carefully and guess the output of same.</li> <li>5. Develop problem solving skills among students using C programming.</li> </ol>
		CS2132	Data Structure and Algorithms Lab	<ol style="list-style-type: none"> <li>1. Analyze basic data structures used in programming</li> <li>2. Implement various data structures in C Language.</li> <li>3. Implement basic algorithms in C language.</li> <li>4. Choose appropriate data structures to develop an application.</li> <li>5. Analyze and compare the static and dynamic implementations of various data structures.</li> </ol>
		CS2152	Digital Electronics Lab	<ol style="list-style-type: none"> <li>1. Study and verification of basic digital concepts</li> <li>2. Analyze and design the combinational and sequential circuits</li> <li>3. Study and implement assembly program</li> <li>4. Design digital electronics applications</li> </ol>
		CS2172	Comprehensive Exam-I	<ol style="list-style-type: none"> <li>1. Choose proper techniques to find solution for engineering problems</li> <li>2. Solve various types of problems</li> <li>3. Develop ability to face competitive examinations</li> <li>4. Inspect the problem &amp; conclude with proper solution.</li> </ol>
2	IV	CS2002	Computer Networks	<ol style="list-style-type: none"> <li>1. Identify and explain the modulation techniques, components used in a communication system.</li> <li>2. Identify different Network models and protocols of different layers</li> <li>3. Discuss the concept multiplexing &amp; switching.</li> <li>4. Recognize and discuss the functions the different protocols in network layer</li> <li>5. Identify the proper transmission control protocol for given applications</li> <li>6. Explain the different services at application layer.</li> </ol>
		CS2022	Formal Language & Automata Theory	<ol style="list-style-type: none"> <li>1. Apply the mathematical techniques for solving the automata problem.</li> <li>2. Implementation of compiler with the help finite machine model.</li> <li>3. Build regular expressions for the regular languages.</li> <li>4. Design a various computation machines like finite automata, pushdown automata, and Turing machines.</li> <li>5. Analyze the finite machine model.</li> </ol>
		CE2262	Engineering Mechanics	<ol style="list-style-type: none"> <li>1. Identify various forces and their effects, to analyze real life problems.</li> <li>2. Analyze engineering problems applying conditions of equilibrium.</li> <li>3. Determine Centroid &amp; Moment of Inertia of the geometrical plane lamina</li> <li>4. Apply fundamental concepts of Kinematics and Kinetics to analyze practical problems.</li> </ol>

		SH2022	Engineering Mathematics-III	<ol style="list-style-type: none"> <li>1. Compute Karl Pearson's Product moment correlation Coefficient and fit the lines of regression.</li> <li>2. Compute Discrete probability distribution, Continuous probability distributions and Joint probability distributions.</li> <li>3. Apply specific probability distributions to real-life examples.</li> <li>4. Compute the Mathematical formulas for the given fuzzy set.</li> <li>5. Prove additional properties of alpha-cuts and use extension principle to fuzzy sets.</li> <li>6. Apply extension principle to fuzzy arithmetic and solve fuzzy equations.</li> </ol>
		CS2042	Computer Networks Lab	<ol style="list-style-type: none"> <li>1. Define and apply architectural principles and mechanisms for data exchange among computer</li> <li>2. Design, implement and analyse simple computer networks.</li> <li>3. Identify &amp; analyse the performance of different network layer protocols to formulate and solve network-engineering problems.</li> <li>4. Identify Operations of TCP/UDP, FTP, HTTP, SMTP, SNMP etc.</li> <li>5. Analyse to compare performance of different routing protocols.</li> <li>6. Compare different networking models.</li> <li>7. Ability to use techniques, skills, and modern networking tools necessary for engineering practice.</li> <li>8. Demonstrate an understanding of computer communications standards</li> </ol>
		CS2062	Object Oriented Programming Lab	<ol style="list-style-type: none"> <li>1. Describe object-oriented design concepts &amp; apply them in software system design.</li> <li>2. Implement basic OOP concepts like Class &amp; Object, Inline functions, dynamic memory allocations etc.</li> <li>3. Demonstrate constructors, destructors, function overloading, operator overloading, and friend functions in C++.</li> <li>4. Write and Execute C++ programs for different types of Inheritance and virtual functions.</li> <li>5. Apply advanced features of C++ programming like exception handling, Templates etc.</li> </ol>
		CE2282	Engineering Mechanics Lab	<ol style="list-style-type: none"> <li>1. Compare coefficient of friction of various surfaces in contact.</li> <li>2. Correlate theoretical and practical results of support reactions and Centroid of plane lamina.</li> <li>3. Verify law of polygon of forces, law of triangle of forces and principle of moment.</li> </ol>
		SH2172	Environmental Science	<ol style="list-style-type: none"> <li>1. Study the importance and sensitivity of environment.</li> <li>2. Interpret the over exploitation of natural resources and follow the environmental ethics.</li> <li>3. Explain methods to protect environment and prevent environmental pollution</li> <li>4. Apply their knowledge and skills to solve their environment related problems.</li> </ol>

		SH2602	Environmental Science Project	<ol style="list-style-type: none"> <li>1. Use scientific methods to solve environmental problems.</li> <li>2. Evaluate technologies for restoration of degraded environment.</li> <li>3. Develop presentation and report writing skills.</li> <li>4. Develop as an individual and in group leadership quality.</li> </ol>
		CS2082	Comprehensive Exam-II	<ol style="list-style-type: none"> <li>1. Choose proper techniques to find solution for engineering problems</li> <li>2. Solve various types of problems</li> <li>3. Develop ability to face competitive examinations</li> <li>4. Inspect the problem &amp; conclude with proper solution</li> </ol>
3	V	CS3011	Database Management Systems	<ol style="list-style-type: none"> <li>1. Express terms related to database design and management.</li> <li>2. Learn and apply the Relational Algebra structured Query Language (SQL ) for database definition and manipulation.</li> <li>3. Able to use of concept of Functional Dependency and decompose schema by applying certain normal forms.</li> <li>4. Apply ethical computing concepts and practices to design database and implementation (security, concurrency control , recovery, deadlock handling)</li> <li>5. An ability to design and create database to solve real world problem.</li> </ol>
		CS3031	System Programming	<ol style="list-style-type: none"> <li>1. Analyze the role of systems programming and be able to apply appropriate knowledge of computing and mathematics to solve systems programming problems.</li> <li>2. Demonstrate the Concept of Concept of Lex&amp;Yacc tool and formulate the aspect of Lex&amp;Yacc program</li> <li>3. Illustrate the concept of Logical analysis &amp; design aspect of macro preprocessor program</li> <li>4. Determine the aspect of LP activity of compiler for processing expressions</li> <li>5. List the various s/w tools for program development using Debugging, Editors, User interfaces and DLL</li> </ol>
		CS3051	Operating System	<ol style="list-style-type: none"> <li>1. Differentiate various operating systems.</li> <li>2. Discuss concept of process and threads.</li> <li>3. Explain synchronization techniques.</li> <li>4. Explain concept of deadlock and avoidance of it.</li> <li>5. Discuss memory management in operating system.</li> <li>6. Differentiate disk and file management in various operating systems.</li> </ol>
		CS3071	Design and Analysis of Algorithm	<ol style="list-style-type: none"> <li>1. Learn basic algorithmic strategies</li> <li>2. Identify the appropriate algorithmic strategy suitable for given problem</li> <li>3. Design an algorithm for given problem</li> <li>4. Analyse complexity of algorithms</li> <li>5. Solve the problems using appropriate algorithmic strategy</li> <li>6. Prove or disprove the problem is np-class problem</li> </ol>
		CS3091	Object Oriented Modeling & Design	<ol style="list-style-type: none"> <li>1. Understand and compare the need of object oriented modeling with traditional methods.</li> <li>2. Propose software system using requirements/feature lists, use cases, and simple of structural uml models</li> </ol>

				<ol style="list-style-type: none"> <li>3. Demonstrate knowledge of functional and behavioral modeling techniques.</li> <li>4. Design an software system based on advanced static/dynamic uml models</li> <li>5. Design an software system based on advanced static/dynamic uml models</li> <li>6. Analyze the application domain and requirements of the problem.</li> </ol>
		CS3511	Database Management Systems Lab	<ol style="list-style-type: none"> <li>1. Explain the real world organization where database management system is required</li> <li>2. Analyse the need of perticular organization for dbms</li> <li>3. Design and implement relational database management system</li> <li>4. Develop database design with the help of open source tools</li> <li>5. Experiment the rdbms tools such as sql/s/access</li> <li>6. Work in team for database designing and application creation</li> </ol>
		CS3531	Java Programming Lab	<ol style="list-style-type: none"> <li>1. Apply Object Oriented concepts in Java.</li> <li>2. Identify real world problem and develop application using java.</li> <li>3. Design GUI for applications and application for database handling and networked architecture.</li> </ol>
		CS3551	Self Learning	<ol style="list-style-type: none"> <li>1. Study of domain specific knowledge for understanding the automation in different industries.</li> <li>2. Apply and studied the Mathematical concepts required for research purpose.</li> <li>3. Working with Inter-disciplinary topics.</li> <li>4. Study of designing &amp; analysis tools.</li> <li>5. Search and present different Thesis and Research papers form international journals.</li> </ol>
		SH3191	Aptitude I	<ol style="list-style-type: none"> <li>1. To develop contemporary English communication skills</li> <li>2. To apply numerical reasoning skills in the analysis and interpretation of data.</li> <li>3. To perform well to qualify screening tests in campus selection process and competitive examinations.</li> <li>4. To be familiar with various aptitude tests</li> <li>5. To describe various quantitative factors and values in business communication.</li> </ol>
4	VI	CS3001	Principles of Compiler Design	<ol style="list-style-type: none"> <li>1. Discuss working of various phases of compiler</li> <li>2. Apply scanning and parsing techniques on given grammar</li> <li>3. Generate syntax tree and check the meaning of given input.</li> <li>4. Apply appropriate techniques to optimize given input.</li> <li>5. Generate intermediate code and resolve various issues in code generation</li> </ol>
		CS3021	LINUX Operating System	<ol style="list-style-type: none"> <li>1. Describe the basic concepts of linux operating system and linux shell commands.</li> <li>2. Demonstrate various basic linux commands used for system administration.</li> <li>3. Familiarize with linux file system, searching, extracting and archiving data.</li> </ol>

				<ol style="list-style-type: none"> <li>4. Demonstrate linux commands for user &amp; group management, network management and set permission &amp; ownership of files.</li> </ol>
		CS3041	Computer Graphics and Virtual Reality	<ol style="list-style-type: none"> <li>1. To apply the mathematical techniques for representing points, lines, curves and surface in graphics</li> <li>2. Design algorithms to draw lines, circle, polygons, etc</li> <li>3. To demonstrate the knowledge of projections</li> <li>4. Learn the basics of OpenGL and emerging technologies using OpenGL and GLUT libraries</li> <li>5. To design a virtual environment</li> <li>6. List and describe graphic devices used in virtual reality system</li> </ol>
		CS3521	Computer Graphics and Virtual Reality Lab	<ol style="list-style-type: none"> <li>1. Implement and demonstrate 2D/3D transformations in computer graphics</li> <li>2. Implement and Demonstrate the algorithms to display 2D basic primitives and clipping</li> <li>3. Implement and Demonstrate representation of basic primitives using OpenGL</li> <li>4. Develop mini-games/ graphical interface using OpenGL and GLUT libraries</li> </ol>
		CS3541	Internet Technology Lab	<ol style="list-style-type: none"> <li>1. Design and implement socket programming by using c, java and python languages</li> <li>2. Develop and host website for commercial purpose</li> <li>3. Build application oriented servers like ftp, dns etc</li> <li>4. Develop wired and wireless topology along with featured of ns2 like using xgraph, nam</li> <li>5. Analyze routing and audio video streaming protocols using ns-2 simulator.</li> </ol>
		CS3561	.NET programming Lab	<ol style="list-style-type: none"> <li>1. Understand the important features of .net framework technology.</li> <li>2. Develop console and windows application by using c# language.</li> <li>3. Understand and implement object oriented programming concepts like data encapsulation, data hiding, inheritance and polymorphism using c# language.</li> <li>4. Implement advanced features of c# language like multi-threading, exceptions and delegates.</li> <li>5. Design and develop project in team of 3-4 students using c# that for any real world problem using event handling, ado.net, multi-threading etc.</li> </ol>
		CS3581	Mini Project-II Lab	<ol style="list-style-type: none"> <li>1. Formulate a real world problem and develop its requirements.</li> <li>2. Develop a design solution for a set of requirements.</li> <li>3. Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project</li> <li>4. Test and validate the conformance of the developed prototype against the original requirements of the problem</li> <li>5. Work as a responsible member and possibly a leader of a team in developing software solutions and Decision making.</li> </ol>
		CS3601	System Software Lab	<ol style="list-style-type: none"> <li>1. Design and implement phases of the compiler</li> <li>2. Build scanners and parsers using different tools</li> </ol>

				<ol style="list-style-type: none"> <li>Build an application by applying concepts of compiler</li> <li>Work as a responsible member and possibly a leader of a team in developing software solutions and Decision making.</li> </ol>
		CS3571	Professional Training (Audit Course)	
5	VII	CS4001	Parallel Programming Techniques	<ol style="list-style-type: none"> <li>Identify compute intensive part from sequential algorithm.</li> <li>Design parallel algorithm from given sequential algorithm.</li> <li>Write parallel programs using openmp, cuda c/c++, etc.</li> <li>Explore different compute intensive applications.</li> </ol>
		CS4011	Advanced Database Systems	<ol style="list-style-type: none"> <li>Evaluate and describe the fundamental theories and requirements that influence the design of modern database systems.</li> <li>Describe and compare client-server, distributed &amp; parallel database.</li> <li>Make use of object relational database and xml for different application in database.</li> <li>Demonstrate handling and administration of real time systems.</li> <li>Discuss concept of data warehousing, security and different case studies like postgresql etc.</li> </ol>
		CS4021	Information Security	<ol style="list-style-type: none"> <li>Describe different methods of Data Encryption and Decryption; their advantages &amp; limitations.</li> <li>Apply different key distribution methods for distribution of Public/Private &amp; Secret keys.</li> <li>Apply message authentications techniques for implementing security during message communication.</li> <li>Demonstrate the use of digital signature.</li> <li>Analyze different security attacks &amp; security solutions for e-mail &amp; web applications.</li> </ol>
		CS4031	Virtualization and Cloud Computing	<ol style="list-style-type: none"> <li>Describe the fundamental concepts of cloud computing and its architecture.</li> <li>Describe core concepts of virtualization and its relation to clouds.</li> <li>Demonstrate the cloud deployment models using aneka and its programming models.</li> <li>Apply the concurrent, high throughput and data intensive computing paradigms in real life scenarios.</li> <li>Develop applications in science, engineering and life science problems using aneka programming models.</li> <li>Analyze the use cloud computing in different domains and future research.</li> </ol>
		CS4051	Soft Computing (Program Elective-I)	
		CS4071	Mobile Technology (Program Elective-I)	
		CS4111	Recent IT Technologies (Program Elective-I)	<ol style="list-style-type: none"> <li>Define the terminology and describe concepts if recent trends in os</li> </ol>

				<ol style="list-style-type: none"> <li>2. Use recent trends in databases</li> <li>3. Explain latest trends and technologies in networking.</li> <li>4. Apply concepts of recent trends in web technology.</li> <li>5. Describe concepts of IoT</li> </ol>
		CS4121	Enterprise Resource Planning (Program Elective-I)	<ol style="list-style-type: none"> <li>1. Explain concepts and applications of resources utilizing in enterprise resource planning (erp) systems</li> <li>2. Applying methods and techniques of supply chain planning and crm</li> <li>3. To develop working skills in planning and managing enterprise resources including aggregate planning, materials requirements planning, capacity management</li> <li>4. Describe the role of business process re-engineering (brp) in erp implementation</li> <li>5. Summarize the erp success rates, implementation strategies and related issues</li> <li>6. Utilize ERP software including the oracle erp system in supply chain planning and scheduling of enterprise resources</li> </ol>
		CS4521	Mobile Application Development Lab	<ol style="list-style-type: none"> <li>1. Formulating new ideas via researching existing apps.</li> <li>2. Analyze limitations and features of developing for mobile devices</li> <li>3. Analyze limitations and features of developing for mobile devices</li> <li>4. Apply proficiency in coding on a mobile programming platform.</li> <li>5. Develop mobile app with a significant programming component, involving the sensors and hardware features of the phone.</li> <li>6. Adapt procedure of app deployment and marketing.</li> </ol>
		CS4531	Web Technology Lab	<ol style="list-style-type: none"> <li>1. Compare between static and dynamic web page.</li> <li>2. Develop application using html5, css 3.0, java script and jquery.</li> <li>3. Develop application using java servlet, manage session of users in web application.</li> <li>4. Develop a java servlet application to connect with rdbms</li> <li>5. Develop application using java server pages (jsp), manage session of users in web application.</li> <li>6. Develop a java server pages application to connect with rdbms</li> </ol>
		CS4541	Parallel Programming Lab	<ol style="list-style-type: none"> <li>1. Design different parallel algorithms to solve compute intensive problems.</li> <li>2. Use different parallel programming languages on multi-core and many-core systems.</li> <li>3. Perform the analysis with different performance metrics.</li> </ol>
		CS4551	Project Phase-I	<ol style="list-style-type: none"> <li>1. Apply knowledge of computer science for real world problem</li> <li>2. Possess professional, practical and reflective practitioner skills</li> <li>3. Upgrade and apply the knowledge through continuous learning</li> </ol>

				<ol style="list-style-type: none"> <li>4. Effectively apply design thinking processes and template to structure learning life cycle in the development of a prototype</li> <li>5. To develop project management and time management skills</li> <li>6. To formulate a process whereby to keep the end-user or customer in mind throughout the project lifecycle.</li> </ol>
		CS4051	Soft Computing	<ol style="list-style-type: none"> <li>1. Describe soft computing techniques and their role in problem-solving.</li> <li>2. Discuss fuzzy logic system</li> <li>3. Discuss evolutionary and swarm intelligence algorithms</li> <li>4. Apply soft computing algorithms to real-time problems</li> </ol>
6	VIII Option-1 CS4551 Conventional Courses with Project	CS4081	Principles & Practices for IT Management	<ol style="list-style-type: none"> <li>1. Describe concepts of requirements analysis, risk management, budgeting a project, creating a work breakdown structure.</li> <li>2. Apply critical path and pert method for project scheduling and tracking.</li> <li>3. Demonstrate resource allocation and scheduling concept.</li> <li>4. Apply strategies, policies &amp; strategic management in project development</li> <li>5. Develop the different it application for various areas.</li> </ol>
		CS4041	Big Data Analytics	<ol style="list-style-type: none"> <li>1. Able to understand big data for business intelligence</li> <li>2. Able to learn business case studies for big data analytics</li> <li>3. Able to understand no sql big data management</li> <li>4. Able to manage big data without sql</li> <li>5. Able to understand map-reduce analytics using hadoop related tools</li> </ol>
		CS4151	Machine Learning	<ol style="list-style-type: none"> <li>1. Demonstrate concept of machine learning and collaborative filtering.</li> <li>2. Apply clustering techniques for group identification and clustering.</li> <li>3. Design solutions for the problem optimization and demonstrates bayesian filtering.</li> <li>4. Demonstrates and builds models for recommendations.</li> </ol>
		CS4191	Software Testing & Quality Assurance	<ol style="list-style-type: none"> <li>1. Demonstrate various terms and technologies used in testing domain.</li> <li>2. Apply the software testing techniques in commercial environments</li> <li>3. Design different test plan and test cases for software quality improvement.</li> <li>4. Choose suitable open source testing &amp; automation tools.</li> <li>5. Use various types of software tests and quality control standards</li> </ol>
		CS45141	Software Testing & Quality Assurance Lab	<ol style="list-style-type: none"> <li>1. Describe the fundamental concepts of software testing and quality assurance</li> <li>2. Create and implement an effective software testing strategy.</li> <li>3. Implement various test processes and continuous quality improvement.</li> </ol>



				4. Apply application of software testing techniques in commercial environments
		CS456	Project Phase-II	<ol style="list-style-type: none"> <li>1. Apply knowledge of computer science for real world problem.</li> <li>2. Upgrade and apply the knowledge through continuous learning.</li> <li>3. Effectively apply Design Thinking Processes and Template to structure learning lifecycle in the development of a prototype.</li> <li>4. To develop project management and time management skills</li> <li>5. Effective track and report project status to management or project guide</li> <li>6. To formulate a process whereby to keep the end-user or customer in mind throughout the project lifecycle.</li> </ol>
		CS4581	Machine Learning Lab	<ol style="list-style-type: none"> <li>1. Demonstrate concept of machine learning and collaborative filtering.</li> <li>2. Apply clustering techniques for group identification and clustering.</li> <li>3. Design solutions for the problem optimization and demonstrates bayesian filtering.</li> <li>4. Demonstrates and builds models for recommendations.</li> </ol>
		OE421	Network Administration	<ol style="list-style-type: none"> <li>1. Identify the correct cable type required to connect two networks</li> <li>2. Express working of internetworking models and need of OSI model</li> <li>3. Differentiate between collision and broadcast domain</li> <li>4. Identify ipv4 address and classify it</li> <li>5. Express working of networking services like FTP, Telnet, DHCP and DNS</li> <li>6. Design a network for given requirements</li> </ol>
		OE422	Information Technology Foundation Program	<ol style="list-style-type: none"> <li>1. Describe configuration of computer, various devices &amp; system software's.</li> <li>2. Apply object oriented concepts in real world scenario</li> <li>3. Solve computational problems using data structures &amp; algorithms</li> <li>4. Design an er model for a given problem-domain</li> <li>5. Implement small application using software development methodologies</li> </ol>
	VIII Option-2 RE0407 Undergraduate Research Experience (URE)			<ol style="list-style-type: none"> <li>1. Investigate the technical literature.</li> <li>2. Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature.</li> <li>3. Design a research problem and develop a methodology.</li> <li>4. Develop and implement an advanced original research or creative project.</li> <li>5. Develop the ability to explain the conceptual viability of the project and describe the major components involved.</li> </ol>

				<ol style="list-style-type: none"> <li>6. Develop the ability to explain how the project will impact the relevant body of work.</li> <li>7. Develop advanced discipline-relevant skills and competencies.</li> <li>8. Construct an accurate record of research performed.</li> <li>9. Write a research report and paper.</li> </ol>
	<p>VIII Option-3 LL0407 Industry Internship &amp; Project</p>			<ol style="list-style-type: none"> <li>1. Examine the functioning of the company on the terms of inputs, transformation</li> <li>2. process and the outputs (products and services)</li> <li>3. Develop an attitude to adjust with the company culture, work norms, code of conduct.</li> <li>4. Recognize and follow the safety norms, Code of conduct.</li> <li>5. Demonstrate the ability to observe, analyze and document the details as per the industry practices.</li> <li>6. Interpret the processes, systems and procedures and to relate to the theoretical</li> <li>7. concepts- studies.</li> <li>8. Improve the leadership abilities, communication.</li> <li>9. Demonstrate project management and finance sense</li> </ol>
	<p>VIII Option-4 ED 4001 Entrepreneurship Development</p>			<ol style="list-style-type: none"> <li>1. Determine distinct entrepreneurial traits</li> <li>2. Recognize the parameters to assess opportunities and constraints for new business ideas</li> <li>3. Apply the systematic practice to select and screen a business idea</li> <li>4. Design strategies for successful implementation of ideas</li> <li>5. Design a business plan</li> </ol>

**Department Name Computer Science & Engineering****PG Program Name:** M.Tech in Computer Science & Engineering**Vision and Mission :-****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.

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

<b>Sr. No.</b>	<b>Program Specific Outcomes</b>
3.	
4.	
5.	

<b>Sr. No.</b>	<b>Semester</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcome</b>

34.	I	CSE1013	Advanced Algorithm	<ol style="list-style-type: none"> <li>1. Select appropriate algorithm design techniques such as divide and conquer, greedy method, dynamic programming and approximation algorithms.</li> <li>2. Implement and evaluate graph based algorithms</li> <li>3. Solve linear programming problems.</li> <li>4. Explore NP problems. Compare traditional and meta heuristic algorithms.</li> <li>5. Identify the new trends and research directions in algorithms.</li> </ol>
		CSE1023	Advanced Programming Concepts	<ol style="list-style-type: none"> <li>1. Solve miscellaneous problems on advanced concepts in c programming.</li> <li>2. Appreciate object oriented programming usefulness in solving real world problems using C++.</li> <li>3. Implement programs as per given requirements using various approaches.</li> <li>4. Use appropriate data structures and algorithms while designing the solution for given problem.</li> <li>5. Explore and implement programs for different problems related with software designs.</li> </ol>
		CSE1053	Cloud Computing (Program Elective-I)	<ol style="list-style-type: none"> <li>1. Describe fundamental and core concepts of cloud computing.</li> <li>2. Investigate the system virtualization and outline its role in enabling the cloud computing system model.</li> <li>3. Develop scientific applications, business and consumer applications on cloud platforms.</li> <li>4. Analyze various cloud programming models and apply them to solve problems on the cloud.</li> <li>5. Configure and experiment iaas and paas service models.</li> </ol>
		CSE1083	Python Programming for Scientific Application (Program Elective-II)	<ol style="list-style-type: none"> <li>1. To conceptualize basics knowledge of programming language like python.</li> <li>2. Identified different built –in object and object oriented features for python programming</li> <li>3. To build comprehensive knowledge of python libraries</li> <li>4. Design and solve scientific application using python.</li> </ol>
		CSE1103	Advanced Algorithm Lab	<ol style="list-style-type: none"> <li>1. Select appropriate algorithm design techniques such as divide and conquer, greedy method, dynamic programming and approximation algorithms.</li> <li>2. Implement and evaluate graph based algorithms.</li> <li>3. Solve linear programming problems.</li> <li>4. Explore np problems. compare traditional and metaheuristic algorithms.</li> <li>5. Identify the new trends and research directions in algorithms.</li> </ol>

		CSE1133	Programming for Scientific Application Lab	<ol style="list-style-type: none"> <li>1. To conceptualize basics knowledge of programming language like python.</li> <li>2. Identified different built –in object and object oriented features for python programming</li> <li>3. To build comprehensive knowledge of python libraries.</li> <li>4. Design and solve scientific application using python.</li> </ol>
35.	II	CSE2013	Soft Computing	<ol style="list-style-type: none"> <li>1. Gain understanding of various soft computing techniques.</li> <li>2. Identify and design fuzzy based systems.</li> <li>3. Design neural network for real world application</li> <li>4. Identify and compare evolutionary techniques with traditional techniques</li> <li>5. Explore different selection, crossover and mutation operators of generic algorithms</li> <li>6. Apply evolutionary computation techniques to optimization, forecasting etc</li> </ol>
		CSE2023	Machine Learning	<ol style="list-style-type: none"> <li>1. Understand mathematical background for analyzing machine learning concepts</li> <li>2. Recognize and appreciate need of machine learning in various applications</li> <li>3. Apply classification and regression techniques for decision making</li> <li>4. Use probabilistic graphical models to represent given problems</li> <li>5. Apply sequential data processing algorithms to solve problems</li> </ol>
		CSE2073	Cryptology and Network Forensics	<ol style="list-style-type: none"> <li>1. Describe different methods of data encryption and decryption; their advantages &amp; limitations.</li> <li>2. Apply different key distribution methods for distribution of public/private &amp; secret keys.</li> <li>3. Apply message authentications techniques for implementing security during message communication.</li> <li>4. Demonstrate the use of digital signature.</li> <li>5. Analyze different security attacks &amp; security solutions for e-mail &amp; web applications.</li> </ol>
		CSE2093	Soft Computing Lab	<ol style="list-style-type: none"> <li>1. Gain understanding of various soft computing techniques</li> <li>2. Identify and design fuzzy based systems.</li> <li>3. Design neural network for real world application</li> <li>4. Identify and compare evolutionary techniques with traditional techniques</li> <li>5. Explore different selection, crossover and mutation operators of generic algorithms</li> <li>6. Apply evolutionary computation techniques to optimization, forecasting etc</li> </ol>
		CSE2103	Machine Learning Lab	<ol style="list-style-type: none"> <li>1. Understand mathematical background for analyzing machine learning concepts</li> <li>2. Recognize and appreciate need of machine learning in various applications</li> <li>3. Apply classification and regression techniques for decision making</li> </ol>

				<ol style="list-style-type: none"> <li>4. Use probabilistic graphical models to represent given problems</li> <li>5. Apply sequential data processing algorithms to solve problems</li> </ol>
		SHP5152	Numerical Computation Techniques	<ol style="list-style-type: none"> <li>1. Apply the concepts of probability, random variables, probability distribution and continuous probability distribution.</li> <li>2. Apply the notions of vector spaces and linear algebra in engineering fields.</li> </ol>
	III	CSE3032	Dissertation-I	<ol style="list-style-type: none"> <li>1. Identify domain, sub-domain and problem statement for the Study.</li> <li>2. Perform a literature survey and identify possible gaps in the existing work in context with identified problem statement.</li> <li>3. Formulate the problem statement and its objectives of project.</li> <li>4. Selection of suitable methodology, techniques and dataset for the research work.</li> <li>5. Write synopsis using standard format with technical aspects and language.</li> </ol>
		CSE3042	Dissertation-II	<ol style="list-style-type: none"> <li>1. Design and develop bench-marking system which compiles expectations and technical specifications mentioned in the Synopsis.</li> <li>2. Perform experimental observation and analysis of the bench-marking system.</li> <li>3. Identify gap and propose possible improvements in the implemented bench-marking system.</li> <li>4. Submit an research article to reputed international conference which should be based on work done till Dissertation Phase 2.</li> <li>5. Prepare a comprehensive, technically and grammatically correct Dissertation Phase 2 report describing the work done.</li> </ol>
	IV	CSE4012	Dissertation-III	<ol style="list-style-type: none"> <li>1. Identify research gap or opportunities for novel work in selected problem statement or domain.</li> <li>2. Define the problem based on identified research gap.</li> <li>3. Develop algorithm/ methodology to address the identified research gap/ provide solution to the selected problem.</li> <li>4. Write pseudo code/develop flow-chart/ develop working flow of proposed system.</li> <li>5. Implement the proposed approach using required tools.</li> </ol>
		CSE4022	Dissertation-IV	<ol style="list-style-type: none"> <li>1. Develop / simulate / implement the proposed system by complying with desired technical specifications.</li> <li>2. Compare working and experimental results of the proposed system with the existing system.</li> <li>3. Analyze and synthesize obtained results in theoretical and practical context.</li> <li>4. Present findings in logical order and write Dissertation Report on basis of work done,</li> </ol>

				<p>results and observations, findings, and contributions.</p> <p>5. Submit a research article to reputed international conference which should be based on work done.</p>
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- **Department Name :-\_Electrical Engineering**
- **UG Program Name :- B.Tech**
- **Vision** :  
Develop professionally competent electrical engineers to serve future needs and challenges of the society in global environment.
- **Mission :-**  
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.

<b>Sr. No.</b>	<b>Program Outcomes</b>
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.

<b>Sr. No.</b>	<b>Program Specific Outcomes</b>
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
5.	3	SH2092	Engineering Mathematics –III	<p>CO1: Solve linear differential equations &amp; problems related to application by using various methods.</p> <p>CO2: Determine expansion of functions by using Fourier series.</p> <p>CO3: Solve problems on probability distribution by using different formula.</p> <p>CO4: Determine Laplace transform &amp; inverse Laplace transform of various functions by using properties.</p> <p>CO5: Laplace transform &amp; apply Laplace transform to solve linear differential equations</p> <p>CO6: Calculate z- transform &amp; inverse z- transform by using properties of z- transform</p>
6.	3	EE2012	DC Machines and Transformer	<p>CO1: Explain the working principle and operation of single phase and three phase transformer.</p> <p>CO2: Identify various industrial application for single phase and three phase transformer.</p> <p>CO3: Describe behavior of dc machines.</p> <p>CO4: Interpret characteristics of dc machines.</p> <p>CO5: Identify the importance of testing and control of dc machines with suitable industrial applications.</p>
7.	3	EE2032	Electrical circuit analysis	<p>CO1: Understand the fundamental laws and elements of electric circuits.</p> <p>CO2: Apply circuit analysis to AC and DC circuits.</p> <p>CO3: Transform the electrical circuit into two port network to analyze.</p>

				<p>CO4: Evaluate the circuit in transient condition</p> <p>CO5: Design the basic filters</p>
8.	3	EE2052	Analog Electronics	<p>CO1: Explain characteristics of diode and transistors</p> <p>CO2: Analyze various diode circuits like rectifier, clipper and clamper</p> <p>CO3: Apply dc and ac analysis to amplifier circuits.</p> <p>CO4: Design sinusoidal and non-sinusoidal oscillators</p> <p>CO5: Design operational amplifier based circuits.</p>
9.	3	EE2072	Electrical Measurement and Instrumentation	<p>CO1: Demonstrate basic standards and concept of measuring instruments.</p> <p>CO2: Explain construction &amp; working of various electrical measuring instruments.</p> <p>CO3: Discriminate the AC and DC bridges.</p> <p>CO4: Explain instrumentation of non-electrical quantities.</p> <p>CO5: Describe different types of Instrumentation systems</p>
10.	3	EE2512	DC Machines and Transformer Lab	<p>CO1: Perform various experiments on DC machines.</p> <p>CO2: Perform various experiments on Transformer.</p> <p>CO3: Find out the characteristics of various machines along with their efficiencies.</p> <p>CO4: Analyze various parameters and predict the durability of the machines.</p> <p>CO5: Compare the performances of the machines by referring relevant standards</p>

11.	3	EE2532	Analog Electronics Lab	<p>CO1: Illustrate input &amp; output response of analog electronic circuits and compare with theoretical values.</p> <p>CO2: Build diode circuits like rectifier, clipper &amp; clamper.</p> <p>CO3: Design various applications of Op-Amp.</p>
12.	3	EE2552	Electrical Measurement and Instrumentation Lab	<p>CO1: Explain construction and working of various instruments.</p> <p>CO2: Determine the measurement of electrical parameters using various measurement techniques.</p> <p>CO3: Describe the various digital measuring instruments.</p> <p>CO4: Describe the measurement techniques of non-electrical parameters.</p>
13.	4	EE2022	AC Machines	<p>CO1: Describe behavior of three of three phase single phase induction motors.</p> <p>CO2: Discover various characteristics of three phase induction motor.</p> <p>CO3: Identify various industrial application for single phase and three phase induction motor</p> <p>CO4: Describe construction, working principle along with winding details of synchronous generator</p> <p>CO5: Analyze performance, characteristics and testing of synchronous machine.</p>
14.	4	EE2042	Power Transmission & Distribution System	<p>CO1: Summarize structure of power sector in India.</p>

				<p>CO2: Calculate various transmission line parameters.</p> <p>CO3: Select various components of overhead transmission lines and cables.</p> <p>CO4: Explain various phenomena during operation of power network</p> <p>CO5: Choose distribution systems which gives minimum loss</p>
15.	4	EE2062	Digital Electronics	<p>CO1: 1. Describe the fundamental concepts and techniques used in digital electronics.</p> <p>CO2: 2. Construct any Boolean function using logic gates by applying logic function minimization techniques.</p> <p>CO3: 3. Implement the given logical problems using logic gates.</p> <p>CO4: 4. Design combinational and sequential logic circuits.</p> <p>CO5 5. State the process of Analog to Digital conversion, Digital to Analog conversion and PLD to implement the given logical problem.</p>
16.	4	EE2082	Signal Processing for Electrical Engineering	<p>CO1: 1. Perform mathematical operations on signals.</p> <p>CO2: 2. Discuss various system properties.</p> <p>CO3: 3. Discuss need of frequency domain analysis and its properties of signals</p> <p>CO4: Compute the Fourier series or Fourier transform of a set of well-defined signals from first principles</p> <p>CO5: Apply Z and Laplace transforms</p>

17.	4	EE2101	Engineering Mechanics	<p>CO1: Classify various forces and their effects, to analyze real life problems.</p> <p>CO2: Analyze engineering problems applying conditions of equilibrium.</p> <p>CO3: Determine Centroid &amp; Moment of Inertia of the geometrical plane lamina</p> <p>CO4: Apply fundamental concepts of Kinematics and Kinetics to analyze practical problems</p>
18.	4	CE2262	Environmental Science	<p>CO1: Interpret impacts of human activities on natural resources and its control measures.</p> <p>CO2: Apply ecological knowledge to solve environmental problems</p> <p>CO3: Select the appropriate technology to control environmental pollution.</p> <p>CO4: Plan waste management and disaster management practices.</p> <p>CO5: Justify methods to assess impacts of developmental activities on environment.</p> <p>CO6; Analyze environmental change and its social impacts</p>
19.	4	EE2522	AC Machines Lab	<p>CO1: Perform various experiments on AC rotating machines.</p> <p>CO2: Find out the characteristics of various AC machines along with their efficiencies.</p> <p>CO3: Analyze various parameters and predict the durability of the machine.</p> <p>CO4: Compare the performances of the machines by referring relevant standards.</p> <p>CO5: Identify proper machine for particular application</p>
20.	4	EE2542	Digital Electronics Lab	<p>CO1: Verify the truth table of different logic gates &amp; Flip-flops.</p> <p>CO2: Implement desired Boolean functions using digital electronic components.</p> <p>CO3: Design combinational logic circuits &amp; sequential logic circuits.</p> <p>CO4: Simulate and validate digital</p>

				circuits using simulation tools such as Proteus, Multi Sim etc.
21.	4	CE2282	Engineering Mechanics Lab	CO1: Compare coefficient of friction of various surfaces in contact. CO2: Correlate theoretical and practical results of support reactions and Centroid of plane lamina. CO3: Verify law of polygon of forces, law of triangle of forces and principle of moment
22.	4	SH 2172	Mini Project (Environmental Science)	CO1: Utilize scientific methods to solve environmental problems  CO2: Examine technologies for restoration of degraded environment  CO3: Develop presentation and report writing skills  CO4: Develop as an individual and in group leadership quality.
23.	5	EE3011	Electromagnetic Field Theory	CO1: Define electric and magnetic fields according to their force effect.  CO2: Understand the physical meanings of the differential equations for electrostatic and magneto static fields.  CO3: Calculate the electric field from the stationary charge distributions and magnetic fields from steady current distributions.  CO4: Describe and use simple models of electric and magnetic field interactions with materials  CO5: Explain the concept of electromotive force, maxwell's equations and their physical meanings  CO6: Analyze energy transportation and wave propagation in an electromagnetic field.

24.	5	EE3031	Power Electronics	<p>CO1: Understand the behavior of semiconductor devices operated as power switches.</p> <p>CO2: Explain operation, waveform and performance parameters of phase controlled converters, uncontrolled rectifiers.</p> <p>CO3: Analyze and design ac-to-dc converters.</p> <p>CO4: Explain the basic topologies of dc-dc converters analyze and design dc-to-dc converters.</p> <p>CO5: Analyze and design dc-to-ac inverters.</p> <p>CO6: Apply the electronic devices for conversion, control and conditioning of power.</p>
25.	5	EE3051	Power System Stability and Control	<p>CO1: Analyze symmetrical faults in power systems.</p> <p>CO2: Apply symmetrical components method for fault analysis.</p> <p>CO3: Interpret the necessity of automatic generation control and excitation control.</p> <p>CO4: Analyze the optimal operation of power system.</p> <p>CO5: Analyze power system stability.</p>
26.	5	EE3071	Feedback Control System	<p>CO1: identify the basic elements and structures and demonstrate an understanding of the fundamentals of feedback control systems.</p> <p>CO2: Develop the mathematical models of any physical systems such as: state space, transfer function.</p> <p>CO3: Determine the response of different order systems for various standard signals.</p> <p>CO4: Interpret and analyze time domain systems using virtual environment.</p>

				CO5: Interpret and analyze frequency domain systems using virtual environment.
27.	5	EE3091	Microprocessors and Micro controller	<p>CO1: describe the architecture of microprocessor and micro-controller.</p> <p>CO2: write assembly language programs for 8085.</p> <p>CO3: explain a typical input-output interface.</p> <p>CO4: identify instruction addressing modes and syntax for 8051.</p> <p>CO5: create an assembly language or C program for 8051 that performs a prescribed task.</p> <p>CO6: design and implement a micro-controller-based embedded system.</p>
28.	5	EE3511	Power Electronics Lab	<p>CO1: Understand the behaviour, turn on &amp; turn off schemes of semiconductor devices operated as power switches.</p> <p>CO2: Analyze, sketch, examine waveforms, and calculate measure performance factors of the output of ac-to-dc converters.</p> <p>CO3: Analyze, sketch, examine waveforms, and calculate measure performance factors of the output of dc-to-dc converters.</p> <p>CO4: Analyze, sketch, examine waveforms, and calculate measure performance factors of the output of dc-to-ac inverters</p> <p>CO5: Simulate, analyze and design power electronic circuits using matlab software.</p>
29.	5	EE3531	Feedback Control Systems Lab	<p>CO1: Solve the mathematical model of different electromechanical systems.</p> <p>CO2: Model any given electrical, mechanical system.</p> <p>CO3: Classify appropriate feedback signal, synthesis feedback gains and</p>



				<p>analyze their results and deduce the first and second order responses.</p> <p>CO4: Draw the root locus and analyze the system.</p> <p>CO5: Plot the bode, polar and nyquist plots and analyze frequency domain.</p> <p>CO6: Represent the system in state space and determine controllability and observability</p>
30.	5	EE3551	Microprocessors and Micro controller Lab	<p>CO1: create a template program, compile it, and then build the executable file.</p> <p>CO2: examine the effects of executing many of the 8085 and 8051 instructions by tracing the execution of a program in GNUSimulator and Keil for microprocessor and microcontroller respectively.</p> <p>CO3: write their own program in assembly language for 8085 and 8051.</p> <p>CO4: write the steps they go through to perform their tasks.</p> <p>CO5: apply their programming knowledge (assembly and C) for real time applications.</p>
31.	5	EE3571	Seminar	<p>CO1: Improve presentation and documentation skills.</p> <p>CO2: Apply theoretical knowledge to industrial problems and research assignment.</p> <p>CO3: Help contribute in analyzing, planning, and synthesizing problems in Electrical engineering</p>
32.	5	SH3191	Scholastic Aptitude I	<p>CO1: Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning Problems</p> <p>CO2: Understand usage of basic</p>

				<p>aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests</p> <p>CO3: Develop a bridge in analogies, series and visualizing directions.</p> <p>CO4: Apply various short cuts &amp; techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams</p>
33.	6	EE3021	Switch Gear and Protection	<p>CO1: Explain fundamentals of different power system components</p> <p>CO2: Classify and explain the operation of circuit breakers and relays</p> <p>CO3: Discuss distance protection schemes.</p> <p>CO4: Determine the causes, effects and protective schemes for over-voltage and over-current relay.</p> <p>CO5: Describe different faults and devise protection schemes for generator and transformer</p>
34.	6	EE3041	Control System Design	<p>CO1: Design and tune proportional, integral and derivative controllers for given specifications.</p> <p>CO2: Design and tune proportional, integral and derivative controllers for given specifications.</p> <p>CO3: Design a suitable compensator in frequency domain for the given specifications.</p> <p>CO4: Design state feedback controller and observer for given system.</p> <p>CO5: Construct matlab models for the implementation of closed-loop systems.</p>

35.	6	EE3061	Instrumentation Techniques	<p>CO1: describe basic concepts of instrumentation and characteristics of instruments.</p> <p>CO2: Explain selection factors and application of transducers and sensors.</p> <p>CO3: Discuss different types of signal conditioning devices.</p> <p>CO4: Explain different data conversion techniques and digital instruments.</p> <p>CO5: Describe different type of industrial process controllers.</p>
36.	6	EE3081	Electrical Drives and Control	<p>CO1: Understand the stability, moment of inertia and torque in drive systems.</p> <p>CO2: Design block schematics of closed loop control of drives.</p> <p>CO3: Evaluate the motor rating for the given duty as per standard is4722.</p> <p>CO4: Explain the d.c. motor drives starting, braking and speed control operated from single phase and three phase converters.</p> <p>CO5: Solve the numerical problems on d.c. drives.</p> <p>CO6: Understand, analyze the operation of v/f, constant torque and constant power control of induction motor using different drives, vsr and csi.</p> <p>CO7: Understand the vector control of induction motor drives.</p> <p>CO8: Understand the operation speed control of synchronous motor drives.</p>
37.	6	EE3101	Restructured Power System	<p>CO1: Explain the needs and methods adopted for restructuring of power industry.</p> <p>CO2: Interpret the basics of economics and analyze the power markets using them.</p>

				<p>CO3: Discover the different paradigms of restructuring adopted in different countries.</p> <p>CO4: Explain the ideas of transmission open access and point out the needs of ancillary services and the methods adopted to provide them..</p> <p>CO5: Analyze the implications of indian electricity act (2003).</p> <p>CO6: Identify the salient features of iegc and the organizational and administrative responsibilities of various organization involved in the power sector of india.</p>
38.	6	EE3121	Corporate ethics	<p>CO1: Understand different approaches to legal ethics.</p> <p>CO2: Debate current ethical issues and think critically about existing practices.</p> <p>CO3: Apply ethical rules to practical scenario.</p> <p>CO4: Understand the moral and characterization to be an example of faith, character and high professional ethics</p>
39.	6	EE3521	Control System Design Lab	<p>CO1: Design and implement pid controller for a closed-loop system.</p> <p>CO2: Design a suitable compensator using root-locus technique.</p> <p>CO3: Design a suitable compensator in frequency domain.</p> <p>CO4: Develop state feedback controller and observer for siso system.</p> <p>CO5: Demonstrate control of closed-loop systems using matlab/hardware.</p>
40.	6	EE3541	Switchgear and Protection Lab	<p>CO1: Identify different switches and circuit breakers</p> <p>CO2: Observe and explain MCCB.</p> <p>CO3: Plot characteristics of Relays.</p>

				<p>CO4: Assure working of Relays based on their technology and characteristics.</p> <p>CO5: Discuss different protection schemes.</p> <p>CO6: Demonstrate for Transformer and Generator protection</p>
41.	6	EE3561	Electrical Drives and Control Lab	<p>CO1: Understand, demonstrate and sketch the speed- torque characteristics of electrical drives fed from power electronic converters.</p> <p>CO2: Understand, examine closed loop control of electrical drives.</p> <p>CO3: Apply simulation software for analyzing electrical drives.</p> <p>CO4: Calculate and measure the input, output parameters of electrical drives.</p> <p>CO5: Select the rating of motor of electrical drive for particular application according load duty as per is4722-1968.</p> <p>CO6: Evaluate the stability, analyze performance of electrical drives (a.c. and d.c. drives.)</p> <p>CO7: Understand advanced electrical drives srm, bldc, pmsm and examine their behavior using matlab/ simulink.</p>
42.	6	SH3222	Scholastic Aptitude II	<p>CO1: Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning Problems</p> <p>CO2: Understand usage of aptitude terms of speed, time and distance and permutations, probabilities and applications.</p> <p>CO3: Understand blood relations and ways of seating arrangements along with various geometrical figures.</p> <p>CO4: Apply various short cuts &amp; techniques to manage speed and accuracy</p>

				to get equipped for various competitive and campus recruitment exams
43.	7	EE4021	Industrial organization and management	<p>CO1:Apply the industrial management concepts, financial management concepts</p> <p>CO2: Contribute to the development, implementation, and evaluation of employee recruitment, selection, and retention plans and processes.</p> <p>CO3. 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</p> <p>CO4: Design a marketing research study that will act as a key resource in the development of a marketing plan</p> <p>CO5:Explain industrial psychology and solve the industrial problems.</p>
44.	7	EE4031	Electrical Machine Design	<p>CO1: Calculate mmf and thermal rating of various types of electrical machines</p> <p>CO2: Design armature and field systems for d.c. machines</p> <p>CO3: Design core, yoke, windings and cooling systems of transformers.</p> <p>CO4: Design stator and rotor of induction machines.</p> <p>CO5: Design stator and rotor of synchronous machines and study their thermal behavior.</p>
45.	7	EE4041	Automation and Control	<p>CO1: Describe the need of industrial automation and their functions.</p> <p>CO2: Make use of standard iec programming languages.</p> <p>CO3: Design relay/rll based control logic for 102oolean expressions.</p>

				<p>CO4: Construct relay logic ladder diagram for the given application.</p> <p>CO5: Develop gui for monitoring system of the given real time applications using scada/hmi.</p>
46.	7	EE4071	FACTS and HVDC	<p>CO1: Understand the importance of controllable parameters and benefits of facts controllers.</p> <p>CO2: Analyse the functional operation and control of series and shunt compensation.</p> <p>CO3: Describe the principles, operation and control of multi-functional facts controller.</p> <p>CO4: Identify significance of dc over ac transmission system, types and application of hvdc links in practical power systems.</p> <p>CO5: Apply various methods of grid control for hvdc systems.</p>
47.	7	EE4081	Power System Planning	<p>CO1: Explain the need of power system expansion</p> <p>CO2: analyze the given power system for determining optimal values of decision variables.</p> <p>CO3: Apply mathematical tools to solve multi-objective optimization problems in expansion planning and reliability studies.</p> <p>CO4: Explain long term and short term planning.</p> <p>CO5: Discuss various economic analysis methods</p>
48.	7	EE4521	Automation and Control Lab	<p>CO1: Design relay logic control system for given application using relays.</p> <p>CO2: Develop rll for 103olean expressions.</p> <p>CO3: Develop rll using timer and counter instructions.</p>

				<p>CO4: Develop rll using math instructions.</p> <p>CO5: Develop gui using scada/hmi for given application</p>
49.	7	EE4531	Electrical Machine Design lab	<p>CO1: Calculate various parameters required for design</p> <p>CO2: Design specific electrical machine as per requirement</p> <p>CO3: Apply and design the electrical machine in software</p>
50.	7	EE4551	Project Phase I	<p>CO1: Identify and analyze problems in the field of electrical engineering.</p> <p>CO2: Formulate and solve practical problems in electrical engineering in systematic way by applying suitable skills, tools and methodologies.</p> <p>CO3: Demonstrate the importance of working in teams with complementary skills.</p> <p>CO4: Disseminate knowledge by writing good technical report.</p> <p>CO5: Work in interdisciplinary project assignments.</p>
51.	7	EE4571	Industry In-plant Training	<p>CO1: To acquire and apply fundamental principles of engineering.</p> <p>CO2: Become updated with all the latest changes in technological world</p> <p>CO3: Develop ability to communicate efficiently</p> <p>CO4: Improve ability to identify, formulate and model problems and find engineering solution based on a systems approach</p> <p>CO5: Develop awareness of the social, cultural, global and environmental responsibility as an engineer</p>
52.	7	EE4591	Operation of wind and solar system	<p>CO1: Prepare report on wind resources assessment</p>



				<p>CO2: Operate and maintain squirrel cage and dfig based system</p> <p>CO3: Compute reactive power requirement for stand-alone wind turbine system</p> <p>CO4: Demonstrate the effect of shadowing on pv model</p> <p>CO5: List the installation materials for off grid pv system</p>
53.	7	ED4001	BUSINESS OPPORTUNITY GUIDANCE	<p>CO1: Generate &amp; identify different business ideas.</p> <p>CO2: Make analysis of different ideas.</p> <p>CO3: Select proper business idea to suit his personality &amp; competencies.</p>
54.	7	RE0407	Research UROP Phase I	<p>CO1: Perform literature review and identify research topic.</p> <p>CO2: Write synopsis of the research work that being done in semester viii.</p> <p>CO3: Write technical review paper.</p>
55.				
56.	8	<b>Program Elective I</b> EE4011	High Voltage Engineering	<p>CO1: Understand the basic generation and measurement of high voltage and high current for testing purposes</p> <p>CO2: Comprehend breakdown phenomenon in air, solid and liquid insulation</p> <p>CO3: Test high voltage electrical equipment with various testing devices</p> <p>CO4: Compare importance of different types of testing of high voltage plant.</p> <p>CO5: Discuss the overvoltage phenomena and insulation coordination in power system</p>
57.	8	<b>Program Elective I</b>	Computer Modelling of Electrical Power System	<p>CO1: Develop mathematical models of various components of power system</p>

		EE4051		<p>CO2: Explain the modelling of power transmission plant.</p> <p>CO3: Develop mathematical expression of ac-dc conversion plant.</p> <p>CO4: Apply different numerical techniques to study power flow problem</p> <p>CO5: Compare iterative methods applied to solve power flow problem</p>
58.	8	<b>Program Elective II</b> EE4061	Energy Audit and Management	<p>CO1: Develop the concept and philosophy of energy conservation and management</p> <p>CO2: Decide the energy conservation and energy efficiency opportunities in the systems</p> <p>CO3: Solve material and energy balance problems</p> <p>CO4: Execute energy action plan</p> <p>CO5: Compute the energy saving potential in electrical and thermal utilities.</p> <p>CO6: Prepare detailed energy audit report of system or processes.</p>
59.	8	<b>Program Elective II</b> EE4161	Power Quality Issues	<p>CO1: Describe various categories of power quality problems.</p> <p>CO2: Classify power quality problems.</p> <p>CO3: Analyze the fundamental problems behind voltage regulation and correct them</p> <p>CO4: Explain the causes and solutions of power system harmonics.</p> <p>CO5: Analyze impact of distributed generation on power quality.</p>
60.	8	<b>Open Elective II</b> OE432	Wind Energy Engineering	<p>CO1: Apply fundamental principles of thermodynamics, fluid mechanics and mechanical systems to wind turbine engineering.</p> <p>CO2: Calculate various parameters related to wind turbine.</p>

				<p>CO3: Design of wind turbine components.</p> <p>CO4: Design in virtual environment.</p> <p>CO5: Work on team-based projects.</p>
61.	8	<p><b>Program Elective I Laboratory</b></p> <p>EE4511</p>	High Voltage Engineering Lab	<p>CO1: Apply knowledge of condition monitoring of transformer</p> <p>CO2: Test the dielectric properties of solid materials</p> <p>CO3: Test the dielectric properties of liquid and solid insulating materials.</p> <p>CO4: Explain the behavior of circuit breakers and transformer.</p> <p>CO5: Explain the behavior of impulse generator and lightning arrester.</p>
62.	8	<p><b>Program Elective I Laboratory</b></p> <p>EE4531</p>	Computer Modelling of Electrical Power System Lab	<p>CO1: Develop admittance matrix for the given system using system data</p> <p>CO2: Simulate power electronic converters for the given hvdc conversion plant</p> <p>CO3: Develop matlab programme to solve power flow problem for the given network</p> <p>CO4: Use various application software packages to perform power flow study of given power system.</p>
63.	8	EE4541	Project Phase -II	<p>CO1: Identify and analyze problems in the field of electrical engineering.</p> <p>CO2: Formulate and solve practical problems in Electrical Engineering in systematic way by applying suitable skills, tools and methodologies.</p> <p>CO3: Demonstrate the importance of working in teams with complementary skills.</p> <p>CO4: Disseminate knowledge by writing good technical report.</p> <p>CO5: Work in interdisciplinary project assignments.</p>
64.	VIII Option-2			CO1. Investigate the technical literature.

	RE0407  Undergraduate Research Experience (URE)			<p>CO2. Recognize and evaluate theories, practices, and/or research on a chosen topic by</p> <p>conducting a thorough literature review and submitting a written integrative, critical summary of the current literature.</p> <p>CO3. Design a research problem and develop a methodology.</p> <p>CO4. Develop and implement an advanced original research or creative project.</p> <p>CO5. Develop the ability to explain the conceptual viability of the project and describe the major components involved.</p> <p>CO6. Develop the ability to explain how the project will impact the relevant body of work.</p> <p>CO7. Develop advanced discipline-relevant skills and competencies.</p> <p>CO8. Construct an accurate record of research performed.</p> <p>CO9. Write a research report and paper.</p>
65.	VIII  Option-3  LL0407  Industry Internship & Project			<p>CO1. Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services)</p> <p>CO2. Develop an attitude to adjust with the company culture, work norms, code of conduct.</p> <p>CO3. Recognize and follow the safety norms, Code of conduct.</p> <p>CO4. Demonstrate the ability to observe, analyze and document the details as per the industry practices.</p>

				<p>CO5. Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies.</p> <p>CO6. Improve the leadership abilities, communication.</p> <p>CO7. Demonstrate project management and finance sense</p>
66.	VIII Option-4 ED 4001 Entrepreneurship Development			<p>CO1. Determine distinct entrepreneurial traits</p> <p>CO2. Recognize the parameters to assess opportunities and constraints for new business ideas</p> <p>CO3. Apply the systematic practice to select and screen a business idea</p> <p>CO4. Design strategies for successful implementation of ideas</p> <p>CO5. Design a business plan</p>

**Department Name: Electrical Engineering**

**PG Program Name: M.Tech Electrical Power System and Power Electronics**

**Vision**

Develop professionally competent electrical engineers to serve future needs and challenges of the society in global environment.

**Mission:-**

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.	<b>PO1: independently carry out</b> research /investigation and development work to <b>solve</b> practical problems
2.	<b>PO2: write and present</b> a substantial technical report/document
3.	<b>PO3: demonstrate</b> 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.	<b>PO4: analyze</b> electrical power systems to <b>identify</b> performance parameters to be improved by designing suitable control system.
5.	<b>PO5: Use</b> modern scientific and engineering tools <b>to assess the performance of</b> power systems
6.	<b>PO6: Evaluate</b> financial aspects in power system infrastructure development considering environmental issues for sustainable growth

Sr. No.	Program Specific Outcomes
1.	<b>PSO:</b> able to interpret power system data and work on well-defined projects with well-defined goals to provide real time solutions pertaining to PS.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SHP515	Numerical Computational Techniques	CO1-Estimate the error. CO2- Apply the relevant numerical method for interpolating the polynomial CO3- Develop the equation to be fitted and fit the curve for given data

				<p>CO4- Estimate numerically the solution of given algebraic equation.</p> <p>CO5- Use the relevant method for solving the simultaneous linear equations and compute the Eigen values.</p> <p>CO6-Construct the fuzzy set for given linguistic variable and apply fuzzy logic.</p>
2.		EPP1010	Computer Aided Power System Analysis	<p>CO1- Develop mathematical models of various components of power system</p> <p>CO2-. Explain the modelling of power transmission plant.</p> <p>CO3- Develop mathematical expression of ac-dc conversion plant.</p> <p>CO4- Apply different numerical techniques to study power flow problem</p> <p>CO5- Compare iterative methods applied to solve power flow problem</p>
3.	I	EPP1020	Electric and Hybrid Vehicles	<p>CO1- Discuss the trends and philosophy of electric vehicles</p> <p>CO2-Analyze conventional vehicles and powertrains</p> <p>CO3- Discuss the electric drive mechanism.</p> <p>CO4- Classify hybrid electric vehicles</p> <p>CO5- Differentiate electric and range-extended electric vehicles</p> <p>CO6- Describe plug-in hybrid electric vehicles and electrical infrastructure</p>
4.	I	Program Elective I	EPP1030 Wind & Solar Energy Technology	<p>CO1: Describe the principle of energy generation from wind and solar PV systems</p> <p>CO2: Formulate wind and solar energy systems by mathematical equations</p> <p>CO3: Assess energy produced from wind and solar energy systems</p> <p>CO4: Compare the different methods of energy generation</p> <p>CO5: Develop economic analysis of a wind turbine and solar PV systems</p>
5.	I	Program Elective I	EPP1040 Advanced Power Electronic Systems	<p>CO1. Classify different type's converters with respect to power output, configuration and application.</p> <p>CO2. Compare different types of power converters</p> <p>CO3. Describe the working principle of different types of power converters</p> <p>CO4. Model different types of power converters mathematically</p> <p>CO5. Design pore converter for specific application</p>
6.		Program Elective I	EPP1050 Distribution Automation	<p>CO1: Model distribution system components.</p> <p>CO2: .Develop layout of the substation and feeders for specific load and voltage level</p> <p>CO3: Analyze distribution system to calculate loading condition, voltage drop and losses</p> <p>CO4: Categorize different components of SCADA system used for distribution system</p>

				CO5: Determine optimum size and location of capacitor in distribution system for voltage profile improvement
7.		Program Elective II	EPP1060 HVDC Transmission	CO1: Justify the need of HVDC Transmission system for power transmission  CO2: Analyze and compare different working modes of converters used for HVDC transmission  CO3: Compute the filter parameters for elimination of voltage and current harmonics in HVDC system.  CO4: Compare different configuration multi-terminal HVDC system.  CO5: Model HVDC link for AC/DC power flow studies.
8.		Program Elective II	EPP1070 Power Electronics Application to Power Systems	CO1: Apply facts devices for power systems  CO2: Analyze power quality issues in power system.  CO3: Identify suitable power electronic solutions for specific power system problems.  CO4: Compare performance of different power electronics devices used for power system compensation problems.  CO5: Design suitable power electronic system for specific power system problem related to reactive power compensation.
9.		Program Elective II	EPP1080 Smart Grid Technologies	CO1: Discuss the smart grid in Indian perspective  CO2: Explain various smart grid technologies.  CO3: Describe smart meters and advance metering infrastructure.  CO4: Compare Smart grid and micro grid  CO5: Apply power quality management in smart grid  CO6: Identify communication technologies for smart grid
10.		EPP1090	Power System Steady State Analysis Lab	CO1: Model electrical power system for steady state and transient studies.  CO2: Develop a flow chart to compose suitable program for fault analysis and load flow studies.



				<p>CO3: Analyze load flow and fault studies of given power system network using power system software such as MATLAB/EATP/CYME.</p> <p>CO4: Debug the program if simulation results are not in line with expected results</p> <p>CO5: Compare different simulation software results</p>
11.		EPP1100	Renewable Energy Lab	<p>CO1: Analyze wind speed and solar radiation related data to estimate energy of given site</p> <p>CO2: Emulate wind turbine generator and solar PV system in laboratory</p> <p>CO3: Model wind turbine generator and solar PV system using suitable mathematical equations</p> <p>CO4: Develop and simulate grid wind turbine generator or solar PV system based systems using MATLAB/ETAP/CYME software packages</p> <p>CO5: Analyze and interpret the results of simulation studies</p>
12.				
13.	II	EPP2010	Power System Dynamics and Stability	<p>CO1: Explain power system operating states and control</p> <p>CO2: Analyze synchronous machine models</p> <p>CO3: Model excitation and prime mover system</p> <p>CO4: Classify power system stability</p> <p>CO5: Analyze transient and voltage stability</p>
14.		EPP2020	Advanced Control of Electrical Drives	<p>CO1: Justify the need of closed loop drive system for industrial applications.</p> <p>CO2: Explain the working principle of different types of drive system.</p> <p>CO3: Compare different types of electric drives.</p> <p>CO4: Develop mathematical models of electric drive system for specific application.</p> <p>CO5: Design controllers for closed-loop operation of different types of electrical motors.</p>

15.		Program Elective III	EPP2030 Grid Integration of Renewable Energy Sources	<p>CO1: Summarize the grid codes for integration of renewable energy sources</p> <p>CO2: Explain the working principle of different power electronic topologies and controllers</p> <p>CO3: Model mathematically renewable energy sources and associated control system</p> <p>CO4: Design systems to reduce impact of renewable energy fluctuations on grid</p> <p>CO5: Decide control strategy for pv renewable systems</p>
16.		EPP2040	Digital Protection of Power System	<p>CO1: Discuss the importance of power electronics devices in power system protection.</p> <p>CO2: Distinguish between conventional relays and modern relays</p> <p>CO3: Apply mathematical approach to design protection scheme for specific condition</p> <p>CO4: Develop algorithms for numerical protection</p> <p>CO5: Explore recent advances in digital protection of power systems</p>
17.		EPP2050	Power System Optimization	<p>CO1: Explain the need of power system optimization</p> <p>CO2: Formulate power system optimization problem</p> <p>CO3: Apply numerical and heuristic technique to solve power system optimization problem.</p> <p>CO4: Solve power system optimization problem</p> <p>CO5: Assess the impact of parameters on defined optimization problem.</p>
18.		Program Elective IV EPP2060	Restructured Power System	<p>CO1: Explain the principles of electricity markets</p> <p>CO2: Determine transactions in electricity markets</p> <p>CO3: Develop scheduling and operating model in electricity markets</p> <p>CO4: Design bidding strategy for competitive power markets</p> <p>CO5: Discuss financial risk management in power markets</p>

19.		EPP2070	Power Quality and Harmonics	<p>CO1: Discuss various power quality problems and their analysis.</p> <p>CO2: Classify various voltage quality issues and solutions.</p> <p>CO3: Describe Power Quality Standards and Monitoring.</p> <p>CO4: Asses sources of harmonic in power system</p> <p>CO5: Analyze effects of Harmonics on Power system</p> <p>CO6: Design of harmonic filters.</p>
20.		EPP2080	Electrical Energy Storage Systems	<p>CO1: Discuss the energy storage as a structural unit of a power system.</p> <p>CO2: Compare various energy storage technologies for power systems.</p> <p>CO3: Apply battery energy storage and management for power system.</p> <p>CO4: Describe hydrogen energy storage for power system.</p> <p>CO5: Discuss short-term, mid-term and long-term applications of power system.</p> <p>CO6: Analyze economics and reliability of energy storage Systems</p>
21.			EPP2090 Research Methodology & IPR	<p>CO1. Formulate a research problem.</p> <p>CO2. Analyze research related information</p> <p>CO3. Prepare and present research proposal/paper by following research ethics</p> <p>CO4. Make effective use of computers and computing tools to search information, analyze information and prepare report.</p> <p>CO5. Describe nature and processes involved in development of intellectual property rights</p>
22.	II	EPP2043	Energy Storage System	<p>CO1: Apply energy storage systems for generation of electrical power</p> <p>CO2: Analyze pumped hydroelectric and compressed energy storage</p> <p>CO3: Apply battery energy storage systems for various power system applications</p>

				CO4: Calculate economics of solar-thermal energy storage CO5: Analyze role of gas storage in transmission and distribution systems
23.	II	EPP2100	Power system protection Lab	CO1: Analyze characteristics of digital relays  CO2: Demonstrate fault simulation on different protection panels  CO3: Develop an algorithm for different protection schemes  CO4: Simulate protection models in MATLAB, E-tap  CO5: Interpret the simulation results
24.	II	EPP2110	Advanced Drives Lab	CO1: Demonstrate control of Induction motor drive.  CO2: Experiment with chopper fed DC drive system.  CO3: Experiment with three phase half and full converter fed DC motor drive.  CO4: Demonstrate control of BLDC, servo and stepper motor drive system.  CO5: Demonstrate control of AC and DC drives using MATLAB/SIMULINK
25.	III	EPS3013	MOOC	CO1: Develop program using C++ language project work CO2: Use the core concepts to implement in the project work CO3: formulate the research problem
26.	III	EPS3023	Dissertation Phase - I	CO1. Identify research opportunities in his/her domain or multidisciplinary domains  CO2. Formulate the problem statement and its objectives correctly  CO3. Apply the principles of project management during development of the project  CO4. Present synopsis in logical order  CO5. Write synopsis of the proposed system
27.	III	EPS3033	Dissertation Phase - II	CO1. Identify research opportunities in his/her domain or multidisciplinary domains.  CO2. Formulate the problem statement and its objectives correctly  CO3. Develop, simulate and implement the system by complying with desired technical specifications  CO4. Analyze and synthesize obtained results in theoretical and practical context

				CO5. Present report in logical order CO6. Write report of the system implementation
28.	IV	EPS4013	Dissertation Phase - III	CO1. Formulate the problem statement and its objectives correctly  CO2. Develop, simulate and implement the system by complying with desired technical specifications  CO3. Analyze and synthesize obtained results in theoretical and practical context  CO4. Present report in logical order  CO5. Write report of the system implementation  CO6. Apply the principles of project management during development of the project
29.	IV	EPS4023	Dissertation Phase - IV	CO1. Formulate the problem statement and its objectives correctly  CO2. Develop, simulate and implement the system by complying with desired technical specifications  CO3. Analyze and synthesize obtained results in theoretical and practical context  CO4. Present report in logical order  CO5. Write report of the system implementation  CO6. Apply the principles of project management during development of the project

- **Department Name :-Electronics and Telecommunication Engineering**
- **UG Program Name :-B.Tech. Electronics and Telecommunication**
- **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.

**Mission-**

- To provide quality education through need based curriculum, effective teaching learning process and state-of-art infrastructure.
- 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.	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2.	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	<b>Design/development of solutions:</b> 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.	<b>Conduct investigations of complex problems:</b> 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.	<b>Modern tool usage:</b> 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.	<b>The engineer and society:</b> 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.	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9.	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	<b>Communication:</b> 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.	<b>Project management and finance:</b> 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.	<b>Life-long learning:</b> 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.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	III	EC2012	ELECTRONIC DEVICES	CO1: Describe fundamentals of semiconductor devices CO2: Explain working principle of various solid-state devices. CO3: Illustrate various applications of electronic devices CO4: Interpret results of various electronic circuits CO5: Analyze different biasing circuits, frequency models
2.		EC2052	ANALOG COMMUNICATION	CO1: Describe the fundamental concepts of communication systems CO2: Solve problems based on different communication signals. CO3: Analyze different analog and digital modulation-demodulation schemes. CO4: Explain different types of pulse modulation systems. CO5: Compare the performance of various modulation & transmission systems.

3.		EC2072	NETWORK THEORY	<p>CO1: Analyze ac &amp; dc circuits</p> <p>CO2: Illustrate resonance in series &amp; parallel circuit</p> <p>CO3: Calculate different parameters of electrical circuits</p> <p>CO4: Design analog passive filters &amp; attenuators</p>
4.		SH2112	ENGINEERING MATHEMATICS-III	<p>CO1: Apply various transformation techniques to solve engineering problems</p> <p>CO2: Solve linear differential equations &amp; problems related to engineering application in electronics</p> <p>CO3: Compute problems on probability distribution by using different formulae.</p> <p>CO4: Determine expansion of functions by using fourier series.</p> <p>CO5: Illustrate curve fitting concepts in electronics related problems</p>
5.		EC2032	DIGITAL SYSTEM DESIGN	<p>CO1: State fundamental knowledge of digital design</p> <p>CO2: Apply knowledge for real-time application</p> <p>CO3: Illustrate combinational and sequential circuits</p> <p>CO4: Design combinational and sequential circuits</p>
6.		EC2112	ELECTRONICS DEVICES LAB	<p>CO1: Build and test circuit as per the requirement</p> <p>CO2: Observe the voltage waveforms at various test points</p> <p>CO3: Plot the frequency response of amplifier</p> <p>CO4: Interpret results of experiment &amp; compare with measured values</p> <p>CO5: Communicate results and observations and write report.</p>
7.		EC2132	DIGITAL SYSTEM DESIGN LAB	<p>CO1: Apply boolean laws/k-map-method to reduce a given boolean function</p> <p>CO2: Demonstrate the operation of combinational and sequential circuits for various practical applications</p> <p>CO3: Interpret results and compare with experimental values</p> <p>CO4: Communicate effectively through lab journals.</p>



8.		EC2152	ANALOG COMMUNICATION LAB	<p>CO1: Analyze &amp; design simple analog communication systems</p> <p>CO2: Illustrate amplitude and frequency modulation and demodulation methods</p> <p>CO3: Draw different modulation and demodulation waveforms and frequency spectrums.</p> <p>CO4: Demonstrate different types of pulse modulation systems</p> <p>CO5: Conduct the experiments in group and write reports.</p>
9.	IV	CE2262	Engineering Mechanics	<p>CO1: Identify various forces and their effects, to analyze real life problems</p> <p>CO2: Analyze engineering problems applying conditions of equilibrium</p> <p>CO3: Determine centroid &amp; moment of inertia of the geometrical plane lamina</p> <p>CO4: Apply fundamental concepts of kinematics and kinetics to analyze practical problems</p>
10.		EC2022	Analog Circuits	<p>CO1: Interpret different parameters of various configurations of operational amplifier</p> <p>CO2: Analyze various applications of operational amplifier</p> <p>CO3: Explain various oscillators and active filters</p> <p>CO4: Illustrate waveform generators using special ICs</p>
11.		EC2042	Microcontrollers	<p>CO1: Describe basic fundamentals of pic microcontroller</p> <p>CO2: Write programs for pic microcontroller</p> <p>CO3: Interface peripherals with pic microcontroller</p> <p>CO4: Develop an embedded application using pic microcontroller</p>
12.		EC2062	Digital Communication	<p>CO1: Explain different concepts of digital communication systems</p> <p>CO2: Solve numerical on statistical theory, source coding &amp; channel coding</p> <p>CO3: Apply various theorems of encoding, error control etc on signals</p>

				CO4: Analyze various digital modulation and channel coding techniques
13.		EC2082	Signals ad Systems	CO1: Classify continuous and discrete-time signals and systems CO2: Illustrate use of convolution and impulse response in lti systems CO3: Apply mathematical techniques to represent signals and systems CO4: Make use of transform theory techniques for system analysis CO5: Distinguish Fourier techniques for frequency-domain analysis.
14.		CE2282	Engineering Mechanics Lab	CO1: Verify law of polygon of forces, law of triangle of forces and principle of moment. CO2: Compare coefficient of friction of various surfaces in contact. CO3: Correlate theoretical and practical results of support reactions and centroid of plane lamina. CO4: Analyze a simple truss
15.		EC2122	Analog Circuits Lab	CO1: Analyze different parameters of various configurations of op amp CO2: Design various applications of op amp CO3: Interpret theoretical and practical results CO4: Communicate effectively through lab journals
16.		EC2142	Microcontrollers Lab	CO1: 1. install configure and utilize the mplab tool for pic microcontroller programming. CO2: 2. write programs for pic microcontroller CO3: 3. compile debug and test programs for pic microcontroller CO4: 4. develop application using pic microcontroller
17.		SH2172	Environmental Science	CO1: Explain the importance and sensitivity of environment. CO2: Analyze the over exploitation of natural resources and follow environmental ethics.

				<p>CO3: Explain methods to protect environment &amp; prevent environmental pollution</p> <p>CO4: Apply knowledge &amp; skills to solve environment related problems.</p>
18.		SH2602	Environmental Science Project	<p>CO1: Utilize scientific methods to solve environmental problems.</p> <p>CO2: Evaluate technologies for restoration of degraded environment</p> <p>CO3: Develop presentation and report writing skills</p> <p>CO4: Develop as an individual and in group leadership quality</p>
19.	V	EC3011	Electromagnetic Field Theory	<p>CO1: apply the knowledge of vector algebra and co-ordinate system to formulate and solve electromagnetic field problems</p> <p>CO2: use and apply basics of steady electric and magnetic fields to solve the electrostatics and magneto-statics problems</p> <p>CO3: use the boundary conditions and method of images to solve electromagnetic problems.</p> <p>CO4: solve transmission line problems and analyze transients on transmission lines and non ideal behavior of r,l,c components.</p>
20.	V	EC3031	Electronics Communication System	<p>CO1: Explain fundamentals and performance factors of communication systems</p> <p>CO2: Describe theory of communication technology</p> <p>CO3: Expose applications of communication systems</p>
21.	V	EC3051	CMOS Digital Integrated Circuit Design	<p>CO1: Describe working principle of mos devices and circuits</p> <p>CO2: Apply knowledge of mos vlsi circuits to solve the problems</p> <p>CO3: Analyze various parameters of cmos vlsi circuits</p> <p>CO4: Compare various mos circuits</p> <p>CO5: Design various digital building blocks using cmos vlsi</p>
22.	V	EC3071	Digital Signal Processing	<p>CO1: Relate effect of computation accuracy on performance of digital signal processing system</p> <p>CO2: Describe techniques available for implementation of digital signal processing system</p> <p>CO3: Explain techniques available for implementation of digital signal processing system</p> <p>CO4: Design and simulate the working of given digital signal processing system</p>

				CO5: Differentiate between techniques available for implementation of digital signal processing system
23.	V	EC3091	Microcontroller	CO1: Explain the fundamentals of microprocessor, microcontroller and programming related terms. CO2: Describe the instructions of microprocessor. CO3: Write the programming of microcontroller 8051. CO4: Interface peripherals to the microcontroller 8051.
24.	V	EC3531	CMOS Digital Integrated Circuit Design Lab	CO1: Design and simulate schematic of various digital circuits CO2: Sketch layout of various digital block in cad tools CO3: Analyze various parameters of vlsi logic circuits CO4: Interpret results and compare with measured values CO5: Improve the ability to communicate effectively through written lab journals
25.	V	EC3551	Microcontroller Lab	CO1: Write programs in assembly language and 'c' language CO2: Test and debug the program CO3: Interface various peripheral. CO4: Write report and analyze the result
26.	V	EC3571	Digital signal processing lab	CO1: Design and simulate the working of given digital signal processing techniques CO2: Evaluate the performance of designed digital signal processing system CO3: Write relevant conclusion on the performance of designed digital signal processing system CO4: Present and write laboratory reports in desired format in grammatically correct language
27.	VI	EC3061	DIGITAL COMMUNICATION	CO1: Explain different concepts of digital communication systems CO2: Solve numerical on statistical theory, source coding & channel coding CO3: Apply various theorems of encoding, error control etc on signals CO4: Analyze various digital modulation and channel coding techniques
28.	VI	EC3041	Mixed Mode Controller	CO1: Describe basic fundamentals of msp430 CO2: Write programs for msp430 controller CO3: Interface peripherals with msp430 CO4: Develop an embedded application using msp430
29.	VI	EC3081	MOBILE COMMUNICATION	CO1: Describe the evolution of wireless communication systems, major modern wireless communication of 21st century, cellular radio concepts and most common analog and digital communication techniques used in wireless communication. CO2: Identify techniques to improve coverage and capacity in cellular systems, which describe how to model and measure large scale and small scale fading effects and choose

				<p>the multiple access schemes which allow many mobile users to share a finite amount of spectrum simultaneously</p> <p>CO3: Distinguish between different generations of wireless communication technology and multiple access schemes.</p> <p>CO4: Analyse frequency reuse principles for the 1st generation cellular systems, coding and modulation techniques for 2nd generation cellular systems, and cdma technology for 3rd generation cellular systems.</p> <p>CO5: Explain need of coding and describe current and future cellular mobile communication systems (gsm, cdma is95, wcdma, lte, etc)</p>
30.	VI	EC3561	DIGITAL COMMUNICATION LAB	<p>CO1: Calculate pdf, cdf, mean and variance of continuous and discrete random variables using simulation tool</p> <p>CO2: Demonstrate different modulation and shift keying techniques</p> <p>CO3: Write necessary reports and conduct the experiments in group</p>
31.	VI	EC3541	Mixed Mode Controller Lab	<p>CO1: Install configure and utilize the iar and ccs for msp430.</p> <p>CO2: Write programs for msp430</p> <p>CO3: Compile debug and test programs for msp430</p> <p>CO4: Develop application using msp430 controller</p>
32.	VI	EC3021	Antenna & wave propagation	<p>CO1: Explain various antenna parameters, types of antenna and antenna arrays.</p> <p>CO2: Derive expressions for antenna parameters electromagnetic waves and fields radiated by antennas.</p> <p>CO3: Solve numerical on antenna parameters, radiations and EM waves.</p> <p>CO4: Analyze different types of antennas.</p> <p>CO5: Select suitable antennas for wireless applications.</p>
33.	VI	EC3121	Java Programming	<p>CO1: Install configure and utilize ide tool set for developing applications using java programming</p> <p>CO2: Write appropriate java programs.</p> <p>CO3: Compile debug and test java programs</p> <p>CO4: Develop simple java applications.</p>
34.	VI	EC3101	Industrial Organization and Management	<p>CO1: Determine relevance of various different industrial organization structure</p> <p>CO2: Discover practical importance of planning &amp; management</p> <p>CO3: Determine the appropriate staffing and controlling techniques, how to motivate the staff with specific traits</p> <p>CO4: Apply the principles of entrepreneurial management and growth through strategic plans, and implementing their own businesses;</p> <p>CO5: Apply project management models and techniques to prepare, deliver and present a project plan</p>
35.	VII	EC4131	SATELLITE COMMUNICATION	<p>CO1: Discuss the fundamentals of satellite communication.</p> <p>CO2: Explain different satellite subsystems and satellite applications.</p>

				CO3: Design link budget for a satellite. CO4: Compare different satellite systems. CO5: Compile recent explorations by India.
36.	VII	EC4191	IMAGE PROCESSING	CO1: Explain different concepts and processes in digital image processing. CO2: Apply different image processing operations on an image. CO3: Analyze various operations on image using different tools CO4: Compare various filtering, enhancement, segmentation and classification techniques used in image processing
37.	VII	EC4011	RTOS based EMBEDDED SYSTEM DESIGN	CO1: Explain the fundamentals of arm7 and rtos CO2: Write peripherals programming for LPC2148 CO3: Develop rtos application for lpc 2148 CO4: Design RTOS based Embedded System
38.	VII	EC4551	INDUSTRIAL TRAINING	CO1: Communicate effectively in both verbal and written form CO2: Demonstrate the skills to use modern engineering tools, software's and equipment to analyze problems. CO3: Apply the knowledge of professional and ethical responsibilities. CO4: Verify the presentation skills. CO5: Generate a report based on the training experiences and modules undertaken
39.	VII	EC4061	POWER ELECTRONICS	CO1: Discuss characteristics and ratings of the power devices. CO2: Analyse the operation of power electronics converters, inverters and drives. CO3: Determine performance parameters of the converters and inverters. CO4: Design dc-dc converters to meet desired specifications.
40.	VII	EC4541	POWER ELECTRONICS LAB	CO1: Interpret v-i characteristics of power electronics devices CO2: Experiment power electronics converter for various conditions CO3: Design and test power electronic converter.
41.	VII	EC4531	COMPUTER COMMUNICATION NETWORK	CO1: Describe basic networking concepts along with role of different network devices used in computer network. CO2: Elaborate various protocols used in computer communications network. CO3: Differentiate frame formats used in computer communication system CO4: Analyze various algorithms implemented in computer communication system CO5: Illustrate network security aspects.

42.	VII	EC4511	COMPUTER NETWORK LAB	<p>CO1: Apply mathematical foundations to solve computational problems in computer networking</p> <p>CO2: develop code for implementation of different algorithms used in networking.</p> <p>CO3: Analyze performance of various protocols and algorithms</p> <p>CO4: Apply the knowledge of networking to design code for different algorithms</p>
43.	VII	EC4571	EMPLOYABILITY ENHANCEMENT SKILL	<p>CO1: Simulate different industry problems using ladder diagram.</p> <p>CO2: Implement the programs in plc hardware.</p> <p>CO3: Analyze different analog and digital control techniques with the help of ladder logic.</p>
44.	VII	EC4031	EMBEDDED SYSTEM LAB	<p>CO1: Write embedded c programs to interface peripherals with lpc2148</p> <p>CO2: Develop a pseudo codes to use apis of ucos-ii .</p> <p>CO3: Demonstrate the working of code in keil ide and lpc2148 kit</p> <p>CO4: Prepare a report on lab activity.</p>
45.	VII	EC4151	WIRELESS SENSOR NETWORK IOT	<p>CO1: Categorize sensor networks for various applications</p> <p>CO2: Choose suitable medium access protocols for wsn hardware</p> <p>CO3: Design and simulate small sensor nodes</p> <p>CO4: illustrate quality of service, fault-tolerance, and security resource constraints of wsn.</p> <p>CO5: Evaluate the performance of sensor networks with iot and identify bottlenecks</p>
46.	VIII	OEC442	ROBOTICS	<p>CO1: Describe architecture, components and technical specifications of robot.</p> <p>CO2: Test programming on fire bird v atmega2560 robot with different i/o modules.</p> <p>CO3: Apply wired and wireless communication techniques for robotics applications</p>
47.	VIII	EC4181	FUZZY LOGIC	<p>CO1: Describe fuzzy tools and techniques.</p> <p>CO2: Apply fuzzy relations for given problem.</p> <p>CO3: Analyze applicability of fuzzy sets to given problem.</p> <p>CO4: Select suitable fuzzification and defuzzification methods to given problem.</p> <p>CO5: Design FKBC system for control applications.</p>
48.	VIII	EC4101	EMBEDDED LINUX	<p>CO1: Describe the basics of embedded linux.</p> <p>CO2: Write applications in Linux for various peripherals</p> <p>CO3: Implement Linux environment on given hardware.</p> <p>CO4: Design an embedded system using embedded linux os.</p>
49.	VIII	EC4201	SYSTEM VERILOG	<p>CO1: Describe various concepts of verification methodologies, using system verilog.</p> <p>CO2: Choose good coding techniques as per current industrial practices.</p>

				<p>CO3: Write a system verilog code for any digital function/module.</p> <p>CO4: Analyze the differences between verilog and system verilog.</p> <p>CO5: Design digital modules and verify using system verilog</p>
50.	VIII	OEC476	MECHATRONICS	<p>CO1: Study of sensors, actuators, system modeling and design with real-time controller interfacing.</p> <p>CO2: Design step-by-step mechatronics system design</p> <p>CO3: Analyze the system for different input and different output.</p>
51.	VIII	EC4501	SYSTEM VERILOG LAB	<p>CO1: Write system verilog code for given specification</p> <p>CO2: Interpret the results as per specification</p> <p>CO3: Use tools for simulation and verification of digital modules</p> <p>CO4: Analyze the results by comparing with interpreted values</p> <p>CO5: Demonstrate and communicate effectively through lab journals</p>
52.	VIII	EC4503	EMBEDDED LINUX LAB	<p>CO1: Prepare linux environment on host and target</p> <p>CO2: Write c and shell programming for various application</p> <p>CO3: Test and debug the embedded c code using various ide</p> <p>CO4: Develop small application using beaglebone black</p>
53.	VIII	EC4581	PROJECT PAHSE II	<p>CO1: To analyze, interpret, express and modify the design and implementation of desired system using modern tools and techniques.</p> <p>CO2: Apply professional, ethical and moral responsibilities</p> <p>CO3: Communicate effectively through reports, presentations and discussions within both the technical domain and the community at large.</p> <p>CO4: Apply the principles of project management both as a member and a team leader for project development.</p> <p>CO5: Learn independently and be ready for a lifelong learning to face increasing challenges and responsibilities</p>



- **Department Name: Electronics and Telecommunication Engineering**
- **PG Program Name: M.Tech. Electronics**
- **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.

**Mission-**

- To provide quality education through need based curriculum, effective teaching learning process and state-of-art infrastructure.
- 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.	Demonstrate a degree of mastery over electronics engineering
2.	Independently carry out research/investigations and development work to solve practical problems of society and industry.
3.	Write and present a substantial technical report/document
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

Sr. No.	Semester	Course Code	Course Name	Course Outcome
	I	ECS1014	ADVANCED COMMUNICATION NETWORKS	CO1: Outline advanced concepts in communication networking. CO2: Design and develop protocols for communication networks. CO3: Identify the mechanisms in quality of service in networking. CO4: Optimize the network design.
2.	I	ECS1024	ADVANCED DIGITAL SIGNAL PROCESSING	CO1: Explain techniques available for implementation of digital signal processing system CO2: Design and simulate working of given digital signal processing system

				<p>CO3: Evaluate performance of digital signal processing system</p> <p>CO4: Interpret the performance of digital signal processing system</p> <p>CO5: Write limitations of digital signal processing system designed with specific technique</p>
3.	I	ECS108 4	MECHATRONICS BASED SYSTEM	<p>CO1: Explain elements required to develop mechatronics system.</p> <p>CO2: Design mechatronics based system for specified application</p> <p>CO3: Describe applications of mechatronics systems</p>
4.	I	ECS110 4	ADVANCED COMMUNICATIO N NETWORKS LAB	<p>CO1: Identify the different types of network devices, their functions, required tools and techniques.</p> <p>CO2: Build and analyze the skills of sub-netting and routing mechanisms.</p> <p>CO3: Evaluate the performance of designed advanced communication networks.</p> <p>CO4: Present and write laboratory reports in desired format in grammatically correct language.</p>
5.	I	ECS103 4	WIRELESS SENSOR NETWORK	<p>CO1: Design wireless sensor network system for different applications under consideration</p> <p>CO2: Explain the hardware details of different types of sensors and select right type of sensor for various applications.</p> <p>CO3: Identify radio standards and communication protocols to be used for wireless sensor network based systems and application.</p> <p>CO4: Use operating systems and programming languages for wireless sensor nodes</p> <p>CO5: Handle special issues related to sensors like energy conservation and security challenges.</p>
6.	I	ECS104 4	ADVANCED POWER ELECTRONICS	<p>CO1: Describe operation and applications of converter</p> <p>CO2: Design magnetic components, heat sinks and converters</p> <p>CO3: Illustrate methods of high power parameters measurements</p> <p>CO4: Justify requirement of power factor correction in utility interface</p>
7.	II	ECS201 4	ANTENNA AND RADIATING SYSTEMS	<p>CO1: Explain different types of antennas.</p> <p>CO2: Solve problems based on antenna parameters, structures and array antennas</p> <p>CO3: Analyze different structures involved in antennas the effect of different parameters on functioning of antenna.</p> <p>CO4: Design antennas and antenna arrays for various desired radiation pattern characteristics.</p>
8.	II	ECS209 4	ANTENNA AND RADIATING SYSTEMS LAB	<p>CO1: Calculate antenna parameters.</p> <p>CO2: Simulate different types of antennas in Electromagnetic Field solver.</p>

				CO3: Compare the performance of different types of antennas. CO4: Write necessary reports
9.	II	ECS203 4	Automotive Electronics	CO1: Describe components of automotive electronics and its evolution & trends. CO2: Develop automotive grade microcontroller system. CO3: Design and model various automotive control systems. CO4: Describe safety standards and advances towards autonomous vehicles.
10.	II	SHP515	NUMERICAL COMPUTATION TECHNIQUES	CO1: Estimate the error. CO2: Apply the relevant numerical method for interpolating the polynomial. CO3: Develop the equation of the curve to fit for given data. CO4: Estimate numerically the solution of given algebraic equation. CO5: Use the relevant method for solving the simultaneous linear equations and compute the eigen values. CO6: Construct the fuzzy set for given linguistic variable and apply fuzzy logic.
11.	II	ECS210 4	WIRELESS AND MOBILE COMMUNICATION LAB	CO1: illustrate cellular concepts, gsm and cdma networks. CO2: Outline gsm handset by experimentation and fault insertion techniques. CO3: interpret cdma concept using dsss. CO4: Develop concepts of software radio in real time environment.
12.	II	ECS202 4	WIRELESS AND MOBILE COMMUNICATION	CO1: Design appropriate mobile communication systems. CO2: Apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques CO3: Distinguish various multiple-access techniques for mobile communications e.g. fdma, tdma, cdma, and their advantages and disadvantages. CO4: Analyze and design cdma system functioning with knowledge of forward and reverse channel details, advantages and disadvantages of using the technology CO5: Understanding upcoming technologies like 3g, 4g etc.
13.	II	ECS206 4	Soft Computing	CO1: Identify and describe soft computing techniques and their roles in building intelligent machines CO2: Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems CO3: Apply genetic algorithms to combinatorial optimization problems CO4: Apply neural networks to pattern classification and regression problems

				CO5: Effectively use existing software tools to solve real problems using a soft computing approach
14.	III	ECS301 4	Industry Internship	CO1: Apply engineering knowledge learned during program CO2: Apply his/her technical skills to engineering problem CO3: Develop creative and innovative solution to the given problem CO4: Support multi disciplinary environment CO5: Show concern for society environment and other social concerns CO6: Demonstrate given task according to industrial needs with full integrity and responsibility
15.	III	ECS303 4	DISSERTATION PHASE I	CO1: Identify research opportunities in his/her domain or multidisciplinary domains CO2: Formulate the problem statement and its objectives correctly CO3: Apply the principles of project management during development of the project CO4: Present synopsis in logical order CO5: Write synopsis of the proposed system
16.	III	ECS304 4	DISSERTATION PHASE II	CO1: Identify research opportunities in his/her domain or multidisciplinary domains. CO2: Formulate the problem statement and its objectives correctly CO3: Develop, simulate and implement the system by complying with desired technical specifications CO4: Analyze and synthesize obtained results in theoretical and practical context CO5: Present report in logical order CO6: Write report of the system implementation CO7: Apply the principles of project management during development of the project
17.	IV	EC4014	DISSERTATION PHASE III	CO1: Identify research opportunities in his/her domain or multidisciplinary domains. CO2: Formulate the problem statement and its objectives correctly CO3: Develop, simulate and implement the system by complying with desired technical specifications CO4: Analyze and synthesize obtained results in theoretical and practical context CO5: Present report in logical order CO6: Write report of the system implementation CO7: Apply the principles of project management during development of the project
18.	IV	ECS402 4	DISSERTATION PHASE IV	CO1: Identify research opportunities in his/her domain or multidisciplinary domains. CO2: Formulate the problem statement and its objectives correctly

				<p>CO3: Develop, simulate and implement the system by complying with desired technical specifications</p> <p>CO4: Analyze and synthesize obtained results in theoretical and practical context</p> <p>CO5: Present report in logical order</p> <p>CO6: Write report of the system implementation</p> <p>CO7: Apply the principles of project management during development of the project</p>
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- **Department Name: Electronics and Telecommunication Engineering**
- **PG Program Name: M.Tech. Embedded Systems and VLSI**
- **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.

**Mission-**

- To provide quality education through need based curriculum, effective teaching learning process and state-of-art infrastructure.
- 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.	Independently carry out research /investigations and development work to solve practical problems
2.	Demonstrate a degree of mastery over the digital systems
3.	Write and present a substantial technical report/document
4.	Apply knowledge of engineering and project Management to carry out dissertation work
5.	Engage in Lifelong learning to improve Knowledge & competence in world of rapid technological changes
6.	Follow professional ethics and moral responsibilities.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	EEV1010	RTL SIMULATION AND SYNTHESIS	CO1: Illustrate finite state machine using rtl  CO2: Describe digital design of various modules and system  CO3: Model various modules and system using HDL  CO4: Classify different plds and rtl coding styles based on applications
2.	I	EEV1020	EMBEDDED SYSTEM DESIGN	CO1: Illustrate system architecture involving hardware & software components as well as of its complex communication structure

				<p>CO2: Apply knowledge of various embedded processor architectures in industrial automation</p> <p>CO3: Design system for real time processing</p> <p>CO4: Deploy test and analyze the new micro architectures for embedded processor s</p>
3.	I	EEV1070	RTL SIMULATION AND SYNTHESIS LAB	<p>CO1: Design various digital modules and systems</p> <p>CO2: Write rtl code for digital modules and systems</p> <p>CO3: Simulate and synthesize various digital modules and systems using eda tools</p> <p>CO4: Implement various modules and systems using appropriate plds.</p>
4.	I	EEV2010	Advanced Embedded Controllers	<p>CO1: Identify the different types of network devices, their functions, required tools and techniques.</p> <p>CO2: Build and analyze the skills of sub-netting and routing mechanisms.</p> <p>CO3: Evaluate the performance of designed advanced communication networks.</p> <p>CO4: Present and write laboratory reports in desired format in grammatically correct language.</p>
5.	II	EEV2010	Advanced Embedded Controllers	<p>CO1: Describe basic fundamentals of arm and DSP processors</p> <p>CO2: Write programs for arm and DSP controllers</p> <p>CO3: Interface peripherals with arm controller</p> <p>CO4: Design an embedded application using arm processors or DSP processors</p>
6.	II	EEV2090	VLSI Design Lab	<p>CO1: Design digital and analog circuits using CMOS</p> <p>CO2: Use EDA tools like cadence, mentor graphics and other open source software tools</p> <p>CO3: Demonstrate basic building blocks and circuit topologies</p>
7.	II	EEV2020	Digital VLSI Design	<p>CO1: Describe components of automotive electronics and its evolution &amp; trends.</p> <p>CO2: Develop automotive grade microcontroller system.</p>

				CO3: Design and model various automotive control systems. CO4: Describe safety standards and advances towards autonomous vehicles.
8.	II	SHP515	NUMERICAL COMPUTATION TECHNIQUES	CO1: Estimate the error. CO2: Apply the relevant numerical method for interpolating the polynomial. CO3: Develop the equation of the curve to fit for given data. CO4: Estimate numerically the solution of given algebraic equation. CO5: Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. CO6: Construct the fuzzy set for given linguistic variable and apply fuzzy logic.
9.	II	EEV2080	Advanced Embedded Controllers Lab	CO1: Install configure and utilize the ide tool for arm and DSP controller programming..  CO2: Write programs for arm and DSP controllers  CO3: Compile debug and test programs for arm and DSP controller  CO4: Develop application using arm or DSP controller
10.	II	EEV2060	Machine Learning	CO1: Study para metric and linear model for classification  CO2: Design neural network and SVM for classification  CO3: Develop machine independent and unsupervised learning techniques .
11.	III	ECS3014	Industry Internship	CO1: Apply engineering knowledge learned during program CO2: Apply his/her technical skills to engineering problem CO3: Develop creative and innovative solution to the given problem CO4: Support multi disciplinary environment CO5: Show concern for society environment and other social concerns CO6: Demonstrate given task according to industrial needs with full integrity and responsibility
12.	III	ECS3034	DISSERTATION PHASE I	CO1: Identify research opportunities in his/her domain or multidisciplinary domains CO2: Formulate the problem statement and its objectives correctly CO3: Apply the principles of project management during development of the project



				CO4: Present synopsis in logical order CO5: Write synopsis of the proposed system
13.	III	ECS3044	DISSERTATION PHASE II	CO1: Identify research opportunities in his/her domain or multidisciplinary domains. CO2: Formulate the problem statement and its objectives correctly CO3: Develop, simulate and implement the system by complying with desired technical specifications CO4: Analyze and synthesize obtained results in theoretical and practical context CO5: Present report in logical order CO6: Write report of the system implementation CO7: Apply the principles of project management during development of the project
14.	IV	EC4014	DISSERTATION PHASE III	CO1: Identify research opportunities in his/her domain or multidisciplinary domains. CO2: Formulate the problem statement and its objectives correctly CO3: Develop, simulate and implement the system by complying with desired technical specifications CO4: Analyze and synthesize obtained results in theoretical and practical context CO5: Present report in logical order CO6: Write report of the system implementation CO7: Apply the principles of project management during development of the project
15.	IV	ECS4024	DISSERTATION PHASE IV	CO1: Identify research opportunities in his/her domain or multidisciplinary domains. CO2: Formulate the problem statement and its objectives correctly CO3: Develop, simulate and implement the system by complying with desired technical specifications CO4: Analyze and synthesize obtained results in theoretical and practical context CO5: Present report in logical order CO6: Write report of the system implementation CO7: Apply the principles of project management during development of the project

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

**Vision:**

To be a centre of excellence in the field of Mechanical Engineering where quality education and research synergize.

**Mission:**

To transform the students of the department into highly motivated and ethical engineers, technologists, researchers and entrepreneurs who will contribute to uplift the society in collaboration with industry and academia.

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.

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Semester	Course Name	Course Code	Course Outcome
Semester-III	Engineering Mathematics-III		Identify the type of differential equations (Ordinary / partial, order and degree, linear/ Nonlinear, homogeneous / non-homogeneous, with constant / variable coefficients etc.)
			Apply appropriate method of solution to the given differential equation.
			Apply the techniques of solution of higher order linear ordinary differential equation to solve specific engineering problems.
			Define and describe what Laplace transform and inverse Laplace transform of a function is and apply rules of Laplace and Inverse Laplace transforms to find transform given expressions using transform and inverse transform of standard functions.

			<p>Explain and identify random variables, discriminate between discrete and continuous Random variables; Define and fit probability distributions for the given frequency Distributions for discrete and continuous random variables.</p> <p>Determine the real roots of algebraic and transcendental equations using various numerical methods.</p>
	Applied Thermodynamics	ME2011	<p>Understand the applications of engineering thermodynamics in real life situations</p> <p>Develop fundamental understanding of applied thermodynamics in an engineering perspective and how to integrate it with other subjects in engineering practice.</p> <p>Demonstrate an understanding of the construction of thermodynamic property tables and the capability to determine changes in enthalpy, entropy and internal energy using a suitable equation of state.</p> <p>Understand the properties of pure substances</p> <p>Formulate, model, and solve problems involving systems and devices having various forms of energy exchange and energy conversion.</p> <p>Discuss thermodynamics in a logical and general way.</p>
	Electrical Technology	ME 209	<p>Explain the constructional features of D.C. motors.</p> <p>Apply the fundamental formulae learned.</p> <p>Describe the constructional features of 3 phase induction motors.</p> <p>Apply the formulae and do the calculations to find different parameters of 3 phase induction motors.</p> <p>Select the appropriate machines suitable for different applications.</p> <p>Explain electric power utilization for various electric drives, electric heading and electric welding.</p>
	Fluid Mechanics	ME2051	<p>Define, calculate and measure properties of fluid.</p> <p>Identify different types of flows &amp; forces acting on fluid /by fluid.</p> <p>Apply basic fluid mechanics equations for different flow system.</p> <p>Estimate different energy losses in fluid flow.</p> <p>Explain &amp; calculate forces acting on body submerged in fluid.</p>

	Manufacturing Processes	ME2071	Select casting as manufacturing process suitable for the component manufacturing and its production volume
			Select suitable Engineering forming process for production of component of required specification
			Select suitable Joining process for the joining of the two components of required specification.
			Illustrate the plastic molding process.
	Environmental Science	SH2011	Avoid over exploitation of natural resources and follow the environmental ethics.
			Do the sustainable practices for sustainable development.
			Protect environment and prevent environmental pollution.
			Apply their knowledge and skills to solve their environment related problems.
			Understand the importance and sensitivity of Environment
	Applied Thermodynamics Lab ME2511	ME2511	Work efficiently in a group, integrating skills and knowledge to make decisions in the performance of tasks, adopting a responsible and organized attitude to work and a willingness to learn.
			Apply the basic concepts of Thermodynamics to carry out professional engineering activities in the field of power plants.
			Conduct the test for determining lubricant properties like redwood viscosity, aniline point, flash & fire point, cloud & pour point, carbon residue, grease penetration number dropping point etc.
	Computer Programming C++	ME2531	Divide the problem into objects & build the Object Oriented Program
			Elaborate the concept of Function and Operator Overloading
			Modify/Extend the program by using Inheritance
			Increase the speed of program by proper memory management using Pointers, Constructor & Destructor
Handle different file operations			
Write programme to draw simple geometric shapes			
Fluid Mechanics and Electrical Technology Lab	ME259	Measure Pressure, Discharge and head of Fluid.	
		Measure and calculate Head loss of fluid.	

			Calibrate discharge measuring instruments in Hydraulics.
			Perform different tests on D.C.shunt motor & calculate related parameters.
			Perform different tests on 3 phase induction motor & calculate related parameters.
Machine Drawing Lab	ME2551		Recognize the significance and draw BIS conventions, types of section and welding symbols.
			Identify & draw the proportionate dimension and free hand sketches of various engineering components.
			Prepare details & assembly drawing from given detail drawings.
			Prepare the manufacturing drawing.
			Identify appropriate limits, fits , tolerances, tolerances of form & position, surface finish symbols for given machine components & incorporate the same in the orthographic drawing of given machine component.
			Identify & draw the curves of interpenetration.
Mini Project (Environmental Science) ME261	ME261		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 Aluminium by TIG welding.
			Produce given job with proper external taper and V threading within dimensional tolerances.
Workshop Practice –III	ME2571		evaluate the solutions from the perspective of sustainable development
			apply their knowledge and skills to solve their Environmental related problems
			Participate effectively in the own and cross disciplinary groups
			Provide solutions to Environmental problems related to Mechanical Engineering Field
			Identify the environmental related problems in the field of Mechanical Engineering

Semester	Course Name	Course Code	Course Outcome
Semester-IV	Mechanics of Deformable Bodies	ME212	Understand the different modes of failure and the stresses developed
			Find the principal stress and principal plane for plane stress system and Derive & apply the torsion, flexure and Euler's formula for determinate shafts.
			Evaluate and apply the shear force and bending moment by different techniques.
			Derive bending stress distribution and shear stress distribution for various cross sections of beam.
			Find the deflection of beams by double integration method and moment area method.
			Analyse axially loaded column and derive & use strain energy method.
	Fluid & Turbo Machinery	ME2041	Explain construction and working of different types of turbines, centrifugal pump & compressors
			Evaluate different efficiencies; power developed and discharge requirement of turbine.
			Sketch velocity triangles & estimate performance of pumps.
			Explain concept of model testing for performance of turbomachines.
			Compute different efficiencies of reciprocating & rotary compressor Select proper fluid & turbo Machine for various operation
	Material Science	ME2061	Deduce mechanical properties from crystal structures of material.
			Draw equilibrium diagram for different alloy systems using cooling curves.
			Calculate the amount of phases present in any alloy using Lever arm principle.
			Tabulate different phases, temperatures and transformations on Fe-Fe <sub>3</sub> C diagram.
			Explain TTT and CCT diagrams for steel and effect of various alloying elements on these diagrams.
			Illustrate different transformations during heat treatment of steel.
			Explain and discriminate different heat treatment processes based on their applications
			Illustrate different heat treatment furnaces and controlled atmospheres.
			Prepare flow chart for different components made by powder metallurgy
	Explain different destructive and Non-destructive testing methods.		
	Machine Tools and Processes	ME214	Illustrate machine tools like lathe, capstan & turret lathe etc.
			Identify the main parts of machine tools like drilling & boring machine.
			Demonstrate various mechanisms used on the capstan & turret lathes.
			Prepare tooling layout for capstan & turret lathe.
			Explain shaping, planning, milling, grinding & broaching machines with neat sketch.
			Distinguish shaping & planning processes.
			Explain non-conventional machining methods.
Describe plastic processing methods with neat sketches.			

			Discuss ceramic processing methods.
Kinematics of Machines	ME2101		Identify Kinematic pair, kinematic chains, mechanisms and inversions
			Draw the velocity and acceleration diagram of a given mechanism.
			Interpret the results obtained by velocity and acceleration analysis by different methods.
			Derive SVAJ functions to fulfil cam design specifications.
			Illustrate the use of flywheel and governor.
			Analyze the controlling force and stability of governor.
			Analyze the gear system used in engineering applications.
Kinematics of Machines and Material Science Lab	ME2521		Determine M.I of irregular shape bodies experimentally.
			Design mechanism to fulfil motion generation.
			Determine the positions, velocities and acceleration of links of mechanism.
			Generate Involute gear tooth profile.
			Illustrate stress strain diagram for mild steel
			Use Rockwell Hardness testing machine to measure hardness of material
			Test materials for their impact strength.
Workshop Practice – IV	ME2541		Judge mechanical properties from microstructure of steel and cast iron
			Compare various heat treatment processes of steel
			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 $\pm 0.2$ mm on diameter and $\pm 0.5$ mm on length.
Fluid and Turbo Machinery Lab	ME2561		Produce given job with proper V threading fitting and within dimensional tolerances $\pm 0.2$ mm on diameter and $\pm 0.5$ mm on length.
			Produce given job of square threading of given specification.
			Conduct trial & Calculate performance parameters of turbine, centrifugal pumps and reciprocating pump, reciprocating compressor & blower.
			Draw & compare performance characteristics curves with their theoretical nature in case of Pelton wheel, Francis turbine, Kaplan turbine, centrifugal pumps and reciprocating compressor.
CAD Modelling and Drafting ME	ME2581		Explain construction & working of gear pump, vane blower, Hydraulic accumulator, intensifier, hydraulic ram.
			Creating sketches of simple machine parts and components
			Construction of simple machine parts and components
			Creating mechanical assemblies of parts.
Professional Skills Development – I	SH2511		Generations of drawing views, editing and modification of drawing views and adding dimensions text to the drawings.
			Creating of surface features and different style tools.
			Prepare professional image perception as reality.
			Develop personality traits.
			Strategize and develop skill to build self-esteem and positive attitude
			Imbibe integrity and ethics.
			Broaden think tanks on entrepreneurial skills.
			Apply English as a language for specific purposes.



Semester	Course	Course Code	Course Outcome
Semester V	Dynamics of Machinery	ME3011	Identify and investigate the stability of spinning bodies due to gyroscopic effect.
			Apply the theoretical knowledge to balance the rotary and reciprocating systems.
			Apply different principles to convert physical vibratory system into a mathematical model.
			Recognize the suitable method for minimizing or elimination the vibration from the system.
			Identify the effect of external excitation on the system and effect of dampers to control the system vibration.
			Recognize the whirling speed conditions of shaft and methods to eliminate it.
	Heat and Mass transfer	ME3031	Differentiate the modes of heat transfer with appropriate governing laws and explain importance of thermal conductivity, heat transfer coefficient etc.
			Derive the general heat conduction equations in Cartesian coordinate system, critical radius insulation of cylinder and sphere, and solve steady state one dimensional heat conduction problem.
			Derive expression heat transfer from pin fin for different condition and calculate heat transfer, efficiency, effectiveness of pin fin Also Solve unsteady state problem
			State and explain different laws, terms related to radiation heat transfer and determine heat exchange between two bodies.
			Explain hydrodynamic, thermal boundary layer and analyze forced and natural convection problem by dimensional analysis procedure and solve problem based on it.
			Analyze heat exchanger by LMTD and NTU method and solve problem based on it, also explain the phenomena like boiling, condensation, mass transfer.
			Design of Machine Components
	Design simple mechanical components, bolted and welded joints at transverse and eccentric loading conditions.		
	Design the shaft on strength and rigidity basis and the keys.		
	Design the spring and select the proper type of spring as per application.		
	Design the Power screw.		
	Design flywheel and flat belt, V belt as per the standard manufacturer's		
	Control Engineering	ME3071	List various elements of feedback control system
			Representation of control systems mathematically and by block diagrams.
			Construct direct and inverse analogue for mechanical and electrical system.
			Solve problems on linearization of nonlinear function.
			Draw steady state curves for control system.
			Reduce given block diagram using block diagram algebra.
			Apply various mathematical tools to express control systems and analyze response to various input conditions.
			Check stability of the system using Routh's stability criteria.
	Prepare root locus for given system function.		

			Use various programming methods for state space representation of the
			Explain the mechanism of metal cutting.
			Analyze the effect of various parameters such as process variables, cutting tool materials etc. on the performance of machining.
	Manufacturing Engineering	ME3091	Identify and recognize the importance of the various elements of tool geometry of single and multipoint cutting tools.
			Explain the design principles common to jigs and fixtures.
			Design jig for given component.
			Design fixture for given component.
			Design press tool for cutting press working operations
			Design press tool for forming press working operations.
	Workshop Practice – V	ME3511	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 $\pm 0.1$ mm on diameter and $\pm 0.2$ 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	ME3531	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 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.
Heat and Mass Transfer Lab	ME3551	Calculate thermal conductivity of metal and insulating powder experimentally, and compare it with standard	
		Compare theoretical and experimental values of heat transfer from composite wall.	
		Calculate the fin efficiency for short and insulated tip fin experimentally	
		Calculate heat transfer coefficient in natural and forced convection experimentally, compare it with standard correlation.	
		Calculate emissivity , Stefan Boltzman constant experimentally and compare it with standard	
		Calculate effectiveness of Heat Exchanger (parallel flow and counter flow arrangement)	
Professional Skills Development – II	SH3511	To describe the importance, for industry and the community, of ethical conduct.	
		To be provided the skills with which to recognize and resolve ethical issues while working.	
		To be able to enhance awareness and critical self-examination of one's own values, and to appreciate the relevance of personal values in the /workplace.	
		To be able to apply engineering ethics to their workplace.	

			To be able to apply and evaluate the behaviour / working of organizations based on normative ethical framework.
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Semester	Course	Course Code	Course Outcome
Semester VI	Machine Design	ME3021	Design machine components under fluctuating loads
			Draw and use Soderberg's and Goodman Diagram.
			Design components considering creep and fracture criteria
			Design spur and helical gears under beam strength and wear strength.
			Apply principles of interaction of materials processing and design.
			Design / select rolling contact and sliding contact bearing.
	Internal Combustion Engines	ME3061	Classify engines and define different performance parameters of the engine.
			Analyze and differentiate between theoretical air standard, theoretical fuel air and actual cycles.
			Calculate the required air-fuel ratio under different operating conditions.
			Outline the requirements of fuel systems of SI and CI engines.
			Explain the stages of combustion in SI and CI engines and differentiate between detonation and knocking.
			Prepare heat balance sheet and Show the distinct operating characteristics of different IC engines.
	Metrology and Quality Control	ME3081	Justify the need of alternative fuels and compare with the standard emission norms.
			Recognize the importance of Metrology and take the linear measurement by using instruments
			Evaluate the limits fits and tolerances for the component Design The limit gauge by using Taylors Principle
			Examine surface finish and use measurement techniques for surface finish measurement
			Describe screw thread terminology, measure screw thread dimensions and detect errors in screw thread measurements
			Describe the principle and working of CMM
			Discuss the measurement system analysis
			Explain Quality Control concepts and analyze by using X bar chart and R and P
	Engineering Management	ME3101	Describe the advance quality tools used in the industry such as PPAP,APQP,FMEA
			Recognize the factors that influence industrial and business environment and visualize their effect on business
			perceive the factors required to develop a business framework
			justify importance of business excellence models on world class business development
elaborate different business growth strategies			
Appraise the scope and objectives of functional areas of business and their integration			
Apply engineering economics principles for evaluation of business			
Identify several ways in which financial accounting information is used to make business decisions			

			Identify appropriate sources of finance and financial institutions
PE I Biomechanics	ME3121		Apply mechanics of material in medicine.
			Apply principles of dynamics in circulatory system by using biological properties
			Model anatomical systems in to mechanical system and perform force analysis
			Select appropriate bio-materials based on functional requirement
			Investigate bio-mechanical aspects of accidents
			Discuss use of several bio-instruments
PE I Material Handling Equipment Design	ME3141		Describe Material handling system.
			Select suitable material handling system for different applications.
			Design Hoists, Cranes and their components
			Design of load lifting attachments
			Choose the systems and Equipments used for Material Storage
			Review of Material Handling / Warehouse Automation and Safety considerations
PE I World Class Manufacturing	ME3201		Illustrate relevance and basics of World Class Manufacturing.
			Relate factors of competitiveness and performance measures based on which, global manufacturing success is bench marked.
			Explain the different systems and tools for world class manufacturing
			Discuss the role of human resource in world class manufacturing strategy formulation
			Design and develop a roadmap to achieve world class manufacturing status.
			Describe the role of total quality management in taking a firm to the world class level.
PE I Recycling and Regeneration Technology	ME3221		Recycle the waste properly and use it as resource.
			Design the system for overall recycle process.
			Describe various processes to recover the energy from waste
			Explain the process of recovering industrial resources from waste effluents
Machine design Lab	ME3521		Explain identification, collection and separation method for recover various materials, plastics from waste
			Design spur and helical gears under beam strength and wear strength criteria.
			Apply principles of interaction of materials processing and design.
			Select rolling contact bearing.
Advanced Machining Lab.	ME3541		Prepare production Drawing using AutoCAD / CATIA, etc.
			Write and explain CNC program.
			Describe CNC Turning and Milling Machines.
			Simulate Taper Turning, Step Turning and Threading CNC Programs.
			Simulate CNC Milling Program for surface finishing, drilling and threading.
			Demonstrate CNC EDM Machine.
IC Engine lab	ME3561		Enter program into CNC Machine, perform Set-up operation and execute it
			Recognize the various parts, systems of IC engine, and disassemble an IC engine.
			Perform various tests on different engines; plot various operating characteristics and compare it with standards.

			Demonstrate and differentiate between fuel system of SI and CI engines.
	Metrology, Quality Control, and Measurement lab	ME3581	Use Vernier Calliper, 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 flatness and straightness using Auto collinometer
			Measurement of screw thread parameter using floating carriage micrometer.
			construct the X bar, R chart, P chart to check the process capability
			Use load cell for measurement of Force.
			Select suitable tachometer for speed measurement.
			Discriminate temperature measuring devices using different criteria's.
			Conduct calibration of thermocouple.
			Conduct an experiment on dead weight pressure gauge tester.
	Mini Project-II/ EPICS project	ME3601	Identify real-life problems faced by local community related to mechanical engineering and identify the areas for innovation.
			Conduct literature review related to identified problem.
			Acquire the requisite skills to deal with social issues through innovative and sustainable solutions considering technical, safety and environmental issues.
			Show ability to participate in team discussions and share responsibilities while carrying out the project work / assignments.
			Develop communication, analytical thinking and decision making skills to become more effective and creative leaders.
			Write technical report and give oral presentation.
	Field Training	ME3621	Demonstrate the use, interpretation and application of an appropriate international engineering standard in a specific situation.
			Analyze a given engineering problem, identify an appropriate problem solving methodology, implement the methodology and propose a meaningful solution.
			Apply prior acquired knowledge in problem solving.
			Recognize various modelling, analysis and validation techniques, manufacturing tools and processes, management techniques, Professional ethics adopted at industries.
			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.	
		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 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
	Additive Manufacturing	ME4291	Participate in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success.
			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.
	PE III CIMS	ME4311	Identify the Different methods for Post-processing of AM parts
			Recognize the Applications of AM in Automobile, Aerospace, and Bio-medical etc.
			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)			
Mechatronics Laboratory	ME4561	Analyze various computer integrated planning and control techniques.	
		Explain various computer aided quality control (CAQC) methods.	
		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 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
			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 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.
	ME4311 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.
	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 Mechanics Laboratory	ME4571	Use of transmission polariscope for measurement of 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	
			Analyze elasto-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.
				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

- Department Name :- Sciences & Humanities
- UG Program Name :- F. Y. B. Tech
- Vision and Mission :- NA

Sr. No.	Program Outcomes
1.	NA
2.	
3.	

Sr. No.	Program Specific Outcomes
1.	NA
2.	
3.	

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SH131	Engineering Physics	<p>1. Use the principles of interference, diffraction and polarization in thin reflecting films, diffraction gratings and polarimeter.</p> <p>2. Apply the knowledge of architectural acoustics for acoustically good halls and principle of magnetostriction and piezoelectric methods for production of ultrasound.</p> <p>3. Apply the Newton's laws of motion to calculate forces acting on objects.</p> <p>4. Describe the behavior of a damped and driven harmonic oscillator.</p> <p>5. Use the knowledge of semiconducting materials in semiconductor devices.</p>

				6. Explain the basics of LASER production and its applications
2.	I	<b>SH1053</b>	<b>Engineering Mathematics-I</b>	<ol style="list-style-type: none"> <li>1. Apply the properties of special functions to evaluate integral.</li> <li>2. Sketch the curve with full justification.</li> <li>3. Evaluate double integral and change the order of the integration.</li> <li>4. Evaluate area bounded between two curves, mass of Lamina, moment of inertia.</li> <li>5. Prove the results of partial differentiation.</li> <li>6. Apply partial differentiation for evaluating and proving the results based on Errors and approximations, maxima and minima.</li> </ol>
3.	I/II	<b>SH1132</b>	<b>Engineering Graphics</b>	<ol style="list-style-type: none"> <li>1. Determine the location and orientation of point, line, and plane with respect to reference planes to draw their projection.</li> <li>2. Develop the projection of various types of solids in various conditions.</li> <li>3. Develop section views and true shape section of various types of solids</li> <li>4. Identify the need of development of lateral surfaces and apply the same in engineering drawing.</li> <li>5. Develop orthographic views of an object to convert pictorial view into two-dimension (2D) view.</li> </ol>

				6. Develop isometric view to convert two-dimension (2D) view to pictorial view.
4.	I	SH187	<b>Engineering Physics Lab</b>	<ol style="list-style-type: none"> <li>1. Apply the theory of semiconductors to calculate band gap energy and carrier concentration</li> <li>2. Apply theory of interference and grating to calculate radius of curvature of plano convex lens and wavelength of light.</li> <li>3. Compare B-H curve for different ferromagnetic materials and measure hysteresis loss in it.</li> <li>4. Use ultrasonic interferometer to calculate velocity of ultrasound in given liquid.</li> <li>5. Use Laurent's half shade polarimeter to calculate specific rotation of optically active solution.</li> <li>6. Verify Newton's laws of motion and phenomena of resonance in forced oscillations.</li> </ol>
5.	I/II	SH1552	<b>Engineering Graphics Lab</b>	<ol style="list-style-type: none"> <li>1. Determine the location and orientation of point, line, and plane with respect to reference planes to draw their projection.</li> <li>2. Develop the projection of various types of solids in various conditions.</li> <li>3. Develop section views and true shape section of various types of solids</li> <li>4. Identify the need of development of lateral surfaces and apply the same in engineering drawing.</li> <li>5. Develop orthographic views of an object to convert pictorial view into two-dimension (2D) view.</li> <li>6. Develop isometric view to convert two-dimension (2D) view to pictorial view.</li> </ol>

6.	I	<b>SH1831</b>	<b>English Proficiency Lab I</b>	<ol style="list-style-type: none"> <li>1. Demonstrate reception skills of language.</li> <li>2. Communicate using oral and written modes.</li> <li>3. Make use of English language with grammatical accuracy.</li> <li>4. Articulate correctly the frequently used words using phonemic transcriptions.</li> <li>5.</li> </ol>
7.	I	<b>SH1582</b>	<b>Japanese Language Lab Level I</b>	<ol style="list-style-type: none"> <li>1. Demonstrate Japanese scripts through oral and written communication.</li> <li>2. Express themselves by using simple sentences and responses to questions.</li> <li>3. Demonstrate effective listening.</li> <li>4. Make use of Japanese etiquette</li> </ol>
8.	I	<b>SH1601</b>	<b>German Language Lab Level I</b>	<ol style="list-style-type: none"> <li>1. Make use of familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.</li> <li>2. Express him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.</li> <li>3. Interact in a simple way provided the other person talks slowly and clearly and is prepared to help.</li> <li>4. Make use of the basic grammar concepts correctly.</li> <li>5. Demonstrate reading and writing skills.</li> </ol>

9.	I	SH185	<b>Engineering practice Lab I</b>	<ol style="list-style-type: none"> <li>1. Acquire skills in basic engineering practice.</li> <li>2. Use of hand tools and power tools.</li> <li>3. Develop sheet metal model for specific application.</li> <li>4. Understand the various operations performed in machine shop.</li> <li>5. Perform different joining operations</li> <li>6. Perform pipe fittings operations.</li> </ol>
10.	I/II	SH189	<b>Engineering Exploration &amp; Design Project</b>	<ol style="list-style-type: none"> <li>1. Explain the role of an Engineer as a problem solver.</li> <li>2. Design engineering solutions to complex problems utilizing multi-disciplinary systems approach.</li> <li>3. Examine a given problem using process of engineering problem analysis.</li> <li>4. Build simple systems/prototypes using engineering design and development process.</li> <li>5. Analyze engineering solutions from ethical and sustainability perspectives.</li> <li>6. Apply basics of engineering project management skills in project development.</li> </ol>
11.	I/II	SH1033	<b>Engineering Chemistry</b>	<ol style="list-style-type: none"> <li>1. Relate to the basic concepts of Chemistry in Engineering.</li> <li>2. Select the correct instrumental techniques for the examination of materials.</li> </ol>



				<ol style="list-style-type: none"> <li>3. Examine water quality for industrial and domestic sector and suggest remedial measures.</li> <li>4. Describe construction, working and applications of batteries and fuel cells.</li> <li>5. Identify causes of corrosion and its remedial measures.</li> <li>6. Compare types and quality of fuels by different instruments and select the proper lubricant and lubrication method.</li> </ol>
12.	II	<b>SH1023</b>	<b>Engineering Mathematics-II</b>	<ol style="list-style-type: none"> <li>1. Use the concepts of matrices that serve as an essential basis for several computational techniques.</li> <li>2. Solve the differential equations by choosing proper method of solution.</li> <li>3. Solve the problems on orthogonal trajectories, simple electrical circuits, and heat flow by applying the methods of Ordinary Differential Equations.</li> <li>4. Use the relevant method for solving simultaneous algebraic linear equations.</li> <li>5. Apply the relevant numerical method for interpolating the polynomial.</li> <li>6. Apply appropriate numerical method to compute the solution of</li> </ol>

				ordinary differential equations.
13.	I/II	<b>SH1291</b>	<b>Electrical Engineering</b>	<ol style="list-style-type: none"> <li>1. Solve Magnetic circuits, D.C. and A.C. electric circuits</li> <li>2. Describe construction, working and application of transformers</li> <li>3. Describe construction, working and application of different types of commonly used rotating machines.</li> <li>4. Classify power converters on the basis of application.</li> <li>5. Suggest suitable capacity of wires, cables switchgear and illumination system for low-voltage electrical installations.</li> </ol>
14.	I/II	<b>SH133</b>	<b>Programming for Problem Solving</b>	<ol style="list-style-type: none"> <li>1. Explain the basic terminology and concepts of C programming language.</li> <li>2. Write Algorithm and draw flow chart for the given problem.</li> <li>3. Write a C Programs for given problems.</li> <li>4. Analyze the given C Program to remove the errors and predict the output.</li> </ol>
15.	I/II	<b>SH1532</b>	<b>Engineering Chemistry Lab</b>	<ol style="list-style-type: none"> <li>1. Examine the materials by using analytical instruments.</li> <li>2. Identify the quality of water for industrial and domestic purposes.</li> <li>3. Apply the knowledge of electrochemistry for design of various cells and batteries.</li> <li>4. Select proper Lubricant for different machines according to working condition.</li> <li>5. Inspect the quality of fuel.</li> </ol>

16.	I/II	<b>SH1791</b>	<b>Electrical Engineering Lab</b>	<ol style="list-style-type: none"> <li>1. Acquaint with the basic concepts and properties of electrical circuits and awareness about safety precautions.</li> <li>2. Select proper meter/s for measuring electrical quantities during experiments.</li> <li>3. Explain various electrical circuits (DC, AC) and magnetic circuits through laboratory practices.</li> <li>4. Demonstrate various power converter for desired application.</li> <li>5. Choose circuit breakers for specific application</li> </ol>
17.	I/II	<b>SH191</b>	<b>Programming for Problem Solving Lab</b>	<ol style="list-style-type: none"> <li>1. Describe orally the basic terminology and concepts of C programming language.</li> <li>2. Write an Algorithm and draw the flow chart for the given problem statement.</li> <li>3. Implement a 'C' programs to solve a given problem statement.</li> <li>4. Compile, execute and debug the 'C' programs to get correct answer.</li> </ol>
18.	II	<b>SH162</b>	<b>English Proficiency Lab II</b>	<ol style="list-style-type: none"> <li>1. Demonstrate writing skills through letters, circulars, notices, memos, and emails.</li> <li>2. Apply report writing skills.</li> <li>3. Organize message in appropriate structures.</li> </ol>

				4. Prepare job application addressing requirements of the post.
19.	II	<b>SH1661</b>	<b>Japanese Language Lab Level II</b>	<ol style="list-style-type: none"> <li>1. Converse in Standard Japanese to perform basic communicative tasks (e.g., exchange greetings/personal information, give time/directions/daily activities)</li> <li>2. Make use of Japanese vocabulary effectively.</li> <li>3. Demonstrate reading comprehension</li> </ol>
20.	II	<b>SH168</b>	<b>German Language Lab Level II</b>	<ol style="list-style-type: none"> <li>1. Understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.</li> <li>2. Express him/her and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.</li> <li>3. Interact in a simple way provided the other person talks slowly and clearly and is prepared to help.</li> <li>4. Make use of basic grammar concepts correctly.</li> <li>5. Demonstrate reading and writing skills.</li> </ol>
21.	II	<b>SH164</b>	<b>Engineering practice- Lab II</b>	<ol style="list-style-type: none"> <li>1. Make wooden job.</li> <li>2. Make Sheet metal job.</li> </ol>

				<p>3. Make job by various machining processes.</p> <p>4. Make job by joining processes.</p>
22.	II	<b>SH106</b>	<b>Engineering Physics</b>	<ol style="list-style-type: none"> <li>1. Apply the knowledge of architectural acoustics for acoustically good halls and the principle of magnetostriction and piezoelectric methods for the production of ultrasounds.</li> <li>2. Explain the Fundamentals of quantum mechanics and apply it to one dimensional motion of particles.</li> <li>3. Understand working principle of laser and optical fibre</li> <li>4. Use the knowledge of basics of semiconductors</li> <li>5. Use characteristics of semiconducting materials in semiconducting devices</li> <li>6. Select appropriate magnetic materials depending on its properties for various applications</li> </ol>
23.	II	<b>SH1512</b>	<b>Engineering Physics Lab</b>	<ol style="list-style-type: none"> <li>1. Apply the theory of semiconductors to calculate band gap energy and carrier concentration</li> <li>2. Apply theory of interference and grating to calculate radius of curvature of plano convex lens and wavelength of light.</li> <li>3. Compare B-H curve for different ferromagnetic materials and measure hysteresis loss in it.</li> <li>4. Determine resolving power of telescope and numerical aperture of optical fiber.</li> <li>5. Use ultrasonic interferometer to calculate velocity of ultrasound in given liquid.</li> </ol>

				6. Use Laurent's half shade polarimeter to calculate specific rotation of optically active solution.
<b>Open Elective Courses</b>				
24.	I/II	<b>SE1011</b>	<b>Basics of Electronics Engineering</b>	<ol style="list-style-type: none"> <li>1. Select basic electronic components and devices used for different electronic applications.</li> <li>2. Apply fundamentals of diode, transistor, OPAMP to build their applications.</li> <li>3. Compute the conversions of different number systems like Binary, Decimal, Hex, Oct.</li> <li>4. Simplify the logic expression using Boolean algebra &amp; Karnaugh Map.</li> </ol>
25.	I/II	<b>SE1511</b>	<b>Basics of Electronics Engineering Lab</b>	<ol style="list-style-type: none"> <li>1. Demonstrate use of various electronic components &amp; equipments for building applications.</li> <li>2. Build the circuits using Diode, Transistor Electronics Devices.</li> <li>3. Construct various applications using Operational Amplifier like Amplifiers.</li> <li>4. Test the basic logic gates, adders &amp; subtractors.</li> </ol>
26.	I/II	<b>SE1051</b>	<b>Basics of Civil Engineering</b>	<ol style="list-style-type: none"> <li>1. Apply fundamental knowledge of civil engineering.</li> <li>2. Identify building components and materials used in construction along with concepts of sustainability and safety of buildings.</li> </ol>

				<p>3. Use basic principles of planning in the building design and processes involved in the property transactions.</p> <p>4. Determine horizontal and vertical distances using modern surveying instruments.</p> <p>5. Describe various components of transportation system.</p>
27.	I/II	SE1551	<b>Basics of Civil Engineering Lab</b>	<p>1. Draw dimensioned sketch/plan of building.</p> <p>2. Plan building using principles and bye laws.</p> <p>3. Perform horizontal and vertical measurement.</p> <p>4. Use modern surveying techniques.</p>
28.	I/II	SE1071	<b>Thermodynamics</b>	<p>1. Apply thermodynamics principles to mechanical engineering applications</p> <p>2. Describe entropy, change in entropy and increase of entropy principle.</p> <p>3. Differentiate between available and unavailable energy with examples.</p> <p>4. Apply mathematical fundamental to study the properties of steam, gas and gas mixtures.</p>
29.	I/II	SE1571	<b>Thermodynamics Lab</b>	<p>1. Conduct test to find properties of oils</p>

				<ol style="list-style-type: none"> <li>2. Explain boilers and mountings</li> <li>3. Estimate the properties of steam, interpret and comment on the results.</li> </ol>
30.	I/II	SE1091	<b>Engineering Materials</b>	<ol style="list-style-type: none"> <li>1. Illustrate stress strain diagram for different materials.</li> <li>2. Explain evaluation of mechanical properties using destructive testing methods.</li> <li>3. Select suitable non destructive testing method for flaw detection in component.</li> <li>4. Select suitable material for different components.</li> </ol>
31.	I/II	SE1591	<b>Engineering Materials Lab</b>	<ol style="list-style-type: none"> <li>1. Illustrate stress strain diagram for different materials.</li> <li>2. Use Rockwell Hardness testing machine to measure hardness of material.</li> <li>3. Measure impact strength of the metals</li> <li>4. Determine fatigue strength of metals.</li> <li>5. Determine flaws in the component using non destructive testing methods.</li> <li>6. Explain working principle of emission spectrometer.</li> </ol>
32.	I/II	SE1131	<b>Green Technology</b>	<ol style="list-style-type: none"> <li>1. Explain the basic principles of green chemistry and ecology.</li> <li>2. Discuss different waste processing techniques.</li> <li>3. Describe various Green innovations for sustainability.</li> </ol>



				<p>4. Discuss concept of green buildings and green management.</p> <p>5. Prepare energy and water budget for a building.</p>
33.	I/II	SE1631	<b>Green Technology Lab</b>	<p>1. Explain the concept of green technology/green building.</p> <p>2. Prepare energy and water budget for a building.</p> <p>3. Design rainwater harvesting for a small catchment area.</p> <p>4. Analyze air quality by using HC/CO analyzer.</p>
34.	I/II	SE143	<b>Basics of Mechanical Engineering</b>	<p>1. Explain different power generation systems.</p> <p>2. Select appropriate energy conversion device for the given application.</p> <p>3. Classify vehicles on the basis of different parameters.</p> <p>4. Compare two stroke and four stroke IC engines.</p> <p>5. Describe different transmission devices in a given system.</p> <p>6. Choose suitable materials and manufacturing processes for a given application.</p>
35.	I/II	SE165	<b>Basics of Mechanical Engineering Lab</b>	<p>1. Explain the different components of power generation systems.</p>

				<ol style="list-style-type: none"> <li>2. Identify the systems and components of vehicle.</li> <li>3. Distinguish between two stroke and four stroke engines.</li> <li>4. Carry out day to day life maintenance of machines.</li> <li>5. Explain the different components of power generation systems.</li> </ol>
36.	I/II	SE145	<b>Creativity, Design Thinking and Entrepreneurial Mindset</b>	<ol style="list-style-type: none"> <li>1. Learn structured approach to creativity, problem identification and problem solving in a new venture context</li> <li>2. Apply design thinking approach to identify innovation opportunities and develop solutions</li> <li>3. Identify, validate and define specific innovation opportunities through Jobs-to-be-Done methodology</li> <li>4. Develop mindset of a successful entrepreneur</li> </ol>
37.	I/II	SE167	<b>Creativity, Design Thinking and Entrepreneurial Mindset Lab</b>	<ol style="list-style-type: none"> <li>1. Learn structured approach to creativity, problem identification and problem solving in a new venture context.</li> <li>2. Apply design thinking approach to identify innovation opportunities and develop solutions.</li> <li>3. Develop mindset of a successful entrepreneur.</li> </ol>

- **Department Name :- Computer Science & Information Technology**
- **UG Program Name :- Computer Science & 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.

**Program Educational Objectives (PEOs)**

- Graduates will pursue successful career as IT professionals, researcher and entrepreneur with high degree of professionalism and values.
- Graduates will demonstrate independent thinking, professionalism and function effectively in team oriented and open ended activities in industry, business and society.
- Graduates will demonstrate adaptation to rapidly changing computer technology through continuous learning leading to self-improvement.

Sr. No.	Program Outcomes
25.	<b>PO1: Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and IT engineering specialization to the solution of complex engineering problems.
26.	<b>PO2: Problem analysis:</b> Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
27.	<b>PO3: Design/Development of solutions:</b> 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.
28.	<b>PO4: Conduct investigations of problems:</b> Use fundamental knowledge and engineering skills including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

29.	<b>PO5: Modern tool usage:</b> 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.
30.	<b>PO6: The engineer and society:</b> 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.
31.	<b>PO7: Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
32.	<b>PO8: Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
33.	<b>PO9: Project management and finance:</b> 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
34.	<b>PO10: Life-long learning:</b> 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.
35.	<b>PO11: Project management and finance:</b> 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
36.	<b>PO12: Life-long learning:</b> 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
7.	<b>PSO1: Domain Specific Knowledge:</b> Apply the relevant methods and techniques to develop solutions in the domains of automation and intelligent systems.
8.	<b>PSO2: Software Product Development:</b> Apply the design and deployment principles to deliver a quality software product for the success of business of varying complexity.

### 2019-20 Sem-I

Sr. No.	Semester	Course Code	Course Name	Faculty	Course Outcome
<b>Sem-I</b>					
<b>SY</b>					
	Sem-I	IT2012	Discrete Mathematics	Mrs. SavitaPatil	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Simplify and evaluate basic logic statements including all logical connectives using the properties of logic.</li> <li>2. Apply the concepts in discrete data structures such as sets, relations and functions to solve the problems.</li> <li>3. Solve examples using algebraic structures.</li> <li>4. Prove the properties, which are based on lattices.</li> <li>5. Apply elementary combinatory to counting problems.</li> <li>6. Apply graph theory concepts to solve problems of connectivity.</li> </ol>
	Sem-I	IT2032	Computer Network	Ms. Prachi Kushire	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Describe the various network components and topologies.</li> </ol>

					<ol style="list-style-type: none"> <li>2. Discuss the concepts, services, protocols and algorithms used in Computer Networks.</li> <li>3. Write the terminology and client-server programs using Berkeley socket programming.</li> <li>4. Solve mathematical problems in computer networks.</li> <li>5. Compare the different services, protocols and algorithms used in Computer Networks</li> </ol>
Sem-I	IT2052	Data Structures and Algorithm	Mr. Ravindra Mandale	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Describe the basic terminologies of data structures and algorithms</li> <li>2. Write algorithms for operations to be performed on data structures</li> <li>3. Demonstrate the working of stack, queue, linked list, tree and graph</li> <li>4. Compare static and dynamic representations of linear and non-linear data structures</li> </ol> <p>Choose appropriate data structures while developing solution to the problem</p>	
Sem-I	IT2072	Digital Electronics	Mr. Pralhad Gavali	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Convert the number from one system to another and vice versa.</li> <li>2. Explain the basic gates and realize it using universal gate.</li> <li>3. Minimize the given expression using Boolean algebra and Karnaugh Map</li> <li>4. Draw a circuit diagram for combinational logic and analyze its properties</li> <li>5. Design the sequential logic circuits.</li> <li>6. Describe the 8085 architecture, Identify the instruction set and apply it in assembly language programming using modern tools.</li> </ol>	
Sem-I	IT2092	Computer Network Lab	Ms. Prachi Kushire	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Implement client server application using Unix Socket programming</li> <li>2. Demonstrate communication protocols, framing methods, error detecting and correcting methods.</li> <li>3. Implement a program to demonstrate routing algorithms.</li> <li>4. Solve problems based on network addressing.</li> <li>5. Demonstrate the use of various networking tools and techniques</li> </ol> <p>Understand the network hardware and software used for network design.</p>	
Sem-I	IT2112	Data Structures and Algorithm Lab	Mr. Ravindra Mandale	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Describe the basic terminologies of data structures and algorithms</li> <li>2. Write algorithms for operations to be performed on data structures</li> <li>3. Implement stack, queue, linked list, tree and graph data structures in C language</li> <li>4. Compare static and dynamic representations of linear and non-linear data structures</li> </ol>	

					5. Choose appropriate data structures while developing solution to the problem
Sem-I	IT2132	Digital electronics Lab	Mr. Pralhad Gavali	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Verify the basics of all logic gates using IC Trainer Kit.</li> <li>2. Demonstrate the working of Combinational circuits on IC Trainer Kit.</li> <li>3. Demonstrate the working of Sequential circuits on IC Trainer Kit.</li> <li>4. Implement the 8085 assembly language program using TASM or simulator.</li> </ol>	
Sem-I	IT2152	Object Oriented design and programming lab	Miss. Pragati Sawant	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Describe elements and features object oriented Programming.</li> <li>2. Implement various object oriented programming concept.</li> <li>3. Develop and design a solution for a given application (Problem statement) using OOP.</li> <li>4. Apply Pointers, Functions, Files, Template and Exception handling, techniques for dealing variety of programs and in application (problem statement).</li> </ol>	
<b>TY</b>					
Sem-I	IT3011	Operating System	Mr. Dadaso Mane	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Elaborate the basic structure of operating systems and key characteristics of different types of operating system.</li> <li>2. Illustrates the benefits of the multiprocessing, concurrency in operating systems.</li> <li>3. Explain the cause and effect related to deadlocks and analyze them related to common circumstances in operating systems.</li> <li>4. Discuss issues involved in the main memory management and file management.</li> <li>5. Demonstrate the commands of UNIX and implement shell programming.</li> </ol>	
Sem-I	IT3031	Computer Algorithm	Miss. Pragati Sawant	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Understand and apply the mathematics needed for the analysis of algorithms.</li> <li>2. Apply algorithm for real life problems like change making problem, shortest path, and minimum spanning tree etc.</li> <li>3. Compute asymptotic notations to determine and analyze the performance of algorithm.</li> <li>4. Identify appropriate algorithm design strategy that is applicable to a given contextual problem.</li> <li>5. Implement and compare various searching and sorting algorithms.</li> </ol>	

	Sem-I	IT3051	Internetworking Protocol	Mrs.Ashwini Patil	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Implement the client server programs for network services.</li> <li>2. Explain IPv6 Addressing, DHCP and domain name systems</li> <li>3. Demonstrate remote login and file transfer protocols</li> <li>4. Identify the different types World Wide Web documents.</li> <li>5. Examine packet capturing, analyzing and simulation tools</li> </ol>
	Sem-I	IT3071	Database Engineering	Mr. Kedar Kulkarni	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Discuss nature and purpose of the database system and storage structure.</li> <li>2. Sketch E-R diagram and design database according to organization requirement.</li> <li>3. Write and estimate cost of SQL query for various operations like retrieval, insertion of data, join etc.</li> <li>4. Apply concepts of indexing on database.</li> <li>5. Describe concurrent execution of transaction.</li> </ol>
	Sem-I	IT3511	Java Programming Laboratory	Mr. Ravindra Mandale	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Understand the fundamentals of programming such as variables, execution, methods, etc.</li> <li>2. Implement object oriented features of java.</li> <li>3. Use Netbeans IDE to develop desktop applications.</li> <li>4. Implement file handling &amp; multi-threaded programs in java.</li> <li>5. Implement Collection classes, Networking and DB connectivity.</li> </ol>
	Sem-I	IT3531	Operating System Laboratory	Mr. Dadaso Mane	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Develop an ability to use the basic and advanced commands in UNIX platform.</li> <li>2. Demonstrate the use of simple and advanced filters of UNIX system using regular expression.</li> <li>3. Develop an ability to write and execute shell scripts and shell programs for defined problems.</li> </ol>
	Sem-I	IT3551	Internetworking Protocol Laboratory	Mrs.Ashwini Patil	After successful completion of the course, students will be able to <ol style="list-style-type: none"> <li>1. Implement the client server program to illustrate the concept of s</li> <li>2. Configure DNS server and study of DNS Utilities</li> <li>3. Demonstration and implementation of TFTP protocol for File tra</li> <li>4. Study and implementation of SMTP commands to send a mail ar</li> <li>5. Demonstrate the Packet Capturing and Analyzing tool and simul</li> </ol>

Sem-I	IT3571	Database Engg. Laboratory	Mr. Kedar Kulkarni	<p>After successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Sketch E-R diagram of database of given database schema.</li> <li>2. Write SQL query for various operations like retrieval, insertion and manipulation of data etc.</li> <li>3. Implement PL/SQL cursor, procedure/function and trigger.</li> <li>4. Apply hashing mechanism to build hash index file on given records.</li> <li>5. Implement a program to connect database to application program.</li> </ol>
<b>BTech.</b>				
Sem-I	IT4152	Principal & Practices for IT Management	Mr. Moshin Mulla	<p>On completion of this course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Prepare the detailed plan for various IT projects.</li> <li>2. Differentiate an IT projects using various project network methods.</li> <li>3. Discuss the TQM &amp; ISO related concepts in IT Project Management.</li> <li>4. Use the Modern approaches in IT Project management</li> <li>5. Illustrate the importance of project procurement management &amp; Stakeholder Management.</li> </ol>
Sem-I	IT4032	Parallel Computing	Ms. Minakshi Patil	<p>On completion of this subject the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Summarize parallel programming technique and compare it with Sequential Programming</li> <li>2. Write parallel programs using MPI, Open MP, CUDA etc.</li> <li>3. Describe CUDA architecture with their memory structure.</li> <li>4. Compare parallel matrix algorithm</li> <li>5. Explain Parallel Sorting algorithms</li> </ol>
Sem-I	IT4052	Internet of Things	Mr. Manoj Patil	<p><b>Course Learning Outcomes:</b></p> <p>On completion of this course the student will be able to:</p> <ol style="list-style-type: none"> <li>4. Explain the basic terminology and concepts of IoT</li> <li>5. Identify the different IoT Platforms, Communication Technologies and Protocols</li> <li>6. Identify the security issues, challenges in IoT</li> <li>7. Implement program the IoT based application with Raspberry Pi3, Arduino kits</li> <li>8. Design the IoT solution for real word problems.</li> </ol>



Sem-I	IT4072	Software Testing & Quality Assurance	Mr. Dadaso Mane	<b>Course Learning Outcomes:</b> On completion of this course the student will be able to: <ol style="list-style-type: none"> <li>1. Describe software testing fundamentals.</li> <li>2. Explain different software testing types.</li> <li>3. Employ correct testing terminology throughout the testing process.</li> <li>4. Make use of modern automation tools for testing a given program.</li> <li>5. Assess quality attributes of the problem using software quality standards.</li> </ol>
Sem-I	IT4092	Big Data Program Elective – I	Mr. Akhilesh Mokashi	On completion of this subject the student will be able to: <ol style="list-style-type: none"> <li>1. Recognize need of Big data Technologies.</li> <li>2. Write program using Map Reduce framework.</li> <li>3. Describe Hadoop and its component</li> <li>4. Write the queries using HIVEQL</li> <li>5. Use Hadoop ecosystem like Pig and Hive to build application.</li> </ol>
Sem-I	IT4112	Cloud Computing Program Elective – I	Dr. Amol Adamuth	On completion of this subject the student will be able to: <ol style="list-style-type: none"> <li>1. Understand the technological changes in computing technologies.</li> <li>2. Compare the architectures and service &amp; deployment models of cloud computing.</li> <li>3. Explore the need and importance of virtualization technologies.</li> <li>4. Explore and identify different cloud platforms.</li> <li>5. Explore the business issues and applications of cloud computing in different sectors.</li> </ol>
Sem-I	IT4572	Free and open Source Lab	Mrs. Savita Patil	On completion of this subject the student will be able to: <ol style="list-style-type: none"> <li>1. Implement basic concepts of PHP.</li> <li>2. Develop dynamic web application using PHP.</li> <li>3. Build web application using Laravel MVC framework.</li> <li>4. Implement Basic concepts of Python.</li> </ol>
Sem-I	IT4592	Advance Java Laboratory	Mrs. J.P.Rankhambe	On completion of this subject the student will be able to: <ol style="list-style-type: none"> <li>1. Use Bootstrap to make web application responsive.</li> <li>2. Build fast and interactive web application using JQuery and Angular JS2</li> <li>3. Develop dynamic, server-side applications using Servlets.</li> <li>4. Develop dynamic, server-side applications using JSP.</li> </ol>

					5. Build web applications using Hibernate framework.
	Sem-I		Project-I	Mr. Akhilesh Mokashi	<ol style="list-style-type: none"> <li>1. To demonstrate ability of analysis, design and implementations.</li> <li>2. To improve ability to work in teams.</li> <li>3. To finalize real life problems to provide software based solutions.</li> <li>4. Design and analyze the project and manage the time involved to complete the project within given time constraints by using modern IT tools.</li> <li>5. Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.</li> </ol>

### 2019-20 Sem-II

Sr. No.	Semester	Course Code	Course Name	Faculty	Course Outcome
<b>Sem-II</b>					
<b>SY</b>					
	Sem-II	SH2042	Engg. Mathematics-III	Prof.M.D. Khedekar	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Compute Karl Pearson's Product moment correlation Coefficient and fit the lines of regression.</li> <li>2. Compute Discrete probability distribution, Continuous probability distributions and Joint probability distributions.</li> <li>3. Apply specific probability distributions to real-life examples.</li> <li>4. Compute the Mathematical formulas for the given fuzzy set.</li> <li>5. Prove additional properties of alpha-cuts and use extension principle to fuzzy sets.</li> <li>6. Apply extension principle to fuzzy arithmetic and solve fuzzy equations.</li> </ol>
	Sem-II	IT2022	Automata Theory	Ms.P.T.Sawant	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Predict the regular expression for given language</li> <li>2. Design computational models for given language</li> <li>3. Parse the given string using top down &amp; bottom up parsing</li> <li>4. Construct the CFG for given language</li> <li>5. Prove the properties of regular language and context free language</li> </ol>
	Sem-II	IT2042	Software Engineering	Mr.M.A.Patil	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Describe fundamental concepts in software engineering and project management</li> <li>2. Practice software process models for the undertaken software problems</li> </ol>

					<ol style="list-style-type: none"> <li>3. Use modern tools to model function-oriented and object oriented design</li> <li>4. Compare black-box testing and white-box testing</li> <li>5. Apply the project management concepts for the undertaken software problems</li> <li>6. Illustrate concepts of project monitoring and control in software development</li> </ol>
	Sem-II	IT2 062	Computer Organization	Mr. P.R. Gavali	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Describe the concepts of computer organization</li> <li>2. Identify the parameters to be considered that effect the performance of the computer</li> <li>3. Evaluate the performance of the system based on different organization technique.</li> <li>4. Inspect the different organization techniques like memory organization, i/o organization, pipelining etc</li> <li>5. Demonstrate the working of different computer organization techniques.</li> </ol>
	Sem-II	CE2 262	Engineering Mechanics	Mr. R. K. Patil	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Identify<sup>3</sup> various forces and their effects, to analyze real life problems.</li> <li>2. Analyze engineering problems applying conditions of equilibrium.</li> <li>3. Determine Centroid &amp; Moment of Inertia of the geometrical plane lamina</li> </ol> <p>Apply fundamental concepts of Kinematics and Kinetics to analyze practical problems.</p>
	Sem-II	IT2 082	Python Lab	Ms.P.T.Sawant	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Explain the concepts in python.</li> <li>2. Write program using python basics.</li> <li>3. Use file handling and database handling using python.</li> <li>4. Use object oriented programming with classes using python.</li> </ol>
	Sem-II	CE2 282	Engineering Mechanic Lab	Mr. R. K. Patil	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Compare coefficient of friction of various surfaces in contact.</li> <li>2. Correlate theoretical and practical results of support reactions and Centroid of plane lamina.</li> <li>3. Verify law of polygon of forces, law of triangle of forces and principle of moment</li> </ol>
	Sem-II	SH2 042	Engg. Mathematics-III	Prof.M.D. Khedekar	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>7. Compute Karl Pearson's Product moment correlation Coefficient and fit the lines of regression.</li> <li>8. Compute Discrete probability distribution, Continuous probability distributions and Joint probability distributions.</li> <li>9. Apply specific probability distributions to real-life examples.</li> <li>10. Compute the Mathematical formulas for the given fuzzy set.</li> <li>11. Prove additional properties of alpha-cuts and use extension principle to fuzzy sets.</li> </ol>

					<b>12.</b> Apply extension principle to fuzzy arithmetic and solve fuzzy equations.
<b>TY</b>					
	Sem-II	IT3 021	System Programming	Mrs.A.B.Patil	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Understand the concept of language processors.</li> <li>2. Design and understand one pass and two pass assembler.</li> <li>3. Discuss the concept of macro &amp; design macro preprocessor.</li> <li>4. Discuss the concept of the compiler, interpreter, linker &amp; loader.</li> <li>5. To study the different open source system software's.</li> </ol>
	Sem-II	IT3 041	Cryptography and Network Security	Mrs.S.P.Patil	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Apply number theory to provide the security solutions.</li> <li>2. Analyze different methods of Data Encryption and Decryption; their advantages &amp; limitations.</li> <li>3. Comprehend the needs &amp; techniques of Message authentications and Digital Signatures.</li> <li>4. Discuss different security attacks &amp; security solutions for e-mail &amp; web applications.</li> </ol>
	Sem-II	IT3 061	Object Oriented Modeling and Design	Mr.D.T.Mane	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Describe concepts of Object, dynamic &amp; functional modeling.</li> <li>2. Classify types of modeling using advanced concepts in dynamic &amp; functional.</li> <li>3. Design &amp; use various concepts of OMT technology.</li> <li>4. Design &amp; implement using structural modeling, behavioral modeling &amp; architectural modeling in UML.</li> </ol>
	Sem-II	IT3 521	Mobile Application Development Laboratory	Mr.R.J.Mandale	After successful completion of the course, students will be able to, <ol style="list-style-type: none"> <li>1. Set up mobile application development environment with Android SDK to be used with Eclipse IDE.</li> <li>2. Design User Interfaces (UIs) using controls, layout managers, menus and dialogs.</li> <li>3. Implement activities, services, content providers, broadcast receivers in Android applications.</li> <li>4. Use Preferences, SQLite for database storage, Media Player, and telephony APIs in android applications.</li> <li>5. Perform testing, packaging of mobile applications and deploy Android applications to emulators and physical devices.</li> </ol>

Sem-II	IT3 541	C# .Net Laboratory	Mr.K.S.Kulkarni	After successful completion of the course, students will be able to, 1. Understand .NET framework & fundamentals. 2. Implement object oriented concept in C#. 3. Develop desktop applications & Multi-threaded programs in C#. 4. Implement ADO.NET concept in C#. 5. Analyze the difference between C# and other programming languages.
Sem-II	IT3 561	Mini Project –II Laboratory	Mr. P.R. Gavali	After successful completion of the course, students will be able to, 1) To demonstrate ability of analysis, design and implementations. 2) To improve ability to work in teams. 3) To take real life problems and provide software based solutions for them.
<b>BTech.</b>				
Sem-II	IT4 022	Soft computing (PE-II)	Dr.A. C. Adamuthe	After successful completion of the course, students will be able to, 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.
Sem-II	IT4 042	Business Intelligence (PE-II)	Ms. J. P. Rankhambhe	After successful completion of the course, students will be able to, 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.
Sem-II	IT4 122	Cyber law and Forensics (PE-III)	Mr. M.N. Mulla	After successful completion of the course, students will be able to, 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.
	Sem-II	IT4 542	R Programming Program Elective Laboratory	Ms. J. P. Rankhamb e	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. Understand the nuances of programming with R and its implementation for Data Science and Advanced Big Data Analytics.</li> <li>2. Install RStudio and work on R interface</li> <li>3. Learn the basics of R programming including objects, classes, vectors, attributes etc.</li> <li>4. Install various packages and work effectively in the R environment</li> <li>5. Become proficient in writing a fundamental program and perform analytics with R</li> </ol>
	Sem-II	IT4 582	Project Phase II	Mr.A. M. Mokashi	<p>After successful completion of the course, students will be able to,</p> <ol style="list-style-type: none"> <li>1. To demonstrate ability of analysis, design and implementations.</li> <li>2. To improve ability to work in teams.</li> <li>3. To finalize real life problems to provide software based solutions.</li> <li>4. Design and analyze the project and manage the time involved to complete the project within given time constraints by using modern IT tools.</li> <li>5. Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.</li> </ol>

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<b>Department Name:</b>	<b>Department of Management Studies</b>
<b>PG Program Name:</b>	<b>Master of Business Administration</b>
<b>Vision :</b>	Achieving excellence in academics and research to develop globally competent and socially responsible managers.
<b>Mission</b>	
<b>1</b>	To leverage innovation and excellence in academic design, delivery and assessment to ensure holistic development of students for employability, entrepreneurship and higher education.
<b>2</b>	To design and keep the curricula updated, based on changing needs of industry and society worldwide.
<b>3</b>	To build and maintain world-class infrastructure, for sustained learning, development and research.
<b>4</b>	To provide an environment that encourages creativity, analysis and critical thinking.
<b>Sr. No.</b>	<b>Program Outcomes</b>
<b>1</b>	PO1: Apply knowledge of management theories and practices to solve business problems.
<b>2</b>	PO2: Foster Analytical and critical thinking abilities for data-based decision making.
<b>3</b>	PO3: Ability to develop Value-based Leadership ability.
<b>4</b>	PO4: Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business.
<b>5</b>	PO5: Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.
<b>6</b>	PO6: Be capable of self-education and clearly understand the value of



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	lifelong learning.
7	PO7: Be familiar with modern statistical and software tools to analyze business problems.
8	PO8: To examine critically for self-assessment and take corrective measures accordingly without external feedback.
<b>Sr. No.</b>	<b>Program Specific Outcomes</b>
1	NA



  
**HOD-DMS**  
**RIT**



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Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	Semester I	MGC1011	Principles of Management	1 Interpret classical & modern theories of management. 2 Apply functions of management 3 Communicate effectively about management decisions. 4 Analyze recent trends in management case studies.
2	Semester I	MGC1031	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 and governance issue that hinder the development 5. Analyse the sectoral development and policies initiated by the governments to improve.
3	Semester I	MGC1051	Financial Accounting and Analysis	1 Comprehend the basic concepts, practices and need of financial accounting. 2. Apply accounting information as a tool for solving managerial problems. 3. Describe the roles of financial reporting and tools of financial statement analysis. 4 Analyse the financial statements for effective decision-making.
4	Semester I	MGC1071	Legal & Business Environment	1. Develop an understanding about micro & macro elements of business environment. 2 To analyse the major and minor factors affecting the functioning of business 3 To provide an overview of important laws that have a bearing on the conduct of business in India. 4 Analyse the international environment and strategies adopted by firms to expand globally. 5 Analyse the dynamics of business environment and its impact on the conduct of business.
5	Semester I	MGC1091	Marketing Management	1 Discuss Core concept of marketing and the role of marketing in business and society. 2 Develop marketing strategies based on product, price, place and promotion 3 Analyse marketing problems and provide

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				solution based on a critical examination of marketing information.
6	Semester I	MGC1111	Organizational Behaviour	<ol style="list-style-type: none"> <li>1. After successful completion of the course, students will be able to</li> <li>2 Analyse the conceptual anchors of Organizational behavior</li> <li>3 Analyse individual human behaviour using organizational behaviour models.</li> <li>4 Demonstrate the group dynamics and its applicability</li> <li>5 Explain organizational change and culture effect on working relationships</li> <li>6 Apply various leadership styles and conflict management strategies used in organizations</li> </ol>
7	Semester I	MGC1131	Quantitative Analysis	<ol style="list-style-type: none"> <li>1. Apply basic mathematical and statistical tools.</li> <li>2 Summarize data visually and numerically</li> <li>3 Demonstrate analytical skill for solving business problems.</li> </ol>
8	Semester I	MGC1151	Indian Ethos and Business Ethics	<ol style="list-style-type: none"> <li>1 Interpret the variable values in morality</li> <li>2 Comprehend and practice the way of righteousness in the Indian mythological literature</li> <li>3 Propose strategies for maximizing personal growth and productivity of employees</li> <li>4 Apply value based management and ethical practices in all functional areas of management</li> </ol>
9	Semester I	MGC1171	Business Communication	<ol style="list-style-type: none"> <li>1 To write business letters in a proper, formal format</li> <li>2 To demonstrate the methods of oral presentation both in a formal and informal environment</li> <li>3 To review the importance of communication relative to securing employment, with emphasis on using both verbal and non-verbal communication and their impact</li> <li>4 To prepare the student with the communication tools-verbal, non-verbal and written-and the practical applications inherent in each</li> </ol>
10	Semester I	MGC1191	Microsoft Office & Advanced Excel	<ol style="list-style-type: none"> <li>1 Customize the formatting of spreadsheet in Excel.</li> <li>2 Protect data in worksheets &amp; workbooks.</li> <li>3 Design the structure of various template</li> <li>4 Consolidate &amp; analyze data from multiple sheets &amp; create reports.</li> </ol>
12	Semester II	MGC1021	Corporate Finance	<ol style="list-style-type: none"> <li>1 Discuss important aspects of financial management that can help an entity to operate more effectively.</li> <li>2 Identify the sources of finance and calculate the</li> </ol>

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				<p>cost of capital for effective decision-making.          3 Apply capital structure theories and leverage analysis to frame optimal capital structure.          4 Evaluate investments proposals by applying capital budgeting techniques          5 Estimate working capital requirement for solving managerial problems</p>
13	Semester II	MGC1041	Operations Management	<p>1 Understand fundamentals of operations management in a firm.          2 Taking decisions related to facility locations &amp; layout.          3 Analyse different design aspects relating to product and processes development.          4 Apply various inventory control models to manage inventory cost.          5 Develop basic understanding of modern practices in operations management.</p>
14	Semester II	MGC1062	Human Resource Management	<p>1. Effectively manage and plan key human resource functions within organizations          2 Identify and analyze problems in the field of HRM and provide innovative solutions          3 Appreciate the implications of increasing globalization for the management of human resources          4 Evaluate and implement the new trends in HRM</p>
15	Semester II	MGC1082	Business Research Methods	<p>1 Understand and apply the major types of research designs          2 Formulate clearly defined research questions          3 Analyse and summarise key issues and themes from existing literature          4 Evaluate and conduct research          5 Understand the ethical issues associated with the conduct of research</p>
16	Semester II	MGC1102	Managing for Sustainability	<p>1. Demonstrate a multi –stakeholder perspective in viewing CSR issues.          2 Analyse the impact of CSR implementation on corporate culture.          3 Evaluate the concept of corporate governance.          4 Analyse the main factors and structures of corporate governance and show how their interaction and functioning differs across national economies.          5 Discuss open issues concerning the future evolution of corporate governance in the context of globalization.          6 Explain the role and significance of management information systems in business.</p>

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				<p>7 Apply the decision support tools of information system to solve business problems.</p> <p>8 Identify the causes of information system success and failure.</p>
17	Semester II	MGC1122	Management Information System	<p>1. Explain the role and significance of management information systems in business.</p> <p>2. Apply the decision support tools of information system to solve business problems.</p> <p>3. Identify the causes of information system success and failure.</p> <p>4. Implement the information system in various functional areas of management</p>
18	Semester II	MGC1142	Strategic Management	<p>1. Comprehend the basic concepts and principles of strategic management</p> <p>2. Analyze the competitive situation and strategic dilemma in dealing with dynamic business environment</p> <p>3. Demonstrate the knowledge and abilities in formulating strategies and strategic plans.</p> <p>4. Evaluate challenges faced by managers in implementing and evaluating strategies based on the nature of business, industry, and cultural differences.</p>
19	Semester II	MGC1162	International Business	<p>1. Describe the foundation of international business.</p> <p>2. Discuss the business operations of international organizations and multinational corporations.</p> <p>3. Analyze forms of foreign involvement.</p> <p>4. Discuss and apply international trade theory.</p>
20	Semester II	MGC1182	Soft core (General Aptitude Skills)	<p>1. Evaluate critically key issues concerns with real life situation.</p> <p>2. Apply innovative thinking skill to solve the problems.</p> <p>3. Demonstrate various principle involved in solving mathematical problems.</p> <p>4. Evaluate assumptions used in analysing quantitative data.</p>
21	Semester II	MGC1202	Laboratory Courses SPSS	<p>1. Develop proficiency in handling SPSS software.</p> <p>2. Analyse data sets using various descriptive and inferential statistical tools.</p>
22	Semester III	MGC2011	Project Management	<p>1 Acquire an understanding of the fundamental concepts of project management.</p> <p>2. Analyze the project proposal by applying feasibility studies.</p> <p>3. Take decisions relating to project cost management.</p> <p>4. Apply PERT &amp; CPM technique for managing</p>

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				project duration. 5. Taking decisions based on risk management in the projects
23	Semester III	MGC2031	MS Project Lab	1. Acquire working knowledge of MS Project basics. 2. Define, schedule and monitor tasks relating to projects using a variety of MS Project tools.
24	Semester III	MGC2051	Comprehensive Project/Industry Internship & EDP Phase I	1. Prepare a Synopsis for CP/IIP and the pre-feasibility report for ED 2. Design the survey tool of CP/ IIP/CP Evaluation
25	Semester III	MGC2071	Soft Core : Business Etiquettes	1. Create a professional image, follow cubicle and office etiquette, and maintain positive office relationships. 2. Use the Internet appropriately when at work and handle ethical dilemmas and personal issues in the workplace. 3. Introduce people properly, be a good conversationalist, and follow proper etiquette in meetings. 4. Display courtesy on the telephone, in voice mails, and in written communications.
26	Semester III	MGC2091	Summer Internship Program	1. Apply knowledge and skills learned in the classroom in a work setting. 2. Develop a greater understanding about career options while more clearly defining personal career goals. 3. Analyze the activities and functions of business professionals. 4. Develop and refine oral and written communication skills. 5. Identify areas for future knowledge and skill development. 6. Be a courteous traveler and prepare for business trips.
27	Semester III	MKT2011	Sales and Distribution Management	1. Develop the knowledge of Selling and Distribution process in an organization. 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 monetary terms. 4. Analyze critical and strategic thinking, improve analytic skills and techniques, and enhance effective decision-making in sales and Distribution. 5. Identify the management challenges to construct & design Distribution Channel to find appropriate

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				way to reach to the customers.
28	Semester III	MKT2031	Services Marketing	<ol style="list-style-type: none"> <li>1. Identify the special management issues and unique challenges involved in marketing and managing services.</li> <li>2. Understand the expectations of customers and know how to translate this knowledge into genuine value for customers.</li> <li>3. Interpret service behavior and service consumption in the light of service-dominant marketing logic and articulate the outcome to service marketing management.</li> <li>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' marketing behavior.</li> <li>5. Apply new approaches to managing customer satisfaction and loyalty</li> <li>6. Understand current research trends in services marketing and management.</li> </ol>
29	Semester III	MKT2051	Retail Marketing	<ol style="list-style-type: none"> <li>1. Acquire and apply relevant knowledge and skills to manage retail management issues.</li> <li>2. Formulate creative yet feasible solutions for customer care, store care, merchandise care and retail strategies.</li> <li>3. Discuss and analyze the latest strategies required for the development of retail marketing.</li> <li>4. Identify and evaluate challenges and opportunities concerning the applications of the latest retail strategies.</li> <li>5. Explain the factors relating to visual merchandising, such as store layouts and presentation.</li> </ol>
30	Semester III	MKT2071	Consumer Behavior	<ol style="list-style-type: none"> <li>1. Assess the relevance of consumer behavior to the entire marketing process.</li> <li>2. Analyze the causes giving rise to consumer behavior with the theories.</li> <li>3. Explain the impact of consumer behavior on the development of marketing strategies including marketing communication, segmentation and target marketing.</li> <li>4. Apply the concepts and theories covered in the course to devise effective solutions in enhancing business performance.</li> <li>5. Collaborate with other classmates productively on the group work, communicate and present information effectively.</li> </ol>

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31	Semester III	MKT2091	Customer Relationship Management	<ol style="list-style-type: none"> <li>1. Explain and characterize the major concepts and framework of customer relationship management.</li> <li>2. Discuss the conceptual foundations of relationship marketing and its implications for further knowledge development in the field of business.</li> <li>3. Get an insight into how CRM practices and technologies enhance the achievement of marketing, sales and service objectives throughout the customer life-cycle stages of customer acquisition, retention and development whilst simultaneously supporting broader organizational goals.</li> <li>4. Equip both a conceptual understanding and the knowledge pertaining to practical application of critical skills necessary for building and managing partnering relationships with customers and suppliers.</li> <li>5. Understand the benefits delivered by CRM, the contexts in which it is used, the technologies that are deployed and how it can be implemented.</li> </ol>
32	Semester III	HRM2011	Compensation Management	<ol style="list-style-type: none"> <li>1. Apply the knowledge to solve compensation related problems in organizations</li> <li>2. Design rational and contemporary compensation systems in modern organizations</li> <li>3. Design and maintain a pay system within the organization</li> <li>4. Analyze and develop incentive programs</li> <li>5. Explain the legally required employee benefits.</li> </ol>
33	Semester III	HRM 2031	Performance & Rewards Management	<ol style="list-style-type: none"> <li>1. Identify and retain talent in an organization to deliver high performance.</li> <li>2. Design an organization's performance management process.</li> <li>3. Compare and contrast various organizational performance management programs and best practices.</li> <li>4. Plan effective performance management policies and practices to improve organisational and employee performance.</li> <li>5. Evaluate the relationship amongst the components of total rewards</li> </ol>
34	Semester III	HRM 2051	Organization Development & Change	<ol style="list-style-type: none"> <li>1. Apply theories and current research concerning individuals, groups, and organizations to the process of change.</li> <li>2. Identify organizational situations that would benefit from OD interventions.</li> <li>3. Discuss the process of change as applied to</li> </ol>

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				<p>organizational culture and human behavior.</p> <p>4. Explain the differences between insider and outsider approaches to consulting and OD interventions.</p> <p>5. Analyze ongoing activities within an organization and design the selected OD interventions</p>
35	Semester III	HRM 2071	Industrial Relations & Labour Laws	<p>1.Acquire a theoretical, practical and ethical perspective on many aspects of industrial relations.</p> <p>2. Apply IR competencies to contribute to organizational capability &amp; employee well being.</p> <p>3. Explain the various forms and causes of Industrial disputes.</p> <p>4 Assess the collective bargaining process, including preparation, negotiation, and settlement.</p> <p>5 Understand the statutory provisions concerning the grievance procedure in India.</p>
36	Semester III	HRM 2091	Human Resource Planning	<p>1.Analyze the theory and concepts of human resource planning.</p> <p>2. Identify the evolution of HRP throughout the organization.</p> <p>3. Apply models and methods used in forecasting.</p> <p>4. Describe the applications of a succession analysis &amp; planning.</p> <p>5. Evaluate the organization's planning program</p>
37	Semester III	FIN2011	Indian Financial System	<p>1. Elaborate the key role played in a modern society by financial markets &amp; its intermediaries</p> <p>2. Elaborate the key role played in a modern society by financial markets &amp; its intermediaries.</p> <p>3. Apply the knowledge of the relative standing of the major financial services in India for various business organizations</p> <p>4. Evaluate the functioning of banking &amp; NBFC in current scenario and discuss the various important aspects concern with banking and non-banking organisations.</p> <p>5. Demonstrate the concept of mutual fund also focus on other relative aspects of mutual fund industry</p>
38	Semester III	FIN2031	Financial Markets & Institutions	<p>1. Interpret the role and determinants of interest rates and interaction of interest rates with money supply.</p> <p>2. Assess the various theoretical concepts underlying money and capital markets.</p> <p>3. Analyze the working of various markets for securities (including debt markets, equity markets,</p>



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				<p>derivative markets) and its role in financial markets.</p> <p>4. Comprehend significant aspects of banking business.</p> <p>5. Compare and contrast the various non-bank operations</p>
39	Semester III	FIN2051	International Finance	<p>1. Explain the fundamental of international business, finance as well as international financial markets</p> <p>2. Describe the various important aspects concern with foreign exchange markets and Apply the knowledge of exchange rate mechanism</p> <p>3. Explain the risks in international operations &amp; apply the techniques to cover it. Also understand the various exchange control regulations.</p> <p>4. Describe long term asset and liability management. Also evaluate project and provide suggestions to the organization.</p> <p>5. Demonstrate short term asset and liability management in international business</p>
40	Semester III	FIN2071	Working Capital Management	<p>1. Evaluate the importance of effective working capital Mgt.</p> <p>2. Investigate funds flow cycles and their impact on working capital management objectives.</p> <p>3. Formulate appropriate working capital management policies to achieve corporate objectives.</p> <p>4. Apply corporate cash management, accounts receivable management, bank relations, and inventory management techniques to maximize the share holders' value.</p> <p>5. Evaluate comparative working capital management policies and their impact on the firm's profitability, liquidity, risk and operating flexibility</p>
41	Semester III	FIN2091	Security Analysis and Portfolio Management	<p>1. Comprehend fundamental concepts of security analysis and portfolio management.</p> <p>2. Analyze the role of stock exchange and financial intermediaries in investment management.</p> <p>3. Evaluate risk and return in different investment avenues</p> <p>4. Apply fundamental and technical analysis in portfolio management.</p> <p>5. Prepare and evaluate performance of different investment portfolios</p>
42	Semester III	BUS201	Marketing Analytics	<p>1. Apply marketing theories to given research problems and types of customer data.</p> <p>2. To critically evaluate business problems and</p>

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				determine the most appropriate analytical technique 3. Design an appropriate course of action based on empirical evidence.by gaining insights from the analysis of data 4. Formulate and confidently communicate (oral and written) research findings that is understandable to marketing managers
43	Semester III	BUD202	HR Analytics	1. Explain basic concepts of HR Analytics 2. Apply Data Analytic techniques using software packages 3. Identify and use key HR Metrics. 4. Forecast budget numbers for HR costs 5. Measure workforce productivity and performance 6.Explore and visualize data
44	Semester III	BUS203	Core Python Programming	1. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python 2.Express different Decision-Making statements and Functions 3. Interpret Object oriented programming in Python 4. Summarize different File handling operations 5. Create and execute Python programs
45	Semester III	BUS204	R Programming	1. Access online resources for R and import new function packages into the R workspace 2.Import, review, manipulate and summarize data-sets in R 3.Explore data--setsto create testable hypotheses and identify appropriate statistical tests 4. Apply appropriate statistical tests using R 5. Create and edit visualizations with R
46	Semester III	BUS205	Financial Analytics	1.Explore, Analyse stock market using Analytics Tools 2.Apply quantitative methods of financial decisions in businesses 3.Evaluate opportunities in financial /investments decisions. 4.Analyse real-life proposals for financial investment in a meaningful manner
47	Semester III	OPM2011	Materials Management & Inventory Control	1.Analyze need & importance of materials management in a firm. 2.Apply methods of classification, codification, specifications & standardization of materials. 3.Manage different issues relating to stores department. 4.Take decisions relating to inventory control by using different techniques.

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				<p>5. Demonstrate the role and importance value analysis.</p> <p>6. Take make or buy decisions relating to materials management</p>
48	Semester III	OPM2031	Operations Planning and Control	<p>1. Analyze need &amp; importance of operations planning and control in a firm.</p> <p>2. Forecast demand of the products by applying various methods of demand forecasting.</p> <p>3. Apply aggregate planning and master production scheduling for taking managerial decision.</p> <p>4. Analyze the need &amp; importance of resource requirements planning.</p> <p>5. Take decisions based on materials requirement planning &amp; resource requirements planning.</p>
49	Semester III	OPM2051	Global Operations Strategy	<p>1. Emphasize the key role of operations strategies in bringing about the growth and profitability of organizations.</p> <p>2. Understand &amp; apply different models in relation with operations strategies.</p> <p>3. Describe different key drivers used for global operations.</p> <p>4. Understand &amp; apply competency based, resource based and process based operations strategies.</p>
50	Semester III	OPM2071	Managing Six Sigma	<p>1. Understand the concept &amp; philosophy of Six Sigma.</p> <p>2. Apply quality function deployment technique for creating customer driven organization.</p> <p>3. Manage six sigma teams for achieving better results.</p> <p>4. Apply different tools &amp; techniques for managing Six Sigma.</p> <p>5. Manage risk involved in the six sigma projects.</p>
51	Semester III	OPM2091	Purchase Management	<p>1. Analyze the role &amp; importance of purchase management in a firm.</p> <p>2. Apply different criteria for vendor analysis &amp; selection.</p> <p>3. Apply different purchase strategies for achieving better results.</p> <p>4. Describe the role &amp; importance of buyer – seller relationship.</p> <p>5. Evaluate various modern purchase practices</p>
52	Semester III	SYS2011	Enterprise Resource Planning	<p>1. Apply Enterprise tools and its role in integrating business process.</p> <p>2. To demonstrate knowledge of ERP modules.</p> <p>3. To summarize the concepts of reengineering and how they relate to ERP system implementations.</p> <p>4. Identify the management challenges to</p>

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				implement ERP & learn how to find appropriate solutions to solve the problem
53	Semester III	SYS2031	Software Project Management	<ol style="list-style-type: none"> <li>1. Know the fundamental principles of Software Project Management &amp; will also have a good knowledge of responsibilities of project manager and how to handle these.</li> <li>2. Be familiar with the different methods and techniques used for project management.</li> <li>3. Superior knowledge of the problems and challenges faced while doing the Software Project Management and will also be able to understand why most of the software projects fail and how that failure probability can be reduced effectively.</li> <li>4. Will be able to do the Project Scheduling, Tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.</li> </ol>
54	Semester III	SYS2054	Strategic Information System Management	<ol style="list-style-type: none"> <li>1. Develop skills to use data warehouse for organization.</li> <li>2. Extract knowledge using data mining techniques.</li> <li>3. Learn the concepts of database technology and its applications.</li> <li>4. Comprehend the roles that data mining plays in various fields and manipulate different data mining techniques.</li> <li>5. Learn multidimensional schemas suitable for data warehousing.</li> <li>6. Understand various data mining functionalities.</li> <li>7. Know in detail about knowledge discovery process.</li> </ol>
55	Semester III	SYS2071	Database Management Systems	<ol style="list-style-type: none"> <li>1. Comprehend the fundamentals of relational and database systems including: data models, database architectures, and database manipulations</li> <li>2. Know the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using enterprise DBMS.</li> <li>3. Be familiar with managing database systems</li> <li>4. Identify new developments and trends in databases.</li> </ol>
56	Semester III	SYS2091	Information System Audit and Security	<ol style="list-style-type: none"> <li>1. Comprehend the fundamentals of relational and database systems including: data models, database architectures, and database manipulations</li> <li>2. Know the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using enterprise DBMS.</li> </ol>

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				3. Be familiar with managing database systems 4. Identify new developments and trends in databases.
57	Semester III	EM2011	Engineering Management	1. Understand various functions of Engineer in the organization 2. Identify the problem and find the optimal solution for that problem. 3. Make Plan for and organize technical activities. 4. Manage production and service activities 5. Understand communication process and Management information system
58	Semester III	EM2031	Enterprise Productivity	1. Understand and explain Enterprise level and micro level productivity 2. Apply different type technology to increase productivity 3. Understand and Explain different productivity models 4. Apply different productivity models in business.
59	Semester III	EM2051	Technology Management	1. Understand role of technology and core competence 2. Explain technology cycle and understand technology change 3. Identifying and evaluating the impact of relevant changing technology and managing those changes. 4. Analyse trend and understand role of TIFAC 5. Identify different patterns of technological changes
60	Semester III	EM2071	R & D Management	1. Understand different Managerial aspects of Innovation function. 2. Develop innovative strategy in business. 3. Measure Performance of R&D management 4. Do R & D project. 5. Understand Intellectual Property Rights
61	Semester III	EM2091	Value Engineering	1. Evaluate cost, worth and value. 2. Create value engineering job plan 3. Evaluate value engineering projects 4. Initiate value engineering programming 5. Use tools of value analysis
62	Semester III	RM2011	Rural Banking and Microfinance	1. Identify and evaluate the complexities of Rural Credit Banking Policies. 2. Analyze the role of Credit Cooperatives. 2. Analyze the Functions of Commercial Banks. 3. Evaluate progress, performance & problems of RRBs, Small Finance Bank & Payment Bank. 4. Assess the role of microfinance as a tool of socio economic development. 5. Conduct Social Assessments of MFIs, Loan

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				Disbursement and Repayment.
63	Semester III	RM2031	Rural Society and Polity	<ol style="list-style-type: none"> <li>1. Analyze development of rural economy &amp; rural society and Interdependence between Rural and Urban Sectors.</li> <li>2. Develop relationship among Rural Communities, Rural Institutions and Rural Environment.</li> <li>3. Analyze problems of Schedule Cast, Schedule Tribe and Women.</li> <li>4. Assess the impact of Social Inclusion on development.</li> <li>5. Analyze the Differences related to gender, Women in Development (WID) and Works and Gender Relation.</li> <li>6. Evaluate Participatory approaches to rural development and social development.</li> </ol>
64	Semester III	RM2051	Society upliftment Policies	<ol style="list-style-type: none"> <li>1. Identify and evaluate the complexities of Growth Vs Development, Rising Expectations &amp; Development, Dilemmas in 2. Development, Challenges &amp; Opportunities in Rural Economy,</li> <li>2. Analyze the impact of Rural Child Development Programme.</li> <li>3. Evaluate the National Rural Health Mission programme.</li> <li>4. Analyze the role of Rural Housing Programme on socio economic development of rural areas.</li> <li>5. Analyze the impact of Rural Women Empowerment programme.</li> <li>6. Evaluate the National Rural Employment programme.</li> </ol>
65	Semester III	RM2071	ICT in Development	<ol style="list-style-type: none"> <li>1. Understand and analyze importance of Information, Communication and Technology in development.</li> <li>2. Assess role of ICT in Sustainable development goals.</li> <li>3. Develop and design ICT as an infrastructure and its relationship in managing development issues.</li> <li>4. Identify opportunities in E-inclusion and its importance in development.</li> <li>5. Analyze National E Governance Policy.</li> <li>6. Examine the impact of ICT in Rural Project Framework.</li> </ol>
66	Semester III	RM2091	Agribusiness	<ol style="list-style-type: none"> <li>1. Analyze global Agribusiness Environment and scope of community based industry.</li> <li>2. Estimate demand and plan procurement method.</li> <li>3. Identify opportunities in organised food retailing.</li> <li>4. Analyze problems in Agri Input Markets.</li> </ol>

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				<p>5. Analyze ICT application in Agriculture Trade.</p> <p>6. Create linkage with apex agriculture and farming welfare institution for getting financial assistance and support from latest research.</p>
67	Semester IV	MGC2021	Entrepreneurship Development	<p>1. Identify the values, attitudes and motivation for a plunge in entrepreneurship.</p> <p>2. Impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.</p> <p>3. Develop and strengthen their entrepreneurial quality and motivation to start their own small scale business/enterprise.</p> <p>4. Understand the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.</p> <p>5. Be aware regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects.</p>
68	Semester IV	MKT2021	Digital Marketing	<p>1. Develop a deeper understanding of the changing digital marketing landscape.</p> <p>2. Apply the latest digital marketing trends and skill sets needed for today's marketer.</p> <p>3. Distinguish between the functions of various digital communication channels and select solutions appropriate to the needs of the organization and the end users.</p> <p>4. Analyze the impact digital technologies have on consumer behavior; consumer research and customer relationships</p> <p>5. Apply to web based marketing tools with the view of incorporating new media into traditional media and marketing planning.</p>
69	Semester IV	MKT2041	Management of Marketing Communications	<p>1. Learn and understand the basic concepts and terminology in advertising, with an emphasis on IMC</p> <p>2. Analyze factors and importance of reaching the target audience through the development of effective media coverage planning, including preparation and justification of an advertising budget.</p> <p>3. Refine critical thinking and decision-making in advertising campaign development through class activities and assignments.</p> <p>4. Carryout advertising monitoring, evaluating, &amp;</p>

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				<p>feedback systems in order to ascertain campaign effectiveness.</p> <p>5. Participate in the development of creative solutions to address advertising and marketing communications challenges.</p>
70	Semester IV	MKT2061	Strategic Marketing Management	<p>1. Apply strategic concepts and theories and their application in marketing environments.</p> <p>2. Compare and contrast the key principles of marketing strategy</p> <p>3. Think strategically about marketing issues and provide recommendations</p> <p>4. Research and analyze marketing strategies in different contexts</p> <p>5. Identify and resolve well-defined problems reaching substantiated conclusions employing methods of analysis specific to marketing.</p> <p>6. Employ strategies and processes which assist independent learning.</p>
71	Semester IV	MGE201	Taxation Planning and Management	<p>1. Apply analytical reasoning tools to assess how taxes affect economic decisions for all taxpaying entities.</p> <p>2. Develop a fundamental understanding of the components of taxable income determination across taxable entities so that the student builds a foundation for effectively learning future tax laws in order to implement future tax compliance and planning strategies</p> <p>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 and opportunities</p> <p>4. Communicate tax conclusions and recommendations in a clear and concise manner to relevant stakeholders.</p> <p>5. Develop technological skills necessary to undertake tax planning, compliance and research strategies.</p>
72	Semester IV	MGE202	Healthcare and Hospital Management	<p>1. Building competencies and provides expertise for hospital &amp; healthcare management, operations and administration through learning of Hospital core and Support Services.</p> <p>2. Provide the students an intensive, stimulating and challenging learning experience in the management and administration of Hospitals.</p>



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				<p>3. Acquaint the Students about Health Policy and Health Care Systems.</p> <p>4. Acquaint the Students about different important services needed in a Hospital.</p>
73	Semester IV	MGE203	Mentoring and Coaching	<p>1. Evaluate the benefits of coaching and mentoring to an organization</p> <p>2. Assess how coaching and mentoring programmes support business objective.</p> <p>3. Develop guidelines and protocols for programmes based on accepted coaching and mentoring theory and practice.</p> <p>4. Conduct formal and informal coaching conversations and begin to understand formal coaching relationships.</p> <p>5. Evaluate the impact to an organisation of establishing coaching and mentoring culture</p>
74	Semester IV	MGE204	Warehouse Management	<p>1. Understand the fundamental concepts of warehouse management.</p> <p>2. Taking decisions related to designing warehouse layout.</p> <p>3. Effectively analyze different processes performed for managing warehouses.</p> <p>4. Develop an understanding and application of warehouse management system.</p> <p>5. Demonstrate the role &amp; importance of inventory &amp; transportation in warehouse Management.</p>
75	Semester IV	MGE205	Mall Management	<p>1. Analyze the concepts and aspects needed for mall management.</p> <p>2. Apply the operational and tenant management principles for malls.</p> <p>3. Evaluate the marketing and promotional principals for the malls.</p> <p>4. Illustrate the statutory requirements for the mall operations</p>
76	Semester IV	MGE206	Change Management	<p>1. Describe in general terms a number of change management theories and how they might apply in practice.</p> <p>2. Articulate what change management is and why it is important in the contemporary business environment.</p> <p>3. Discriminate between different types of change process for different purposes and outcomes.</p> <p>4. Identify the steps in putting together an effective change management plan.</p> <p>5. Apply critical thinking and problem solving</p>

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				skills to the analysis and resolution of change problems
77	Semester IV	MGE207	Commodity Markets	<ol style="list-style-type: none"> <li>1. Explore the fundamental concepts of commodity market &amp; derivative market.</li> <li>2. Apply their knowledge of financial markets.</li> <li>3. Understand the dynamics of commodity exchange.</li> <li>4. Get familiar with various commodities.</li> <li>5. Understand the workings of commodity market &amp; derivative market.</li> <li>6. Get an aware with necessity of investment knowledge.</li> </ol>
78	Semester IV	MGE208	Food Retail Management	<ol style="list-style-type: none"> <li>1. Identify variables for vast International Food Markets.</li> <li>2. Analyses trends in Food Retailing.</li> <li>3. Measure the brand value of Food Retail organizations and their products.</li> <li>4. Analyses the challenges present in Food Retail operation and develop CRM strategy for food retail companies.</li> <li>5. Follow appropriate law of conducting food business.</li> <li>6. Analyze the opportunities and threat associated with GMO Foods.</li> </ol>
79	Semester IV	MGE209	Human Resource Audit	<ol style="list-style-type: none"> <li>1. Gain knowledge about a systematic methodology for evaluating HRD.</li> <li>2. Demonstrate knowledge in examining the adequacy and appropriateness of the HRD systems, structures, styles, culture, and competencies.</li> <li>3. Design &amp; prepare Human Resource Audit Report</li> <li>4. Identify the gaps between the current state and the standard.</li> <li>5. Conduct the Human Resource Audit for the organization</li> </ol>
80	Semester IV	MGE210	Small scales industries management	<ol style="list-style-type: none"> <li>1. Understand small businesses and supporting organizations for its setup.</li> <li>2. Identify Business Opportunities and plan according to survey.</li> <li>3. Prepare project and develop the report according to planned idea and market.</li> <li>4. Analyze the basic aspects of business and understand better to prepare for the same.</li> <li>5. To understand the Legal laws governing the business and environment.</li> <li>6. Analyze the other business considerations which</li> </ol>

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				are also important.
81	Semester IV	MGE211	Total Quality Management	<ol style="list-style-type: none"> <li>1. Understand the fundamental principles of Total Quality Management.</li> <li>2. Develop an understanding on various ISO standards and quality systems.</li> <li>3. Apply the tools and techniques of quality management to manufacturing and services processes.</li> <li>4. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implementable solutions to those.</li> </ol>
82	Semester IV	MGE212	Search Engine Optimization	<ol style="list-style-type: none"> <li>1. Promote the search engine ranking of site by implementing the best practices.</li> <li>2. Achieve impressive results through inbound marketing by applying SEO strategies.</li> <li>3. Understand new SEO innovations and changing search engine trends.</li> <li>4. Use Google Analytics and other metrics and tools to monitor progress in achieving search engine marketing goals.</li> </ol>
83	Semester IV	MGE213	Marketing Analytics	<ol style="list-style-type: none"> <li>1. Apply marketing theories to given research problems and types of customer data.</li> <li>2. To critically evaluate business problems and determine the most appropriate analytical technique</li> <li>3. Design an appropriate course of action based on empirical evidence. by gaining insights from the analysis of data</li> <li>4. Formulate and confidently communicate (oral and written) research findings that is understandable to marketing managers.</li> </ol>
84	Semester IV	MGE214	Tourism Management	<ol style="list-style-type: none"> <li>1. Use knowledge and skills associated with problem solving, creative and critical thinking, reflection and decision making to function effectively in the classroom, community and industry.</li> <li>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 that place.</li> <li>3. To develop a range of leadership skills and abilities such as motivating others, leading changes, and resolving conflict</li> <li>4. Gain supervisory skills and competencies necessary to meet the needs of the ever</li> </ol>

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				demanding Travel and Tourism Industry. 5. Recognize the importance of outstanding guest service quality, server-guest relationships, and ethics
85	Semester IV	MGE215	Export – Import Procedure & Documentation	1. Providing an overall perspective on import & export management. 2. Developing an understanding towards export and import procedure and documentation. 3. Developing analytical skills for processing of export order. 4. Identifying & managing risk involves in the import & export transactions
86	Semester IV	MGE216	Supply Chain Management	1. Understand the fundamental concepts and importance of Supply Chain Management. 2. Apply methods for managing demand & supply position in supply chain network. 3. Managing inventory in Supply chain network. 4. Plan and design transportation networks relating to supply chain management. Demonstrate the role & importance of logistics management
87	Semester IV	HRM 2021	Strategic & International human resource	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. globalisation, 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 critically and analytically, conducting research for the purpose of discussing specific cases relating to international HR
88	Semester IV	HRM 2041	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. 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.
89	Semester IV	HRM 2061	Cross Cultural	1. Analyze the impact of culture on business

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			Management	<p>practices.</p> <ol style="list-style-type: none"> <li>2. Analyze the impact of national culture on organizational cultures.</li> <li>3. Apply strategies for managing international teams and projects</li> <li>4. Develop strategies for working in virtual and co-located multicultural teams.</li> <li>5. Assess and leverage the impact of culture in management and other business function.</li> </ol>
90	Semester IV	HRM 2081	Conflict & Negotiation Management	<ol style="list-style-type: none"> <li>1. Analyze the key practical and theoretical concepts of managing and resolving conflicts.</li> <li>2. Describe the nature of small and large scale conflicts.</li> <li>3. Articulate the theoretical and practical components of negotiation and mediation and explain the link between effective negotiation skills and effective leadership.</li> <li>4. Analytically understand the types of conflict management styles.</li> <li>5. Explain the link between effective negotiation skills and effective leadership</li> </ol>
91	Semester IV	FIN2021	Mergers, Acquisition and Corporate Restructuring	<ol style="list-style-type: none"> <li>1. Identify the key issues and concepts of mergers, acquisitions and Corporate Restructuring.</li> <li>2. Analyze typical valuation strategies, pre and post-merger issues and challenges</li> <li>3. Assess the funding alternatives available and the various aspects of financial restructuring in case of mergers, acquisitions.</li> <li>4. Discuss the revival of sick units with special reference to the Law and its Procedure</li> <li>5. Examine the impact of changing business scenario worldwide on Corporate Restructuring</li> </ol>
92	Semester IV	FIN2041	Funds Management Banking and Insurance	<ol style="list-style-type: none"> <li>1. Get an insight into the liquidity management in commercial Banking business and discuss the necessity of adequate capital fund.</li> <li>2. Explain different types of reserves &amp; different factors affecting on its requirement.</li> <li>3. Understand the different aspects related with Management of Bank loan.</li> <li>4. Evaluate the performance of Bank on the basis of deposit mobilization, credit deployment &amp; profitability.</li> <li>5. Discuss different functions &amp; principles of life &amp; non-life insurance. Also describe role of insurance &amp; risk management policies related with non-life insurance.</li> </ol>
93	Semester IV	FIN2061	Cost Analysis	<ol style="list-style-type: none"> <li>1. Discover the importance of analyzing and</li> </ol>

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			and Control	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 decision making 5. Evaluate and manage performance through strategic cost management
94	Semester IV	OPM2021	Lean Manufacturing System	1. Understand the concept & philosophy of lean manufacturing. 2. Analyze different control techniques used under lean manufacturing. 3. Describe different steps for applying lean in manufacturing and service sectors. 4. Describe the interrelationship of lean manufacturing with just in time system. 5. Analyze the role & importance of cellular manufacturing system in relation with lean manufacturing.
95	Semester IV	OPM2041	Maintenance Management	1. Analyze the role and importance of maintenance management 2. Apply maintenance planning & scheduling technique for better results. 3. Understand & apply total productive maintenance system in a firm. 4. Describe computerized maintenance management system. 5. Manage different issues relating to safety and accident prevention.
96	Semester IV	OPM2061	Manufacturing Systems Management	1. Analyze & apply just in time manufacturing practices in a firm. 2. Analyze the role & importance of benchmarking quality improvement system. 3. Analyze the planning & implementation of flexible manufacturing systems in a firm. 4. Apply theory of constraints tools in manufacturing for better performance. 5. Apply business process reengineering system and green manufacturing practices for improving overall productivity.
97	Semester IV	SYS2021	E-Business	1. To enable students to understand and implement digital technologies in business 2. To be able to appreciate the role of e-payments, e-security, e-marketing, eservices 3. To understand the basic aspects of cyber laws 4. To realize the difficulties in implementation of

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				digital technology with its impact on business, society and individuals 5. To apply e-business implementation through an awareness of SAP ERP.
98	Semester IV	SYS2041	Cyber Laws and Cyber Security	1. Comprehend the knowledge of cybercrime. 2. Identify the up-coming legal issues in a digital environment including general issues of jurisdiction and enforcement of rights and liabilities in cyberspace. 3. Consider developments in specific areas of law arising in cyberspace including intellectual property and electronic commerce. 4. Analyze the developing concepts affect the flow of information in society and the work of information professionals. 5. Identify the recent developments in national and global information policy, the nature of the policy making process and the identities and positions of the various stakeholders.
99	Semester IV	SYS2061	System Analysis & Design	1. Explain the functions of systems analysis and design and the roles and responsibilities of systems analysts and project managers. 2. Explain the stages of the system development life cycle model. 3. Analyze an existing system and recognize the causes of information related problems and design a new system to allay these problems. 4. Design appropriate information systems. 5. Manage the development of systems based on system specifications.
100	Semester IV	RM2021	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. 6. Analyze problems of managing rural cooperatives.
101	Semester IV	RM2041	Social Marketing and Social entrepreneurship	1. Analyze Theories & Approaches in Behavioral Modification. 2. Identify social marketing projects. 3. Manage Social marketing programme.

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				<ol style="list-style-type: none"> <li>4. Assess the models of social Entrepreneurship and Enterprise.</li> <li>5. Analyze impact of social impact investors.</li> <li>6. Develop a plan for scaling of social enterprise.</li> </ol>
102	Semester IV	RM2061	Governance and Development	<ol style="list-style-type: none"> <li>1. Analyze the relationship between Governance and Development.</li> <li>2. Identify the role of environment in Governance.</li> <li>3. Analyze Governance issues in Modern state and societies.</li> <li>4. Evaluate Board of Director Roles and responsibilities for better corporate governance.</li> <li>5. Assess Accountability and Transparency in Governance in CBOs.</li> </ol>
103	Semester IV	EM2021	Engineering Systems Simulation	<ol style="list-style-type: none"> <li>1. Understand system stimulation</li> <li>2. Random numbers</li> <li>3. Explain engineering systems modeling and simulation</li> <li>4. Conduct simulation experiments</li> <li>5. Analyze simulation output</li> </ol>
104	Semester IV	EM2041	Big Data Analytics	<ol style="list-style-type: none"> <li>1. Explain Challenges of Conventional Systems</li> <li>2. Explain Stream Data Model and Architecture</li> <li>3. Use The Hadoop Distributed File System</li> <li>4. Develop a Map Reduce Application</li> <li>5. Set up a Hadoop Cluster</li> </ol>
105	Semester IV	EM2061	Manufacturing Systems	<ol style="list-style-type: none"> <li>1. Explain fundamentals of manufacturing and automation</li> <li>2. Analyze flow lines without storage and with storage buffer</li> <li>3. Develop and implement FMS</li> <li>4. Understand functions and components of CIM system</li> <li>5. Plan and Schedule Functions in CIM System</li> </ol>
106	Semester IV	MGC2041	Supply Chain Management	<ol style="list-style-type: none"> <li>1. Apply knowledge and skills learned in the classroom in a work setting.</li> <li>2. Develop a greater understanding about career options while more clearly defining personal career goals.</li> <li>3. Analyze the activities and functions of business professionals.</li> <li>4. Develop and refine oral and written communication skills.</li> <li>5. Identify areas for future knowledge and skill development</li> </ol>
107	Semester IV	MGC2061	Comprehensive Project	<ol style="list-style-type: none"> <li>1. Discuss the fundamental concepts and importance of Supply Chain Management.</li> <li>2. Apply methods for managing demand &amp; supply position in supply chain network.</li> </ol>



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				<ol style="list-style-type: none"> <li>3. Manage inventory in Supply chain network.</li> <li>4. Design transportation networks relating to supply chain management.</li> <li>5. Demonstrate the role &amp; importance of logistics management</li> </ol>
108	Semester IV	IPMB2YYY	Self study/ Online Course related to project domain area approved by DPC	<ol style="list-style-type: none"> <li>1. Expand and improve the knowledge in concerned course selected.</li> <li>2. To update the knowledge of latest Technology.</li> </ol>
109	Semester IV	IP204	Internship	<ol style="list-style-type: none"> <li>1. Understand the functioning of the company in the terms of inputs, transformation process and the outputs (Products and Services)</li> <li>2. Develop an attitude to adjust with the company culture, work norms, code of conduct.</li> <li>3. Understand and follow the safety norms, code of conduct.</li> <li>4. Demonstrate the ability to observe, analyze and document the details as per the industry practices.</li> <li>5. Understand the processes, systems and procedures and to relate to the theoretical concepts studies.</li> <li>6. Improve the leadership abilities, communication.</li> <li>7. Demonstrate project management and finance sense.</li> </ol>
110	Semester IV	IP206	Project (Individual related to their Specialization)	<ol style="list-style-type: none"> <li>1. Identify the project/problem in the domain of program relevant to the company.</li> <li>2. Collect the information to the pertaining to the problem identified.</li> <li>3. Analyze the information using the statistical tools/ Techniques.</li> <li>4. Suggest the Feasible alternative solution and select the best solution.</li> <li>5. Present the solution to the company and seek assistance in the implementation.</li> <li>6. Measure the impact of the project on the performance of company/ department/ section.</li> </ol>
111	Semester IV	ED3002	Project feasibility Analysis	<ol style="list-style-type: none"> <li>1. Prepare Business Plan for selected Business.</li> <li>2. Make risk analysis &amp; Market analysis of selected project.</li> <li>3. Make Technical appraisal of selected project</li> <li>4. Make financial appraisal of selected project</li> </ol>
112	Semester IV	ED3004	Entrepreneurship Development	<ol style="list-style-type: none"> <li>1. Identify the values, attitudes and motivation for a plunge in entrepreneurship.</li> <li>2. Impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.</li> </ol>

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				<p>3. Develop and strengthen their entrepreneurial quality and motivation to start their own small scale business/enterprise.</p> <p>4. Understand the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.</p> <p>5. Be aware regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects.</p>
113	Semester IV	ED3006	EDP Program (short term intensive program either in house / by any authorized agencies approved by CIIED)	<p>1. Summarize knowledge of management, economics, marketing and finance for selected business.</p>
114	Semester IV	ED3008	Product/ start up Complete techno economic feasibility assessed by funding agencies & approved for funding	<p>1. Apply knowledge of management, economics, marketing and finance for preparation of project report of selected business</p> <p>2. Make Technical and financial appraisal of project report</p>
115	Semester IV	IPMB2YYY	Self study/ Online Course related to project domain area approved by DPC	<p>1. Identify the values, attitudes and motivation for a plunge in entrepreneurship.</p> <p>2. Impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.</p> <p>3. Develop and strengthen their entrepreneurial quality and motivation to start their own small scale business/enterprise.</p> <p>4. Understand the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.</p> <p>5. Be aware regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects.</p>
116	Semester IV	IP204	Internship	<p>1. Develop a deeper understanding of the changing digital marketing landscape.</p>

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				<p>2. Apply the latest digital marketing trends and skill sets needed for today's marketer.</p> <p>3. Distinguish between the functions of various digital communication channels and select solutions appropriate to the needs of the organization and the end users.</p> <p>4. Analyze the impact digital technologies have on consumer behavior; consumer research and customer relationships</p> <p>5. Apply to web based marketing tools with the view of incorporating new media into traditional media and marketing planning.</p>
117	Semester IV	IP206	Project (Individual related to their Specialization)	<p>1. Learn and understand the basic concepts and terminology in advertising, with an emphasis on IMC</p> <p>2. Analyze factors and importance of reaching the target audience through the development of effective media coverage planning, including preparation and justification of an advertising budget.</p> <p>3. Refine critical thinking and decision-making in advertising campaign development through class activities and assignments.</p> <p>4. Carryout advertising monitoring, evaluating, &amp; feedback systems in order to ascertain campaign effectiveness.</p> <p>5. Participate in the development of creative solutions to address advertising and marketing communications challenges.</p>
118	Semester IV	ED3002	Project feasibility Analysis	<p>1. Apply strategic concepts and theories and their application in marketing environments.</p> <p>2. Compare and contrast the key principles of marketing strategy</p> <p>3. Think strategically about marketing issues and provide recommendations</p> <p>4. Research and analyze marketing strategies in different contexts</p> <p>5. Identify and resolve well-defined problems reaching substantiated conclusions employing methods of analysis specific to marketing.</p> <p>6. Employ strategies and processes which assist independent learning.</p>