Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering & Technology, Ashta
(Approved by AICTE, New Delhi, Govt. of Maharashtra and Affiliated to Shivaji University Kolhapur)
An Autonomous Institute

Programme Name   :   **Mechanical Engineering   (Revision-Zero0)**

PSO	Statement
1	PSO1. Ability to apply electrical engineering knowledge, skills for testing, control & maintenance of electrical systems such as Machines, Power Syst Drives& Automation.
2	PSO2. Ability to identify problems in the diversified areas of Electrical Engineering and determine the hardware or software solutions to support the Soci Environmental & Industrial needs.

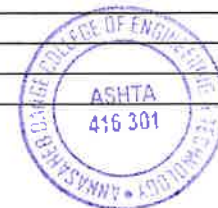| Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	0MEBS201	Applied MathematicsIII	CO1	Solve the problems on Fourier Series and Laplace Transform,
			CO2	Make use of Linear Differential Equation to solve the Mechanical Engineering problems,
			CO3	Make use of Partial Differential Equation to solve the Mechanical Engineering problems,
			CO4	Solve the problems of vector calculus,
			CO5	Construct the Fourier Series for any functions.
2	0MEPC202	Engineering Thermodynamics	CO1	Explain basic laws of thermodynamics,
			CO2	Define and describe fundamentals of entropy,
			CO3	Explain the importance of heat and work and their correlation,
			CO4	Apply the concepts of engineering thermodynamics to systems,
			CO5	Analyze various properties of fuels related with combustions.
3	0MEPC203	Fluid Mechanics	CO1	Explain basic properties of fluid, fluid statics, kinematics and dynamics,
			CO2	Identify various types of flow, flow pattern and their importance,
			CO3	Explain concepts of flow through pipes, boundary layer theory, forces on immersed bodies and dimensionless parameters,
			CO4	Explain basics of computational fluid dynamics and its applications,
			CO5	Apply various equations in fluid mechanics such as Euler's, Bernoulli's, Momentum , Continuity etc,
			CO6	Solve the problems related to properties of fluid, fluid kinematics, fluid dynamics, laminar flow, pipe flow, dimensional analysis, boundary lay theory, forces on immersed bodies.
4	0MEPC204	Manufacturing Processes and Machine Tools.	CO1	Explain the basic casting process and the various operations involved in casting process,
			CO2	Explain different types of forming and plastic shaping processes,
			CO3	Explain types of joining processes and their applications,
			CO4	Identify and explain the function of the basic components of machine tools and its accessories,
			CO5	Explain working principle and applications of nonconventional machining processes,
			CO6	Select manufacturing process and machine tools required to manufacture the component.
5	0MEPC205	Machine Drawing	CO1	Draw mechanical engineering components and sketches of standard machine components using BIS conventions,
			CO2	Assign limits, fits and tolerances on drawings,
			CO3	Prepare detailed drawings from given assembly drawing and vice versa,
			CO4	Draw true shape of inclined surface using auxiliary projection,
			CO5	Produce curves of intersections of the surfaces of solids.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
6	0MEES206	Computer Programming Using C++	CO1	Explain objectoriented programming concept,
			CO2	Illustrate the concept of class and object in programs,
			CO3	Define the concepts of array, pointers, constructor and destructor,
			CO4	Explain concept of Inheritance for reusability,
			CO5	Define concept of overloading and polymorphism for solving the task in C++,
			CO6	Apply their knowledge and programming skills to solve various graphical and mechanical problems.
7	0MEMC207	Environment Studies	CO1	Explain importance of environmental studies with necessary of acts,
			CO2	Explain importance of public awareness on environmental problems,
			CO3	Write a technical report in team regarding course and impacts of environment related issues,
			CO4	Discuss current concern of environment issues,
			CO5	Describe the need of environment protection and ethics.
8	0MEPC251	Fluid Mechanics Laboratory	CO1	Identify various types of flow by using Reynolds Experiment, flow pattern, velocity profile, pressure measurement devices and their significanc
			CO2	Apply the various equations to calculate the discharge through various flow measuring devices, equivalent pipe for parallel pipes, Coefficients discharge and coefficient of friction values,
			CO3	Communicate effectively, both orally and in writing journals,
			CO4	Perform the experimental task individually and in team in fluid mechanics laboratory, and interpret the results,
			CO5	Respond willingly to questions asked by faculty and asked to involve in experimental task of fluid mechanics laboratory.
9	0MEPC252	Machine Drawing Laboratory	CO1	Produce sketches of detail and assembly drawing on drawing sheet,
			CO2	Prepare the 2D drawings using AutoCAD,
			CO3	Construct a basic threedimensional drawing using AutoCAD,
			CO4	Communicate effectively, both orally and in drawing sheets,
			CO5	Follow professional and ethical principles during laboratory work.
10	0MEES253	Computer Programming Using C++ Laboratory	CO1	Explain the basic concept of objectoriented programming,
			CO2	Apply the concepts of class, object, array, pointers, inheritance, overloading, polymorphism and transformation in C++,
			CO3	Develop programming skills to solve problems using objectoriented concept in Turbo C,
			CO4	Communicate effectively, both orally and in writing journals and complete assigned tasks in team,
			CO5	Follow given instructions during practical performance,
			CO6	Engage in independent and lifelong learning in the programming domain.
11	0MEPC254	Workshop Practice III	CO1	Explain the basics of manufacturing processes and machine tools,
			CO2	Prepare a pattern for casting,
			CO3	Explain joining operation by application of TIG/MIG welding,
			CO4	Perform various sand tests to check the properties of sand,
			CO5	Work individually or in team to perform the experimental task effectively,
			CO6	Follow professional and ethical principles during laboratory work.
12	0MEHS255	General Proficiency	CO1	Communicate effectively and accurately by using grammatically sound language,
			CO2	Be acquainted of etiquettes of formal communicative event and perform better in events like Group Discussion, Interview etc,
			CO3	Review ones' competence and produce more meaningful and logically interwoven extracts necessary for professional correspondence like ema technical paragraph etc,
			CO4	Identify importance of vocabulary and update it to become confident speaker,
			CO5	Mould accordingly and able to work in various teams and will contribute positively to strengthen team work.

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13	0MEES208	Applied Numerical Methods	CO1	Use different methods to find roots of equations and check its convergence.
			CO2	Solve the various simultaneous linear algebraic equations and analyze them.
			CO3	Apply the least square and interpolation methods to obtain the best fitting curves for engineering problems.
			CO4	Apply various differentiation and integration processes to solve the current engineering problems.
			CO5	Distinguish and apply various methods to solve ordinary & partial differential equations.
14	0MEPC209	Mechanics of Materials	CO1	Explain different types of stresses, strains and elastic constants.
			CO2	Identify and apply a particular theoretical method of stress and strain determination for mechanical elements under various loads.
			CO3	Apply different methods to determine the deflection of beams.
			CO4	Apply different theories to determine the loads on the columns.
			CO5	Determine strain energy absorbed in the body due to external load, torsion and bending.
			CO 6	Analyse the beam by drawing shear force and bending moment diagram.
15	0MEPC210	Thermal Engineering	CO1	Explain the phenomenon of steam generation and properties of steam,
			CO2	Illustrate the application of laws of thermodynamics in steam power generation systems,
			CO3	Demonstrate various performance parameters and their estimations in respect to steam turbines,
			CO4	Discuss various applications of compressors, and calculate performance parameters,
			CO5	Demonstrate the working and performance of gas turbine,
			CO 6	Compute performance of gas power cycles.
16	0MEPC211	Hydraulic Machines	CO1	Explain the construction and working of water turbines, centrifugal pump, Reciprocating pump ,Hydraulic Devices ,Other types of pumps,
			CO2	Describe the various applications of Hydraulic machines,
			CO3	Compute various design parameters of water turbines, centrifugal pump and Reciprocating pump by using the velocity diagrams,
			CO4	Solve step by step problems based on Hydraulic machines,
			CO5	Apply model testing concept to analyze the performance of Hydraulic machines.
17	0MEPC212	Kinematics of Machines	CO1	Demonstrate different types of mechanisms with their applications.
			CO2	Summarise the friction for various applications,
			CO3	Select different power transmitting elements according to application.
			CO4	Analyze kinematic theories of mechanism.
			CO5	Differentiate between types of gears and to analyze the characteristics of meshing gears,
			CO6	Design cam with follower for different practical applications.
18	0MEPC213	Materials Science and Metallurgy	CO1	Discuss properties of metals, defects and its possible causes,
			CO2	Differentiate various ferrous and nonferrous metals along with their microstructure,
			CO3	Describe various destructive and nondestructive testing,
			CO4	Apply principles of heat treatment,
			CO5	Discuss the principle of mechanical testing to evaluate the mechanical properties,
			CO6	Explain powder metallurgy methods and their applications,
19	0MEPC257	Numerical Methods using MATLAB Laboratory	CO1	Demonstrate the basics of MATLAB programming,
			CO2	Interpret the results of engineering problems through mathematical and programming and find out the errors,
			CO3	Use MATLAB to solve computational problems through programming,
			CO4	Communicate effectively about laboratory work in writing journals/technical reports,
			CO5	Behave with highest ethical standards with concern to life long learning, and awareness of contemporary issues.

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20	0MEPC258	Hydraulic Machines Lab	CO1	Describe construction, working principle, importance, application and their selection of Hydraulic Machines, through Laboratory, industrial vi or hydro power plant visit,
			CO2	Draw and Interpret the performance characteristics of various turbines and pumps,
			CO3	Follow written or verbal instructions to carry out experimental task in Hydraulic Machines,
			CO4	Perform the experimental task individually in Hydraulic Machines, communicate effectively and interpret the results,
			CO5	Respond willingly to question asked by faculty and involve in experimental task of Hydraulic Machines.
21	0MEPC259	Kinematics of Machines Lab	CO1	Explain the appropriate application of mechanisms, power transmission devices, friction and mechanical energy storage devices,
			CO2	Simulate the process of experimentation to calculate various parameters effectively,
			CO3	Analyze the mechanism and machines effectively using graphical method,
			CO4	Record all calculations related with these experiment and generate a Technical report,
			CO5	Respond ethically on fundamentals of mechanisms as well as cams while presentation.
22	0MEPC260	Materials Science and Metallurgy Laboratory	CO1	Evaluate different mechanical properties of materials using various destructive testing techniques with their significance,
			CO2	Estimate percentage phases present in microstructure of ferrous and non ferrous alloys with their effect on mechanical properties,
			CO3	Recognize and handle the tools and materials from written or verbal instruction.
			CO4	Competently repeat the experiment performance individually and interpret the results,
			CO5	Express awareness of the concepts and their applications with satisfactory demonstration as a response.
23	0MEPC261	Computer Aided Design Lab	CO1	Prepare solid, assembly, surface model with suitable constraints and 2D drafting using CATIA software.
			CO2	Demonstrate kinematics of simple assembly using CATIA software.
			CO3	Communicate effectively, both orally and in writing journals.
			CO4	Practice professional and ethical behavior to carry forward in their life.
			CO5	Recognize the need of modeling software and utilize it for their project work.
24	0MEPC262	Workshop Practice IV	CO1	Select the suitable machining operations and prepare process sheet to manufacture a component and implement the same,
			CO2	Choose and set appropriate gear combination to manufacture threads,
			CO3	Gain handson experience in manufacturing of a component by smithy/ forging operations as per given drawing,
			CO4	Explain working of surface grinding, shaper/planer machines,
			CO5	Work effectively in teams to accomplish the assigned responsibilities in an integral manner,
			CO6	Behave with highest ethical standards with concern to global, environmental, economic issues.
25	0MEPC301	Design of Machine Elements I	CO1	Explain the fundamentals of machine element like joints, levers, power screws, & springs.
			CO2	Describe the significance of material selection for various machine elements.
			CO3	Apply the basic concepts to design machine element for applications on strength basis using design data book.
			CO4	Solve problems by applying acquired knowledge of machine elements to compute design dimensions under static conditions.
			CO5	Solve problems on mechanical components subjected to fluctuating/ reversed loading conditions.
26	0MEPC302	Heat and Mass Transfer	CO1	Explain the mechanism and basic concept of heat transfer,
			CO2	Describe different forms of heat equations in conduction, convection and radiation heat transfer,
			CO3	Solve the problems on conduction, convection and radiation heat transfer,
			CO4	Apply empirical correlations for both forced and natural convection to determine convection heat transfer coefficient ,
			CO5	Analyze the performance of shell and tube type heat exchanger.
27	0MEPC303	Dynamics of Machines	CO1	Solve problems of gear train according to its application,
			CO2	Select and apply different governing mechanisms for prime mover.
			CO3	Illustrate the effects of gyroscopic couple in aeroplane, ship, two wheelers and four wheelers,
			CO4	Apply balancing concept while designing machine components,
			CO5	Select vibration measuring device for condition monitoring.
			CO6	Analyze machines/mechanical system under free vibration and damped vibration.

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28	0MEPC304	Control Engineering	CO1	Explain the type of control system, their applications, limitations & concepts of feedback.
			CO2	Compute the analogies of the given physical system by using grounded chair representation.
			CO3	Use technique of linearization and block diagram algebra.
			CO4	Calculate transient response using Laplace transform and time specifications.
			CO5	Identify the stability of control systems using RootLocus Technique and Routh's Stability Criteria.
			CO6	Analyze control systems using frequency response technique (Bode plot).
29	0MEPC305	anufacturing Engineering	CO1	Explain the basics of metal cutting mechanism and cutting tools.
			CO2	Explain the fundamentals of press tools operations and study of cutting forces.
			CO3	Determine the effect of cutting parameters on machining.
			CO4	Compute the parameters related with economics of tooling.
			CO5	Design and draw assembly of jig and fixture for a given component.
30	0MEPE306	Advanced Mechanics of Solids	CO1	Conceptual analysis of stress and strain.
			CO2	Solve numerical on stress and strain analysis.
			CO3	Analyze torsion induced in shafts, elliptical bars and rectangular bars.
			CO4	Apply the different energy methods.
			CO5	Analyze thickwalled cylinder subjected to internal and external pressures.
31	0MEPE307	Advanced Foundry Technology.	CO1	Explain the foundry processes / equipment.
			CO2	Describe the concepts of solidification in castings.
			CO3	Describe the feeding and gating system, gating ratio, cooling rate.
			CO4	Explain the melting practices and equipment.
			CO5	Describe the advanced moulding, core making, melting, pouring, shake out and fettling equipment used in foundries.
			CO6	Discuss the quality control specifications of foundry sand, sand additives, furnace charging material.
32	0MEPE308	Fluid Dynamics	CO1	Understand the basic principles of fluid mechanism to solve real life engineering problems.
			CO2	Apply the governing differential equations to solve the fluid flow problem for different fluid model.
			CO3	Describe the various properties of inviscid incompressible flow of fluid.
			CO4	Evaluate fluid systems for performance of compressible flow.
			CO5	Analyze the fluid systems for performance of viscous incompressible flow at different conditions.
			CO6	Analyze the dimensionless parameter of fluid mechanics for different fluid flow model.
33	0MEPR309	Research MethodologyI	CO1	Understand basic concepts of research and its necessity.
			CO2	Compare between research and research methodology.
			CO3	Explain the procedure for defining and designing a research problem.
			CO4	Express the need of sampling design, its types and characteristics of a good sample design.
			CO5	Select appropriate data collection method for a given research work.
34	0MEPC351	Heat and Mass Transfer Laboratory	CO1	Carry out experiment and calculate various heat transfer parameters,
			CO2	Interpret the experimental results of heat transfer properties.
			CO3	Communicate effectively, both orally and in writing journals,
			CO4	Function effectively as an individual, and as a team member for performing laboratory work,
			CO5	Follow professional and ethical principles during laboratory work,
35	0MEPC352	Dynamics of Machines Laboratory	CO1	Calculate M.I of bifilar, Trifilar & Compound pendulum
			CO2	Perform the experiments on Gyroscope, Epicyclic gear train, Governor, balancing of rotary masses & Longitudinal vibrations of helical spring
			CO3	Solve the problems on Gear trains & Balancing of reciprocating masses
			CO4	Analyze logarithmic decrement in free damped vibrations.
			CO5	Follow professional & ethical principles during laboratory work
			CO6	Record all calculations related with these experiments & generate technical report.

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36	0MEPC353	Manufacturing Engineering Laboratory	CO1	Explain broaching and various gear manufacturing processes.
			CO2	Solve the numerical on economic aspect of tooling.
			CO3	Design and draw assembly of drilling jig and milling fixture for a given component.
			CO4	Explain the work effectively both orally and in writing.
			CO5	Function effectively as an individual, and as a team member for producing technical reports and drawings.
			CO6	Follow professional and ethical principles during lab and industrial visit
37	0MEPC354	Computer Aided Manufacturing Laboratory	CO1	Explain CAM, NC/CNC machine, G and M codes
			CO2	Develop part program for machining on CNC machine using G and M codes.
			CO3	Simulate metal cutting process and casting process.
			CO4	Communicate the importance of CAM and its simulation tools both orally and in written.
			CO5	Practice professional and ethical behavior.
			CO6	Engage in independent and lifelong learning in the programming domain.
38	0MEPC355	Workshop Practice V	CO1	Explain spur gear manufacturing on milling machine
			CO2	Select suitable machining operations and prepare the process sheet required to manufacture the components
			CO3	Perform series of manufacturing operations independently by controlling key dimensions on a component using principles of metrology and assembly
			CO4	Smoothly coordinates a series of operations precisely with speed and timing
			CO5	Follow professional and ethical principles during lab and industrial visit
39	0MEPR356	Mini ProjectI	CO1	Identify the real life institutional, societal, industrial problems/issues for sustainable development.
			CO2	Review the research literature, formulate, and analyze complex engineering problems to give costeffective, optimal solution considering societ health, legal and safety issues.
			CO3	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage projects by maintaining professional and ethical values.
			CO4	Communicate effectively on complex engineering activities, write appropriate project report and make effective presentations.
			CO5	Engage in lifelong learning in the broadest context of technological change.
40	0MEPC310	Design of Machine Elements II	CO1	Explain considerations and methodologies used for the design and selection of gears, shafts, keys, couplings and bearings.
			CO2	Solve the design problems of gears using design data book.
			CO3	Use the standard design procedures of shaft, key, coupling, and antifriction bearings.
			CO4	Select the belt, pulley, chain and sprocket using manufacturer's catalogue.
			CO5	Solve design problems of bearings using manufacturer's catalogue.
			CO6	Design and/or select the components of a transmission system for static and dynamic loading conditions and by using the standard design procedure and design data book. engineering and consumer products consisting of sensors, actuators etc.
41	0MEPC311	Mechatronics	CO1	Demonstrate integration of knowledge from different disciplines in order to realize
			CO2	Explain signal conditioning processes and working of different signal conditioning devices.
			CO3	Explain architectures of Microprocessor, Microcontroller, its applications and instruction sets, types along with basic digital circuits.
			CO4	Apply fundamentals of ladder diagram and PLC to construct logic for lighting and sequencing operations.
			CO5	Develop the ladder logic used to program PLC for real time cases such as workstation for stamping, drilling etc.
42	0MEPC312	Industrial Hydraulics and Pneumatics	CO1	Explain the principles, working and applications of hydraulic, pneumatic systems, fluidics and automation through hydraulic and pneumatic systems.
			CO2	Explain and draw different ISO/JIC symbols used in hydraulic and pneumatic circuits.
			CO3	Explain safety regulations and troubleshooting in hydraulic and pneumatic system.
			CO4	Explain the construction and working of hydraulic and pneumatic system components.
			CO5	Construct the hydraulic and pneumatic circuits for industrial application.
			CO6	Solve the problems on filter rating, piston force and velocity.

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43	0MEPC313	Metrology and Quality Control	CO1	Distinguish various measuring instruments and their characteristics.
			CO2	Use various measuring instruments and interpret the data.
			CO3	Explain the terminologies related to screw thread, gears, surface roughness and select appropriate measuring instruments for checking them.
			CO4	Explain the terminologies related to quality & quality control.
			CO5	Solve the problems on limits, fits and tolerances.
			CO6	Solve the problems on acceptance sampling and process control charts.
44	0MEPE314	Finite Element Analysis	CO1	Write equations of equilibrium, Stressstrain relations and the principle of potential energy and approximations of differential equations.
			CO2	Understand a basic the limitation of the FE method and the possible error sources in its use and interpret results.
			CO3	Prepare finite element formulations by considering the 1D and 2D problem, such as Shape function, element stiffness and boundary conditions
			CO4	Compute displacements, strain, stress and reaction for twodimensional truss element and CST element.
			CO5	Solve 1D, 2D problems for steady state heat conduction.
45	0MEPE315	Advanced Manufacturing Technology	CO1	Describe various nontraditional machining processes.
			CO2	Describe various types of rapid prototyping process capabilities for industrial usage.
			CO3	Differentiate composites with respect to various isotropic materials
			CO4	Select appropriate processing techniques used to manufacture composites
			CO5	Evaluate various process parameters involved in different nonconventional machining processes.
46	0MEPE316	Computational Fluid Dynamics	CO1	Solve the governing equations for fluid flow.
			CO2	Explain the methodology of grids generation and discretization.
			CO3	Explain solution algorithm for pressure velocity coupling in steady flow.
			CO4	Apply different methods of finite difference methods to fluid flow problems.
			CO5	Apply and evaluate finite difference methods to Diffusion problems.
			CO6	Apply turbulence models to engineering fluid flow problems.
47	0MEPR317	Research MethodologyII	CO1	Summarize various tools and techniques used for the analysis of data.
			CO2	Illustrate the need of interpretation of research results.
			CO3	Explain the concept of hypothesis testing.
			CO4	Use various statistical techniques for analyzing the data.
			CO5	Compare various ways of research communication.
48	0MEPC357	Mechanical Measurement Laboratory	CO1	Demonstrate the various instruments used for linear, angular, thermal, flow and strain measurements & summarize the various results for respective parameters.,
			CO2	Use Various instruments for measuring Temperature, pressure, Displacement, Torque, Vibration, Velocity, Speed.
			CO3	Function effectively as an individual, and as a team member for performing laboratory work
			CO4	Communicate effectively, both orally and in writing journals
			CO5	Engage in independent and lifelong learning in the broadest context of technological change.
			CO6	Follow professional and ethical principles during laboratory work.
49	0MEPC358	Design of Machine Elements II Laboratory	CO1	Explain types of gearboxes and design procedures for optimum design of gearboxes for machine tool applications.
			CO2	Design the multispeed gearbox.
			CO3	Design the bevel/worm gearbox.
			CO4	Work effectively in teams to accomplish the assigned responsibilities in an integral manner.
			CO5	Communicate effectively about laboratory work in writing journals/technical reports.

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50	0MEPC359	Mechatronics Laboratory	CO1	Explain the basics of sensors; signal conditioners, digital circuits, PLC, SCADA, MEMS.
			CO2	Distinguish between microprocessor microcontroller and its applications.
			CO3	Use PLC and RS Logix software to formulate and simulate the ladder logic for industrial applications.
			CO4	Communicate effectively and work in a team for laboratory activities, write effective reports.
			CO5	Follow professional and ethical principals during laboratory and industrial visit.
51	0MEPC360	Industrial Hydraulics and Pneumatics Laboratory	CO1	Operate and control the hydraulic and pneumatic systems.
			CO2	Identify circuit components and build Hydraulic & Pneumatic circuits for industrial applications .
			CO3	Build hydraulic and pneumatic circuits with/without electrical / electronic control for automation.
			CO4	Engage in updating the technical knowledge about industrial fluid power.
			CO5	Communicate effectively about laboratory work both orally and in writing.
			CO6	Use fluid simulation software to build the circuits.
52	0MEPE361	Finite Element Analysis Laboratory	CO1	Explain Past, Present and Future of FEA and Types of meshing.
			CO2	Formulate and solve one dimensional structural problem
			CO3	Solve static structural, steady state thermal analysis 1D, 2D problems by using ANSYS and computer programming C++ software
			CO4	Communicate effectively, both orally and writing journals.
			CO5	Practice professional and ethical principles during laboratory work.
			CO6	Engage in independent and lifelong learning in the broadest context of technological change.
53	0MEPE362	Advanced Manufacturing Technology Laboratory	CO1	Describe various nontraditional machining processes and their applications
			CO2	Illustrate various types of rapid prototyping process.
			CO3	Perform series of manufacturing operations to prepare composite sheet /pipe
			CO4	Evaluate the material removal rate for various nontraditional machining processes based on process parameters.
			CO5	Explain the work effectively both orally and in writing.
			CO6	Execute teams work effectively to accomplish the assigned responsibilities.
54	0MEPE363	Computational Fluid Dynamics Laboratory	CO1	Develop the simulation model of fluid flow and heat transfer.
			CO2	Interpret the fluid flow and heat transfer for steady and unsteady state.
			CO3	Develop and Interpret the simulation results of 2D and 3D model.
			CO4	Communicate effectively about journals/technical reports.
			CO5	Behave with highest ethical standards with concern to life long learning, and awareness of contemporary issues.
55	0MEPC364	Workshop Practice VI	CO1	Select suitable machining operations and prepare the process sheet required to manufacture the components
			CO2	Perform series of manufacturing dimensions on a component.
			CO3	Prepare the assembly of manufactured sub components.
			CO4	Perform various machining operations precisely with speed and timing.
			CO5	Follow professional and ethical principles during lab work.
56	0MEPR365	Mini ProjectII	CO1	Design, development and testing of components, systems and or processes using modern tools/ techniques and available resources
			CO2	Analyze the results obtained from analytical and or numerical and or experimental methods.
			CO3	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage t projects by maintaining professional and ethical values.
			CO4	Communicate effectively on complex engineering activities, write appropriate project report and make effective presentations.
			CO5	Engage in lifelong learning in the broadest context of technological change.
57	0MEPR366	Vocational Training	CO1	Explain the knowledge acquired during industrial training
			CO2	Demonstrate competency in relevant engineering fields through problem identification and formulation
			CO3	Apply appropriate techniques, resources, and modern engineering tools to solve industrial problems.
			CO4	Work & communicate individually or in team in actual industrial environment, showing engineering & management principles.
			CO5	Present an ability to write technical documents and give oral related to the work completed
			CO6	Demonstrate the knowledge of professional and ethical responsibilities.

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58	0MEPC401	Refrigeration and Air Conditioning	CO1	Explain the need and application of multipressure, multi evaporator refrigeration system
			CO2	Explain the basics of air distribution techniques used in air conditioning systems.
			CO3	Select refrigerant and refrigeration equipments for various applications.
			CO4	Apply the fundamentals of thermodynamics & heat transfer to refrigeration and air conditioning systems.
			CO5	Analyze the performance of various refrigeration & air conditioning systems using psychrometric chart, steam table, ph charts etc.
59	0MEPC402	Internal Combustion Engines	CO1	Compare the different thermodynamic cycles in I.C. engines,
			CO2	Describe the impact of vehicular pollution and ways to reduce or control the pollution,
			CO3	Explain the fuel supply systems and requirement in the engine,
			CO4	Explain the combustion mechanism of S.I. and C.I. engines
			CO5	Evaluate the performance parameters of I.C. engine
60	0MEPE403	Mechanical System Design	CO1	Interpret various design considerations used for designing typical mechanical systems considering aesthetical and ergonomical aspects.
			CO2	Derive appropriate procedure for design of mechanical systems using various theories of failure.
			CO3	Design mechanical systems for different requirements.
			CO4	Compare various design solutions for a given mechanical system.
			CO5	Evaluate optimum design solution for a give mechanical system considering product quality and performance
61	0MEPE404	Advanced Welding Engineering.	CO1	Model mechanism of metal transfer of soldering, brazing process.
			CO2	Choose the appropriate welding process and consumables for given alloy system.
			CO3	Analyze the effect of welding parameters on metallurgical characteristics of weldments with selection of proper filler materials and select the appropriate welding processes for welding different types of ferrous alloys
			CO4	Infer the metallurgical behavior of different alloy system under different welding processes and their influence on mechanical properties of weldments.
			CO5	Design the optimum configurations for weldments.
62	0MEPE405	Design of Thermal Systems	CO1	Explain the Thermal System Characteristics.
			CO2	Calculate the Characteristics of Thermal Systems.
			CO3	Compute Operating variables in Thermal Systems at Steady State
			CO4	Solve Optimization Problems on Heat Rejection in Power Generation
			CO5	Design and Analyze Heat Transfer Equipments
63	0MEPE406	Noise and Vibration	CO1	Describe the basic concepts of noise and vibration,
			CO2	Explain different noise and vibration measuring instruments,
			CO3	Determine natural frequency of mechanical vibrating system/element ,
			CO4	Compute the parameters of vibration isolation system ,
			CO5	Analyze vibratory response of mechanical system/element
64	0MEPE407	Non Destructive Testing	CO1	Choose the appropriate testing techniques as per raw material and manufacturing process.
			CO2	Apply the ultrasonic wave theory for flaw determination using angle probes and calibration blocks
			CO3	Compute the applications of eddy current testing technique.
			CO4	Examine the different inspection techniques under radiography test.
			CO 5	Analyze the surface and subsurface discontinuities by magnetic particle and dye penetrant inspection test.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
65	0MEPE408	Steam Engineering	CO1	Explain working of different boilers, their mountings and accessories.
			CO2	Illustrate different types of condenser, cooling tower & Feed water treatment
			CO3	Identify different techniques used for steam generation
			CO4	Solve numerical related to pressure , area and velocity of nozzle different types of nozzle
			CO5	Analyze thermal efficiency of different Vapour cycles.
66	0ME0E409	IMOR (Industrial Management & Operation Research)	CO1	Explain the principles of management in organizations.
			CO2	Describe structure of small scale industries and Entrepreneurship development program
			CO3	Explain the basics of EDP, SSI and Safety guidelines.
			CO4	Formulate Linear Programming problems for various OR models.
			CO5	Solve various types of problems related with Operational Management.
			CO6	Solve simple Project management and Replacement analysis problems.
67	0ME0E410	Industrial Automation & Robotics	CO1	Explain basic elements of automation systems, types of automation, advanced automation functions and low cost automation.
			CO2	Comprehend effectively utilization of hydraulic and pneumatic systems in automation.
			CO3	Explain electrical and electronic devices of automated control systems.
			CO4	Comprehend specifications, characteristics, applications, anatomy and related attributes of industrial robot.
			CO5	Explain the end effectors, grippers, gripper selection and design.
			CO6	Interpret different programming methods, program statements and different application areas of robotic system.
			CO7	Analyze of transfer lines with and without storage buffers
68	0MEHS412	Human Values and Professional Ethics	CO1	Understand the core human values that shape the ethical behavior of a person.
			CO2	Learn the need of Human values and Professional ethics in life.
			CO3	Understand Harmony at Four levels of life.
			CO4	Understand how values act as an anchor of actions for life.
			CO5	Comply with the moral issues and problems in profession and find the solution to those problems
69	0MEPC451	Refrigeration and Air Conditioning Laboratory	CO1	Identify the components used in refrigeration & air conditioning systems.
			CO2	Determine the performance of various refrigeration & air conditioning systems
			CO3	Follow professional and ethical principles during laboratory work.
			CO4	Communicate effectively, both orally and in writing journals
			CO5	Function effectively as an individual, and as a team member for producing technical reports.
			CO6	Engage in independent and lifelong learning in broadest context of technological change.
70	0MEPC452	Internal Combustion Engines Laboratory	CO1	Identify the different components of internal combustion engine.
			CO2	Interpret the experimental results of I. C. Engine performance testing.
			CO3	Use modern technique to analyze the performance parameters of I. C. Engine.
			CO4	Communicate effectively, both orally and in writing journals,
			CO5	Engage in independent and lifelong learning in the broadest context of technological change.
			CO6	Follow professional and ethical principles during laboratory work
71	0MEPE453	Noise and Vibration Lab	CO1	Illustrate and Carry out measurement of various vibration parameters,
			CO2	Use FFT analyzer to capture different vibration parameters,
			CO3	Function effectively as an individual, and as a team member for performing laboratory work,
			CO4	Communicate effectively, both orally and in writing journals,
			CO5	Engage in independent and lifelong learning in the broadest context of technological change.
			CO6	Follow professional and ethical principles during laboratory work,

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
72	OMEPE454	Non Destructive Testing Lab	CO1	Explain about various methods of Non Destructive Testing.
			CO2	Inspect surface as well as sub surface flaws of the components.
			CO3	Identify use of suitable nondestructive method for particular application.
			CO4	Use non destructive techniques in maintenance practices in industry.
			CO5	Follow the professional practices like maintaining a laboratory journal and completion of work on time.
73	OMEPE455	Steam Engineering Laboratory.	CO1	Demonstrate different measuring instrument used in various test setup.
			CO2	Experiment with steam nozzle, boiler and steam condenser to study their performance.
			CO3	Examine dryness fraction of steam by using separating, throttling and bomb calorimeter.
			CO4	Communicate effectively, both orally and in writing journals.
			CO5	Engage in independent and lifelong learning in the broadest context of technological change.
			CO6	Follow professional and ethical principles during laboratory work.
74	OMEPR456	ProjectI	CO1	Choose & construct the real life institutional or industrial problems relevant to the societal and environmental issues for sustainable development.
			CO2	Formulate, analyze complex engineering problems and give costeffective optimal solution.
			CO3	Design of components, system or processes that meet the specified needs by using advance tools/ techniques/ resources
			CO4	Interpret the impact of solution by considering environmental issues, societal aspects like health, safety etc.
			CO5	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage projects maintaining professional and ethical principles.
			CO6	Communicate effectively on complex engineering activities, design the documentations, write the reports and make effective presentations.
75	OMEPC413	Industrial Engineering	CO1	Apply industrial engineering tools to calculate and improve productivity,
			CO2	Estimate the process time with by different methods,
			CO3	Plan production activities using tools like capacity and aggregate planning,
			CO4	Decide the plant location and design appropriate type of layout and recommend suitable material handling system,
			CO5	Apply different project management techniques,
			CO6	Apply different lean manufacturing tools,
76	OMEPC414	Smart Materials	CO1	Explain the concepts of smart materials.
			CO2	Describe the method of classification of smart materials and the respective characterizes.
			CO3	Determine effective utilization of various smart materials in the process of design of smart systems.
			CO4	Apply conceptual method of integration of sensors, actuators and transducers to form a smart system.
			CO5	Identify the effectiveness of various smart materials for engineering applications
77	OMEPE415	Vehicle Dynamics	CO1	Explain fundamentals of vehicle dynamics and vehicle performance in motion,
			CO2	Describe recent trends in vehicle dynamics.
			CO3	Evaluate performance characteristics of vehicles according to conditions,
			CO4	Illustrate different braking & handling characteristics of vehicle,
			CO5	Identify suspension& ride excitation sources,
78	OMEPE416	Solar Technology	CO1	Explain the impact of use of nonrenewable sources on environment.
			CO2	Explain Solar PV technology.
			CO3	Utilize the technical skills attained in carrying out energy audit.
			CO4	Analyze solar flat plate collector system performance.
			CO5	Design standalone solar energy system.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
79	0MEPE457	Vehicle Dynamics Lab	CO1	Compute dynamic axle load when vehicle in motion,
			CO2	Evaluate performance characteristics of road vehicles,
			CO3	Determine the acceleration and braking performance of a vehicle when provided with specifications,
			CO4	Illustrate the effect of suspension system on ride characteristics,
			CO5	Communicate effectively, both orally and in writing journals.
80	0MEPE458	Solar Technology Lab	CO1	Measure solar irradiation selecting proper equipment.
			CO2	Evaluate performance of flat plate collector and concentrating collector.
			CO3	Evaluate efficiency of standalone solar PV system.
			CO4	Identify and measure performance parameters of solar PV module.
			CO5	Conduct energy audit for energy conservation.
81	0MEPR459	ProjectII	CO1	Estimate financial management of project by applying the engineering & management principles
			CO2	Development of system or processes that meet the specified needs by using advance tools/ techniques/ resources
			CO3	Compare theoretical evaluations or simulations with actual experimental results by applying engineering concepts.
			CO4	Engage in independent and lifelong learning in the project development & management.
			CO5	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage projects maintaining professional and ethical principles.
			CO6	Communicate effectively on complex engineering activities, write effective reports, design documentation and make effective presentations,

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H.O.D.
Mechanical Engineering

Programme Name	:	Mechanical Engineering (Revision-First)		
	PSO	Statement		
	1	**PSO1.** An ability to find out, articulate the local industrial problems and solve with the use of mechanical engineering tools for realistic outcomes.		
	2	**PSO2.** Apply the knowledge of mechanical engineering domains to design and analyze the products or process.		

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
1	IMEBS201	Engineering Mathematics- III	CO1	Solve the Mechanical Engineering problems using Linear Differential Equation,
			CO2	Solve the problems of vector calculus,
			CO3	Construct the Fourier Series for the any function,
			CO4	Evaluate Laplace Transform and inverse Laplace Transform of any function,
			CO5	Solve Algebraic and transcendental Equations using numerical method,
			CO6	Solve the problems on Partial Differential Equation,
2	IMEPC202	Kinematics of Machines	CO1	Explain inversion of mechanisms with their applications.
			CO2	Distinguish different types of power transmitting devices according to their applications.
			CO3	Interpret different terminologies of toothed gears
			CO4	Determine geometric parameters of gears, cams and characteristics of governors.
			CO5	Analyze kinematic behavior of different mechanism by drawing velocity and acceleration diagrams
3	IMEPC203	Thermodynamics	CO1	Illustrate first law and second law of thermodynamics and explain their application to wide range of system
			CO2	Describe entropy, changes in entropy and increase in entropy principle.
			CO3	Determine the availability of different system.
			CO4	Explain governing and troubleshooting of turbine.
			CO5	Evaluate Properties of pure substances
			CO6	Compute performance of Impulse & Reaction turbine.
4	IMEPC204	Strength of Materials	CO1	Explain different types of stresses, strains and elastic constants.
			CO2	Identify and apply a particular theoretical method of stress and strain determinaLion for mechanical elemenLs under various loads.
			CO3	Determine the deOcction of beams under different loading conditions.
			CO4	Apply different theories to determine safe load on the columns.
			CO5	Determine strain energy absorbed in the body due to external load, torsion and bending.
			CO6	Analyze the beam by drawing shear force and bending moment diagram.
5	IMEES205	Materials Science and Metallurgy	CO1	Describe properties of metals, defects and its possible causes,
			CO2	Differentiate various ferrous and non-ferrous metals along with their microstructure,
			CO3	Describe various destructive and non-destructive testing,
			CO4	Select appropriate beat treatment for metals and alloys for particular application,
			CO5	Explain the principle of mechanical testing to evaluate the mechanical properties,
			CO6	Explain powder metallurgy methods and their applications,
6	IMEPC206	Manufacturing Processes and Machine Tools.	CO1	Explain the basic casting process and the various operations involved in casting process,
			CO2	Explain different types of forming and plastic moulding processes,
			CO3	Explain types of joining processes and their applications,
			CO4	Identify and explain the function of the basic components of machine tools and its accessories,
			CO5	Explain working principle and applications of nonconventional machining processes,
			CO6	Select manufactming process and machine tools required to manufacture the component.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
7	1MEMC207	Environmental Studies	CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
			CO3	Write a technical report m team regarding course and impacts of environment related issues.
			CO4	Discuss current concern of environment issues
			CO5	Describe the need of environment protection and ethics.
8	1MEPC251	Kinematics of Machines Lab	CO1	Identify different types mechanisms, 2 power transmission devices and Mechanical energy storing devices
			CO2	Explain the process of experimentation to calculate various parameters effectively
			CO3	Analyze cam profiles velocity and acceleration diagrams of various mechanism and machines effectively using graphical method
			CO4	Perform the experimental task individually and in team in dynamics of machines laboratory ,and interpret the results
			CO5	Respond willingly to questions asked by faculty and asked 2 to involve in experimental task of dynamics of machines laboratory
9	1MEES252	Materials Science and Metallurgy Laboratory	CO1	Evaluate different mechanical properties of materials using various destructive testing techniques with their significance,
			CO2	Estimate percentage phases present in microstructure of ferrous and non- ferrous alloys with their effect on mechanical properties,
			CO3	Follow professional and ethical principles during laboratory work,
			CO4	Communicate effectively, both orally and in writingjournals,
			CO5	Function effectively as an individual, and as a team member for study of microstructure of various metals and alloy,
			CO6	Engage in independent and life-long learning in the use various equipments/ instruments/machines which are used to study structures and properties of metals and alloys,
10	1MEPC253	Workshop Practice -II	CO1	Explain different manufacturing processes and machine tools useful in industries,
			CO2	Prepare a pattern as per drawing,
			CO3	Explain joining operation by application ofTIG/MIG welding,
			CO4	Conduct test on sand to check its various properties,
			CO5	Prepare a component by smithy/ forging operations as per given drawing,
			CO6	Function effectively as an individual, and as a team member for performing experimental task,
			CO7	Follow professional and ethical principles during laboratory work.
11	1MEHS254	General Proficiency Laboratory	CO1	Acquaint etiquettes of formal communicative event and perform better in formal communicative events.
			CO2	Collect relevant information and utilize it effectively, in fomal communicative events.
			CO3	Construct meaningful and logically interwoven extracts necessary for professional correspondence like email professional letters.
			CO4	Write relevant professional e-mails and letters.
			CO5	Adapt m team and will contribute positively to strengthen team performance.
12	1MEPC208	Dynamics of Machines	CO1	Describe dynamic force analysis of slider crank chain mechanism.
			CO2	Solve problems of gear train according to its application.
			CO3	Illustrate the effects of gyroscopic couple in aero-plane, ship, two wheelers and four wheelers.
			CO4	Apply balancing concept while designing machine components.
			CO5	Analyze machines/mechanical system under free vibration and damped vibration.
13	1MEPC 209	Fluid Mechanics	CO1	Explain basic properties of fluid and fluid statics.
			CO2	Identify various types of flow and explain kinematic and dynamics behavior of fluid.
			CO3	Describe the concepts of flow through pipes and various types of losses in pipe flow.
			CO4	Explain the concepts of boundary layer, forces on immersed bodies and dimensionless analysis.
			CO5	Derive various equations in fluid mechanics such as Euler's equation, Bernoulli's equation, Continuity equation etc.
			CO6	Solve the problems related to various concepts of fluid mechanics.
14	1MEPC210	Design of Machine Elements I	CO1	Describe the appropriate selection of material for various machine elements,
			CO2	Explain the functions and working of machine element like joints, levers, power screws and springs,
			CO3	Apply the basic design procedure based on material strength for various components using design data book,
			CO4	Solve problems by applying acquired knowledge of machine elements to compute design dimensions under static conditions,
			CO5	Solve problems on mechanical components subjected to fluctuating/ reversed loading conditions.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
15	1MEPC211	Tools Engineering	CO1	Explain the fundamentals of metal cutting and cutting tools,
			CO2	Explain the fundamentals of press tools operations and it's cutting forces,
			CO3	Determine the effect of cutting parameters on metal cutting,
			CO4	Compute the parameters related with economics of tooling,
			CO5	Conceptual design of drillingjigs and fixtures.
16	1MEPC212	Metrology, Quality Control & Measurement	CO1	Explain construction, working and characteristics or measuring instruments,
			CO2	Determine the least count of instrument and use for the measurement and interpret the data,
			CO3	Identify the measuring parameters f om screw threads, gears and select appropriate measuring instrument,
			CO4	Solve the problems on limits, fits and tolerances and surface roughness,
			CO5	Solve the problems on process control charts.
17	1MEHS213	Economics for Mechanical Engineers	CO1	Explain concept of microeconomics and macroeconomics.
			CO2	Describe forecasting tools of demand and supply management.
			CO3	Explain different monetary policy tools.
			CO4	Explicate elements of costs related to production.
			CO5	Illustrate basic concept of budget and its analysis.
18	1MEPC255	Dynamics of Machines Lab	CO1	Calculate M.I of bifilar, Trifilar & Compound pendulum.
			CO2	Perform the experiments on Gyroscope, Epicyclic gear train, Governor, balancing of rotary masses, Longitudinal vibrations of helical springs andlogarithmic de
			CO3	Solve the problems on Gear trains & Balancing or reciprocating masses.
			CO4	Use the computer aided force analysis software for slider crank mechanism or four bar mechanism
			CO5	Communicate effectively, both orally and in writing journals.
			CO6	Respond willingly to questions asked by faculty and asked 2 to involve inexperimental task of dynamics of machines laboratory. (A)
19	1MEPC256	Fluid Mechanics Laboratory	CO1	Identify various types of flow by using Reynolds Experiment, flow pattern, velocity orofile.
			CO2	Perform various experiments to calculate the discharge through various now measuring devices and coefficient of friction vulues for different oipes.(K3)
			CO3	Communicate effectively, both orally and in writing journals, (82)
			CO4	Function effectively as an individual, and as a team in nuid mechanics laboratory and interpret the results.
			CO5	Follow professional and ethical principles during laboratory work.
20	1MEPC257	Metrology,Quality Control & Measurement Laboratory	CO1	Explain different technologies used in metroJogy, quality control & measurement domain,
			CO2	Demonstrate the construction and working of various instruments,(K.2)
			CO3	Use measuring instruments and equipments to measure and calculate various parameters,
			CO4	Communicate effectively, both orally and in writingjournals,
			CO5	Follow professional and ethical principles during laboratory work.
21	1MEPC258	CAD Laboratory	CO1	Prepare solid, as Sembly, surface model 2 with suitable constraints and 2D drafting using 30 modeling software.
			CO2	Demonstrate kinematics of simple asSembly using 30 modeling software.
			CO3	Communicate effectively, both orally and in w1itingjournals.
			CO4	Practice professional and ethical behavior to carry forward in their life.
			CO5	Recognize 3 the need of modeling software and utilize it for their project work.
22	1MEPC259	Workshop Practice - III	CO1	Plan the sequence of machining operations and prepare process sheet to manufacture a component and implement the same.
			CO2	Perform various machining operations on Lathe machine.
			CO3	Prepare the design procedure and conceptual drawings of assembly of jig and fixture for a given component.
			CO4	function effectively as an individual, and as a team member for performing experimental task.
			CO5	Follow professional and ethical principles during laboratory work.
23	TY.1MEOE301	Industrial Automation & Robotics	CO1	Explain basic elements of automation systems, types of automation, advanced automation functions and low-cost automation and actuators,
			CO2	Illustrate effectively utilization of hydraulic and pneumatic systems in automation.
			CO3	Comprehend specifications, characteristics, applications, anatomy and related attributes of industrial robot.
			CO4	Interpret different programming methods, program statements and di application areas of robotic system
			CO5	Analyze of transfer lines with and without storage buffers.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
24	1MEOE302	Composite Material	CO1	Explain the basics of composite material and their significance.
			CO2	Descdbe the fabrication techniques of different types of composite materials.
			CO3	Distinguish the phases & characteristics of the composite materials.
			CO4	Identify the strengthening mechanics adopted in a particular type of composite material.
			CO5	Describe the significance of advanced materials.
25	1MEOE303	Solar Technology	CO1	Understand the fundamentals of solar energy and its conversion techniques
			CO2	Explain the different solar applications such as low temperature, medium and high temperature, PY cell
			CO3	Analyze different solar collector and its performance.
			CO4	Describe importance of energy audit and economics analysis
			CO5	Design of solar energy system like solar PY system.
26	1MEPC301	Turbo Machinery	CO1	Explain the construction, working and applications of turbines, pumps, air compressors, fans and blowers.
			CO2	Apply similarity principles related to the performance of turbines and pump.
			CO3	Construct the performance characteristics of turbines, pumps, air compressors, fans and blowers.
			CO4	Compute various design and operational parameters of turbines, pumps, air compressors, fans and blowers.
			CO5	Select an appropriate turbo machine for given application.
27	1MEPC302	Heat and Mass Transfer	CO1	Explain the mechanism and basic concept of heat and mass transfer
			CO2	Apply the boundary conditions in equation of heat and mass transfer
			CO3	Derive different forms of heat equations in heat and mass transfer
			CO4	Solve the problems on conduction, convection, and radiation heat transfer
			CO5	Analyze the perfonnance of heat exchanger.
28	1MEPC303	Design of Machine Elements II	CO1	Explain considerations and methodologies used for the design and selection of gears, shafts, keys, couplings and bearings.
			CO2	Solve the design problems of gears and bearings using design data book and manufacturer's catalogue.
			CO3	Use the standard design procedures of shaft, key, coupling, and anti-friction bearings.
			CO4	Select the bearing by using manufacturer's catalogue.
			CO5	Design and/or select the components of a transmission system for static and dynamic loading conditions and by using the standard design procedure and design data book.
29	1MEPC304	Industrial Hydraulics and Pneumatics	CO1	Explain the principles, working, ISO/JIC symbols, applications of hydraulic, pneumatic systems and electro systems.
			CO2	Discuss the construction and working of hydraulic and pneumatic system components.
			CO3	Solve the numerical on pump power, cylinder force and speed etc.
			CO4	Construct the hydraulic and pneumatic circuits for industrial application.
			CO5	Design of hydraulic and pneumatic systems for industrial application.
30	1MEPE305	Power Plant Engineering	CO1	Describe present status and future trends in power generation.
			CO2	Apply the principle of thennodynamic to analyze different power plant.
			CO3	Explain functions, components and working principle of different power plants.
			CO4	Solve various problems related to power plant engineering
			CO5	Discuss the measuring instrument and pollution controls in power plant.
31	1MEPE306	Mechanical System Design	CO1	Explain design considerations used in products or various mechanical systems.
			CO2	Derive the expression to find out the dimensions of components of various mechanical systems.
			CO3	Apply the considerations used for the design and selection of components of various mechanical systems.
			CO4	Design of various mechanical systems for the given specifications.
			CO5	Evaluate optimum design solution for a given mechanical systems considering product quality and performance.
32	1MEPE307	Advanced Manufacturing Technology	CO1	Explain various materials and advanced manufacturing teclmiques with a schematic diagram.
			CO2	Select suitable advanced manufacturing processes and materials for a particular application.
			CO3	Choose an appropriate welding process and the consumables depending upon the requirement.
			CO4	Examine the composite material in terms of various properties.
			CO5	Analyze various process parameters involved in different advanced machining processes.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
33	IMEPC351	Turbo Machinery Laboratory	CO1	Identify the various parts of turbines, pumps and blower
			CO2	Compute the operational parameters of turbines, pumps, and blowers.
			CO3	Construct the performance characteristics of turbines, pumps and blowers.
			CO4	Compare the experimental results of turbo machineries with the standard performance curves.
			CO5	Evaluate the performance characteristics of various turbines, pumps and blower
34	IMEPC352	Heat and Mass Transfer Laboratory	CO1	Carry out experiment and calculate various heat transfer parameters,
			CO2	Interpret the experimental results of heat transfer properties.
			CO3	Communicate effectively, both orally and in writing journals,
			CO4	Function effectively as an individual, and as a team member for performing laboratory work,
			CO5	Follow professional and ethical principles during laboratory work,
35	IMEPC353	Design of Machine Elements - II Laboratory	CO1	Explain types of gearboxes and design procedures for optimum design of gearboxes for machine tool applications.
			CO2	Select the belt, pulley using manufacturer's catalogue.
			CO3	Design the multispeed gearbox spur/helical/bevel/worm gearbox.
			CO4	Compare various belt, pulley, bearings, gears available in market
			CO5	Prepare a report on multispeed gearbox
36	IMEPC354	Industrial Hydraulics and Pneumatics Laboratory	CO1	Explain the construction and working of hydraulic and pneumatic system components.
			CO2	Demonstrate the maintenance and troubleshooting of fluid power systems.
			CO3	Show the operation and control of hydraulic and pneumatic systems.
			CO4	Construct hydraulic & pneumatic circuits for industrial applications.
			CO5	Use fluid simulation software to build the circuits.
37	IMEPC355	Computer Aided Manufacturing Laboratory	CO1	Explain different terms of CAD, CAM and CNC machine.
			CO2	Write part programs for various operations of CNC machine using G and M codes.
			CO3	Develop skills in using CAM simulation software to generate tool path, G and M codes.
			CO4	Analyze the part programs of any industrial part and improvise it.
			CO5	Produce a part on a CNC machine individually or in group using CAD/CAM.
38	IMEOE304	Industrial Management & Operation Research	CO1	Explain the principles of management in organizations. Basics of EDP SSI and safety guidelines.
			CO2	Describe structure of small scale industries and Entrepreneurship development program.
			CO3	Formulate Linear Programming problems for various OR models.
			CO4	Solve various types of problems related with Operational Management.
			CO5	Construct network diagrams and determine critical path, floats for deterministic and PERT networks.
39	IMEOE305	Non Destructive Testing	CO1	Choose the appropriate testing techniques as per raw material and manufacturing process.
			CO2	Apply the ultrasonic wave theory for flaw determination using angle probes and calibration blocks
			CO3	Analyze the surface and subsurface discontinuities by magnetic particle inspection test.
			CO4	Compute the applications of eddy current testing technique.
			CO5	Examine the different inspection techniques under radiography test.
40	IMEOE306	Computational Fluid Dynamics	CO1	Explain the methodology of grids generation and discretization.
			CO2	Solve the governing equations for fluid flow.
			CO3	Apply various discretization methods to fluid flow problems.
			CO4	Interpret the suitable turbulence models to engineering fluid flow problems.
			CO5	Analyze the effect of solution algorithm for pressure velocity coupling in steady flow.
41	IMEPC308	Control Engineering	CO1	Explain the type of control system, their applications, limitations & concepts of feedback.
			CO2	Compute the analogies of the given physical system by using grounded chair representation.
			CO3	Use technique of linearization and block diagram algebra.
			CO4	Calculate transient response using Laplace transform and time specifications.
			CO5	Identify the stability of control systems using Root-Locus Technique and Routh's Stability Criteria.
			CO6	Analyze control systems using frequency response technique (Bode plot).

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
42	1MEPC309	Refrigeration and Air Conditioning	CO1	Explain the basics of Refrigeration and air conditioning systems.
			CO2	Apply the basic of VCR to multi-pressure, multi evaporator refrigeration system
			CO3	Select refrigerant for various applications by refening to standards
			CO4	Evaluate cooling and heating loads in an air-conditioning system.
			CO5	Analyze the performance of various refrigeration & air conditioning systems using psychrometric chart, steam table, p-h charts etc.
43	1MEPC310	Noise and Vibration	CO1	Explain fundamentals of noise, vibration and measuring instruments,
			CO2	Determine natural frequency of mechanical vibrating system/element,
			CO3	Analyze vibratory response of mechanical system/element,
			CO4	Illustrate the mechanical system to reduce the vibrations,
			CO5	Estimate the noise and vibration parameters of mechanical system.
44	1MEPC311	Mechatronics and Robotics	CO1	Demonstrate integration of knowledge from different disciplines in order to realize engineering and consumer products consisting of sensors, actuators etc.
			CO2	Select the components of signal conditioning for acquisition of data from field devices
			CO3	Make use of knowledge gained from microprocessor, microcontroller and digital circuits in various applications.
			CO4	Apply fundamentals of ladder diagram and PLC to construct logic for lighting and sequencing operations.
			CO5	Develop the]adder logic used to program PLC for real time cases such as workstation for stamping, drilling etc.
45	1MEPE312	I. C. Engines	CO1	Explain the fundamental of LC. Engine, fuel Supply, lubrication &cooling System in I.C. engines
			CO2	Describe the impact of vehicular pollution and ways to control the pollution.
			CO3	Illustrate the combustion mechanism of S.I. and C.I. engines.
			CO4	Select the LC. Engine and pollution control devices for various applications.
			CO5	Evaluate the performance parameters of LC. Engine
46	1MEPE313	Machine Tool Design	CO1	Describe general design requirements of machine tool system.
			CO2	Apply fundamental laws and principles of machine tool design.
			CO3	Determine Forces, Velocities and Power Requirements during metal cutting
			CO4	Design different elements of machine tool system like design of beds, guide ways, sideways, spindle etc.
			CO5	Analyze machine tool system as per designed constraints.
47	1MEPE314	Foundry and Forming Technology	CO1	Explain the principle and working of casting and fon]ing processes.
			CO2	Estimate potu·ing time, solidification rate and design gating system for casting process
			CO3	Describe mechanism of metal forming techniques and calculate load required for flat rolling.
			CO4	Apply the basic principles to design of tools for forming operations
			CO5	Select appropriate processing techniques for the given job assignment.
48	1MEPC356	Refrigeration and Air Conditioning Laboratory	CO1	Identify the components used in refrigeration & air conditioning systems.
			CO2	Determine the performance of various refrigeration & air conditioning systems
			CO3	Use the refrigeration tools and equipments efficiently.
			CO4	Compare various refrigeration/ Air conditioning products available in market.
			CO5	Prepare a report on refrigeration and air conditioning applications in industry.
49	1MEPC357	Noise and Vibration Laboratory	CO1	Explain fundamentals of noise, vibration and measuring instruments,
			CO2	Determine natural frequency of mechanical vibrating system/eleme1lt,
			CO3	Illustrate and Carry out measurement of various vibration parameters,
			CO4	Analyze vibratory response of mechanical system/element,
			CO5	Use FFT analyzer to capture different vibration pasameters.
50	1MEPC358	Mechatronics and Robotics Lab	CO1	Explain the basics of sensors, signal conditioners, digital circuits and PLC
			CO2	Apply the ladder programming method to simple operations like sequencing .
			CO3	Validate characteristics of different sensors.
			CO4	Simulate the ladder logic for industrial applications using PLC and RS Logix software.
			CO5	Apply the knowledge gained to build simple mechatronics systems.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
51	1MEPE359	I. C. Engines Lab	CO1	Identify the different components of internal combustion engine.
			CO2	Interpret the experimental results of I. C. Engine performance testing.
			CO3	Use modern technique to analyze the performance parameters of I. C. Engine.
			CO4	Compare the performance characteristics of different I.C. Engines available in market
			CO5	Prepare report for industrial visit to engine manufacturing or maintenance center
52	1MEPE360	Machine Tool Design Lab	CO1	Describe general design requirements of machine tool system
			CO2	Apply fundamental laws and principles of machine tool design
			CO3	Determine Forces, Velocities and Power Requirements of machine tools like bed of lathe machine, drilling machine etc
			CO4	Design different elements of machine tool system like lathe beds, column and radial arm of radial drilling machine etc
			CO5	Analyze machine tool system as per designed constraints
53	1MEPE361	Foundry and Forming Technology Laboratory	CO1	Explain different testing methods for moulding sand.
			CO2	Experiment withsand testing equipments for identifying sand properties.
			CO3	Identify various process for preparation of core, core print and gating system in metal casting processes.
			CO4	Perform the experiments on forging setup.
			CO5	Evaluate the strength of moulding sand used for casting.
54	1MEPR362	Mini Project	CO1	Identify the real life institutional, societal, industrial problems/issues for sustainable development.
			CO2	Design, development and testing of components, systems and or processes using modern tools/ techniques and available resources using contemporary knowledge.
			CO3	Analyze the results obtained from analytical and or numerical and or experimental methods.
			CO4	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage the projects by maintaining professional and ethical values.
			CO5	Communicate effectively on complex engineering activities, write appropriate project report and make effective presentations.
			CO6	Engage in life-long learning in the broadest context of technological change.
55	1MEOE401	Total Quality Management	CO1	Explain the techniques and philosophy of Total Quality Management (TQM).
			CO2	Make use of statistical process control techniques to control the quality of the process.
			CO3	Identify the system reliability using different tests and find the loss functions.
			CO4	Organize different customers, feedback, organizational structures, internal departments, their role and responsibilities in TQM.
			CO5	Select an appropriate quality certification like ISO series of standards with its importance.
56	1MEOE402	Reliability Engineering	CO1	Explain the basics concepts of reliability, maintainability and availability.
			CO2	Apply fundamentals ofreliability to estimate various reliability measures.
			CO3	Calculate system reliability using basic reliability models.
			CO4	Estimate maintainability and availability characteristics.
			CO5	Analyze reliability of a given system/configuration using various reliability techniques.
57	1MEOE403	Renewable Energy Engineering	CO1	Describe need & working principles of different energy sources.
			CO2	Evaluate various parameters of energy resources.
			CO3	Analyze various renewable energy sources utilized in power plants.
			CO4	Apply energy management principles to enhance energy related business.
			CO5	Distinguish the performance of various power plants on the basis of availability and economics.
58	1MEPC401	Vehicle Engineering	CO1	Explain components of automobile, modern trends, techniques used in industries.
			CO2	Identify various types of automobile layouts as per drive given to wheels, automobile bodies and materials used for the same.
			CO3	Demonstrate various electrical systems like lighting, starting charging and its construction and working principle.
			CO4	Resolve the problems related with various systems for the automobile.
			CO5	Analyse techniques used in brake system, steering system.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
59	IMEPC402	Finite Element Analysis	CO1	Illustrate the fundamental concepts, equations of equilibrium, Stress-strain relations and the principle of potential energy and approximations of differential equations.
			CO2	Develop finite element formulations by considering the 1 D problem, just as Shape function, element stiffness and boundary conditions.
			CO3	Apply the finite element formulations for two dimensional plane stress and plane strain problems using constant strain triangle.
			CO4	Compute displacement, stress and strain for two dimensional elements
			CO5	Analyze the steady state heat transfer using Galerkins approach.
60	IMEPE403	Computational Fluid Dynamics	CO1	Explain the methodology of grids generation and discretization.
			CO2	Solve the governing equations for fluid flow.
			CO3	Apply various discretization methods to fluid flow problems.
			CO4	Interpret the suitable turbulence models to engineering fluid flow problems.
			CO5	Analyze the effect of solution algorithm for pressure velocity coupling in steady flow.
61	IMEPE404	Condition Monitoring	CO1	Understand the types monitoring methods and maintenance methods.
			CO2	Analyze machine vibrations to diagnose mechanical faults in rotating machines.
			CO3	Analyze the mechanical faults in the machines and systems.
			CO4	Apply the knowledge of condition monitoring for preventive maintenance of machines.
			CO5	Evaluate the balancing conditions and carry out site balancing.
62	IMEPE405	Non-Destructive Testing	CO1	Explain the different inspection techniques under radiography test.
			CO2	Select the appropriate testing techniques as per raw material and manufacturing process.
			CO3	Apply the ultrasonic wave theory for flaw determination using angle probes and calibration block.
			CO4	Analyze the surface and subsurface discontinuities by magnetic particle inspection dye penetrant test.
			CO5	Compute the parameters of eddy current testing technique.
63	IMEPE406	Energy Management	CO1	Explain the various measures for energy conservation and financial implications for various thermal utilities.
			CO2	Examining the performance of thermal systems using energy management principles and energy audit.
			CO3	Compute the various techniques of waste heat recovery and cogeneration.
			CO4	Analyze the methods of energy conservation for air conditioning, heat recovery and thermal energy storage systems.
			CO5	Evaluate energy projects on the basis of economic and financial criteria.
64	IMEPE407	Reliability Engineering	CO1	Explain the basics concepts of reliability, maintainability and availability.
			CO2	Apply fundamentals of reliability to estimate various reliability measures.
			CO3	Calculate system reliability using basic reliability models.
			CO4	Estimate maintainability and availability characteristics.
			CO5	Analyze reliability of a given system/configuration using various reliability techniques.
65	IMEPE408	Industrial Engineering	CO1	Explain different techniques used to improve the productivity and production.
			CO2	Estimate the process time using different work measurement techniques.
			CO3	Identify best sequence and schedule of various jobs and machines.
			CO4	Apply different inventory control and project management techniques.
			CO5	Analyze the plant location and design appropriate type of layout with suitable material handling system.
66	IMEPC451	Finite Element Analysis Laboratory	CO1	Illustrate structural analysis process for mechanical components using Finite Element Software (ANSYS),
			CO2	Use computer programming C++ software to analyze mechanical components,
			CO3	Solve static structural, steady state thermal analysis 1 D, 2D problems by using ANSYS software,Workbench.
			CO4	Analyze 30 components with stress concentration geometry using ANSYS Workbench.
			CO5	Evaluate buckling analysis of column using ANSYS.
67	IMEPE452	Computational Fluid Dynamics Laboratory	CO1	Understand the various applications of CFD tool.
			CO2	Create the fluid model by using design modular
			CO3	Develop an effective mesh to fluid model.
			CO4	Solve the governing equations iteratively by applying the suitable boundary condition.
			CO5	Interpret the flow pattern (fluid flow and heat transfer) and results obtained.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
68	1MEPE453	Condition Monitoring Laboratory	CO1	Select the proper type of condition monitoring method to be apply for maintenance of a machines.
			CO2	Analyze machine vibrations to diagnose mechanical faults in rotating machines.
			CO3	Demonstrate an ability to rectify the mechanical faults in the machines and systems.
			CO4	Apply the knowledge of condition monitoring for preventive maintenance of machines.
			CO5	Evaluate the balancing conditions and carry out site balancing.
69	1MEPE454	, Non Destructive Testing Laboratory	CO1	Identify use of suitable non-destructive method for particular application.
			CO2	Inspect surface flaws of the components using visual and liquid penetrant testing.
			CO3	Use magnetic particle inspection method for identification of surface and subsurface defect.
			CO4	Apply Ultrasonic testinp; method for welding joint and shaft inspection.
			CO5	Analyze the metal structure using microscopic examination process.
70	1MEPR455	Project	CO1	Identify the real life practical problem relevant to the industry, societal, health & environmental issues for sustainable development.
			CO2	Formulate a practical problem in real life to explore for its possible solution after suitable review of literature.
			CO3	Analyze the feasibility of different mechanisms/techniques/process.
			CO4	Analyze the problem and give suitable cost-effective optimal solution on the basis of engineering knowledge
			CO5	Design of components, system or process that meet the specified needs by using. advance tools/ techniques/ resources
71	1MEHS409	Project and Finance Management	CO1	Explain the functions of management in organizations.
			CO2	Categorize different responsibilities , principles and polices of evaluate the management and material management
			CO3	Make use of. Purchasing cycle, purchase policies & procedures to evaluate the purchase performance
			CO4	Classify financial sources for business management.
			CO5	Prepare project management plan for the given pro blem.
72	1MEMC411	Constitution of India	CO1	Explore the basic features and modalities about Indian constitution.
			CO2	Differentiate the functioning of Indian parliamentary system at the center and state level.
			CO3	Describe different aspects of Indian Legal System and its related bodies.
			CO4	Discuss different laws and regulations related to engineering practices.
			CO5	Correlate role of engineers with different organizations and governance models.
73	1MEPR459	Internship/Project	CO1	Design of components or system or process that fulfills the specified need with suitable consideration for the industry, public health, safety and with societal & environmental considerations.
			CO2	Innovate and implement ideas to working model or program for the conceotualize idea bv using advance tools/ techniques/ resources.
			CO3	Estimate financial management of project by applying the engineering.& management orincioles.
			CO4	Develop components or system or process with rea I istic constraints using manufacturing resources.
			CO5	Synthesize the outcome of the problem and validate findings on the basis of experimentation.

Programme Name	:	Mechanical Engineering (Revision 0)
	PSO	Statement
	1	PSO1. Ability to apply electrical engineering knowledge, skills for testing, control & maintenance of electrical systems such as Machines, Power Systems, Drives& Automation.
	2	PSO2. Ability to identify problems in the diversified areas of Electrical Engineering and determine the hardware or software solutions to support the Societal, Environmental & Industrial needs.

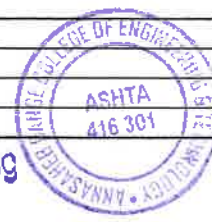| Sr.No.	COurse COde	Course Name	CourseOutcome	CO Statement
1	0MEDE501	Advanced Design Engineering	CO1	Implement the analysis of variance and various analysis.
			CO2	Analyze factors affecting fatigue behavior and mechanism of creep
			CO3	Integrate optimization techniques for multi variable's approximation methods.
			CO4	Instantiating the behavior and properties of composites.
			CO5	Hypothesize the procedure for selection of material and processes for mechanical components.
			CO6	Formulate the design techniques for gears, springs and various mechanical elements
2	0MEDE502	Advanced Mechanics of Solids	CO1	Classify engineering materials and differentiate their mechanical behavior
			CO2	Differentiate composites with respect to various isotropic materials
			CO3	Understand different processing techniques used to manufacture polymer composites
			CO4	Solve for stresses and strains in the lamina
			CO5	Solve for stresses and strains and analyse the laminate using various failure theories
			CO6	Design and analyze laminated structures
3	0MEDE503	Advanced Mechanics of Solids	CO1	Analysis of plane stress and plane strain.
			CO2	Analyze the two dimensional problems in rectangular and polar coordinates.
			CO3	Analyze torsion induced in shafts, ellipt\cal bars and rectangular bars.
			CO4	Develop the skill to solve the problems related to contact stresses.
4	0MEDE504	Design for Sustainability	CO1	Explain basics of sustainable this level of course, life sustainability the
			CO2	To use an appropriate methodology to analyze and improve product design considering sustaibinility and product life cycle issues.
			CO3	Compare cognitive the level) life cycle cost models and select suitable model for a given application
5	0MEDE505	Tribology	CO1	Explain the theories of Tribology, friction and wear mechanisms
			CO2	Apply principle of hydrodynamic lubrication for design of bearing.
			CO3	Analyze the hydrostatic bearing for minimum energy loss.
			CO4	Apply Reynolds equation for designing gas and elastohydrodynamic lubrication system.
			CO5	Select appropriate surface treatment for minimum wear and high corrosion resistance.
6	0MEDE506	Material Handling Equipment Design	CO1	Understand materials handling system which are essential for industries ranging from heavy works to semiconductor devices manufacturing.
			CO2	Differentiate practically oriented needs of industry.
			CO3	Select th materials handling systems for flow, transport and assembly operations in production lines.
7	0MEDE507	Process Equipment Design	CO1	Distinguish in the types of equipment used in the process industry and their general procedure of design.
			CO2	Apply various design codes in process equipment design.
			CO3	Apply the principles of process equipment of design, the mechanical aspects of the design and operation of process equipment , including safety considerations
			CO4	Understand the detailed designs of several process equipments.
			CO5	Develop knowledge in planning, manufacture, inspection, erection of process equipment and and Process Control.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
8	0MEDE508	Advanced Optimization Techniques	CO1	Conclude optimization problems
			CO2	Apply the concept of optimality criteria for various types of optimization problems.
			CO3	Develop variance analysis for a given problem using excel sheet
			CO4	Develop solutions for various constrained and unconstrained problems in single variable as well as multivariable
			CO5	Apply the methods of optimization in real life situation.
9	0MEDE509	Reverse Engineering	CO1	Understand scope of reverse engineering in product development.
			CO2	Apply various techniques of reverse engineering along with software's in prototyping
			CO3	Analyze the process of the reverse engineering.
			CO4	Integrate data management system in the reverse engineering.
			CO5	Use the formal and structured methods in reverse engineering.
			CO6	Visualize process of reverse engineering in real life case studies.
10	0MEDE510	Experimental Stress Analysis	CO1	Understand the overall concepts of stress/strain analysis by experimental means
			CO2	Differentiate Coating Methods for stress analysis.
			CO3	Analyze photo elastic technique to stress analysis
			CO4	Explain the concept of strain gages and its applications
			CO5	Calculate plane waves and spherical waves intensity
11	0MEDE511	Micro Electro Mechanical Systems	CO1	Compare standard microfabrication techniqus and the issues surrounding them
			CO2	Identify the major classes, components, and applications of MEMS devices/systems available commercially
			CO3	Distinguish the unique requirements, environments, and applications of MEMS
			CO4	Apply knowledge of microfabrication techniques and applications to the design
12	0MEDE551	Simulation and Analysis Lab.I	CO1	Identify and analyze practical problems
			CO2	Model the given problem and use experimentation tools required for the same
			CO3	Analyze the air conditioning system and hydraulic, pneumatic system with reference to experimental results.
			CO4	Communicate effectively about laboratory work in writing journals/technical reports
			CO5	Behave with highest ethical standards with concern to life long learning, and awareness of contemporary issues.
13	0tvIBDE513	Advanced Finite El"ment Methods	CO1	Explain modelling and descretization technique, principle of potential energy, variational and weighted residual methods.
			CO2	Analyze linear, 1h quadratic and higher order elements. Formulations of shape functions for these elements
			CO3	Demonstrate the analysis aspects of plate bending and shell elements.
			CO4	Develop the ability to solve 1D, 2D and 3D structural problems using FEM and its validation with commercial software.
14	0MEDE514	Analysis and Synthesis of Mechanisms	CO1	Able to perform velocityacceleration analysis of complex mechanisms
			CO2	Analysis of curvature theory using Euler Savy equation, Bobillier constructions.
			CO3	Synthesis of fourbar mechanisms for different angular velocities and accelerations using complex numbers.
15	0MEDE515	Advanced Mechanical Vibrations	CO1	Understand the causes and effects of vibration in mechanical systems and their classification
			CO2	Develop 1h schematic models for physical systems and formulate governing equations of motion
			CO3	Understand the role of damping, stiffness and inertia in mechanical systems
			CO4	Calculate free and forced vibration responses of multi degree freedom systems using modal analysis
			CO5	Analyze rotating and reciprocating systems and design machine supporting structures, vibration isolators and absorbers.
16	0MEDE516	Fracture Mechanics	CO1	Differentiate the design approach and fracture mechanics approach
			CO2	Solve the numericals of design problems using the fundamemais of LEFM
			CO3	Analyse the suitability of frature testing specimen and evaluate the fracture toughness of the material
			CO4	Apply the FailSafe principle and predict the service life of to the components undergoin2 fatigue failure
			CO5	Understand the difference in theories of LEFM and EPFM and apply EPFM theories to find out fracture toughness of ductile materials
17	0MEDES17	Noise and Vibration Control of Machines	CO1	Design the machines and systems with minimum noise and vibration.
			CO2	Solve the contemporary problems in rotating machines related to noise and vibrations
			CO3	Apply knowledge of condition monitoring for preventing maintenance of machinery

Sr.No.	COurse C0de	Course Name	CourseOutcome	CO Statement
18	0MEDE518	Rotor Dynamics	CO1	Understand the causes and effects of torsional vibrations in systems.
			CO2	Explain the analysis of simple rotor systems.
			CO3	Understand the role of gyroscopic effects in rotors.
			CO4	Analyse gyroscopic effects in rotors and instability in rotating machines.
			CO5	Apply measurements and diagnostics technique for condition monitoring of rotating machinery.
19	0MEDE519	Dynamics of Road Vehicles	CO1	Summarize the principles underlying the development and design of road vehicles under the influence of dynamic loads.
			CO2	Analyze the performance and establish the design specifications for the acceleration and braking conditions.
			CO3	Analyze the conventional road vehicles for better ride comfort.
			CO4	Develop an appreciation for the need of a modern technological approach to reduce the maintenance
			CO5	Summarize the new developments to serve ·the changing needs of the educational and professional communities.
20	0MEDE520	Advanced Machine Tool Desigr:	CO1	Detennine the basic needs of the machine tool component design
			CO2	Interpret the knowledge of designing the gear boxes for stepped drive systems in the machine tools.
			CO3	Coherence the various methods of controls of the machine tools.
			CO4	Construct and design the various elements of machine tool systems.
			CO5	Distinguish the Various controls and their importance in every field.
			CO6	Propose the N.C. system for machine tool and Designing of Special Purpose Machine and Specific Purpose Machines
21	0MEDE521	Theories of optimum Design	CO1	Understand scope of optimization in product design and development.
			CO2	Apply various optimization techniques product design and development.
			CO3	Apply Taguchi technique for optimization in product design and development.
			CO4	Analyze the process of the system design optimization.
			CO5	Use the various optimization techniques to optimize design parameters of mechanical components.
22	0MEDE522	Reliability Engineering	CO1	Explain basics of reliability. maintainability and availability and dirierentiate among them.
			CO2	Estimate parameters of the distributions using probability plotting paper
			CO3	Evaluate system reliability using various techniques.
			CO4	Apply fundamentals to estimate mai mainability and availability characteristics.
			CO5	Analyze field failure data for reliability analysis
			CO6	Apply the fundamentals of reliability and life testing to estimate reliability of component/ system.
23	0MEDE523	Advanced Robotics	CO1	Understand basic elements and types of automation systems get familiar advanced industrial automation.
			CO2	Comprehend effectively utilization of knowledge Manipulator Kinematics and Robot Dynamics concepts including Trajectory Planning.
			CO3	Understand effectively utilization various robotic sensors and controllers.
			CO4	Comprehend effectively robot programming methods and associated developments in robot technology at micro level.
24	0MEDE553	Simulation and Analysis Lab.11	CO1	Identify and analyze practical problems
			CO2	Model the given problem and use experimentation tools required for the same
			CO3	Analyze the structural and thermal systems with refrence to experimental results.
			CO4	Communicate effectively about laboratory work in writing journals/technical reports.
			CO5	Behave with highest ethical standards with concern to life long learning, and awareness of contemporary issues.
25	0MEDE652	Dissertation Phase I	CO1	Conduct the literature review and Identify research problem from literature survey
			CO2	Prepare research design for research problem.
			CO3	Present the work carried out.
			CO4	Prepare the synopsis report for the· dissertation.
26	0MEDE653	Disser:tation Phase II	CO1	Conduct the literature review and Identify research problem from literature survey
			CO2	Prepare research design for research problem.
			CO3	Present the work carried out.
			CO4	Prepare the review paper on the dissertation.

H.O.D.
Mechenical Engineering

Programme Name	:	Electricalcal Engineering (Revision - Zero)

PSO	Statement
1	PSO1. Ability to apply electrical engineering knowledge, skills for testing, control & maintenance of electrical systems such as Machines, Power Systems, Drives& Automation.
2	PSO2. Ability to identify problems in the diversified areas of Electrical Engineering and determine the hardware or software solutions to support the Societal, Environmental & Industrial needs.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	0EEBS201	Applied Mathematics –III	CO1	Demonstrate basic knowledge of Laplace transform, Fourier series and Ztransforms.
			CO2	Solve the problems on Fourier Series, Laplace Transform and Z- Transform.
			CO3	Make use of Linear Differential Equation with constant coefficients to solve the Electrical Engineering problem.
			CO4	Solve the problems of vector calculus.
			CO5	Demonstrate numerical ability to solve the problem.
2	0EEPC202	Electrical Circuits & Networks	CO1	Use network techniques, like node analysis and mesh analysis, to write equations for various linear circuits.
			CO2	Apply network theorems to analyze various circuits and networks.
			CO3	Calculate initial conditions for current and voltage in first order and second order circuits.
			CO4	Derive resonance condition in ac circuits, and solve ac circuits in sinusoidal steady state conditions.
			CO5	Calculate and correlate two port network parameters.
			CO6	Apply the transform analysis to linear circuits and systems.
3	0EEPC203	Electrical Engineering Materials	CO1	Understand the different properties of Conducting, Insulating, Magnetic and Dielectric Materials in the Electrical Engineering
			CO2	Understanding the properties of solid, liquid and gaseous of the insulating materials
			CO3	Explain the phenomenon of the polarization mechanism which use for the Dielectric in the Capacitor
			CO4	Evaluate Conducting, Insulating and Magnetic Materials use in the Electrical Engineering
			CO5	Explain the construction, working and application of the new methods of the renewable energy sources
			CO6	Select the particular battery use for various applications
4	0EEPC204	Analog Electronics	CO1	Classify different characteristic of analog electronic components.
			CO2	Compare different signals using ICs.
			CO3	Describe Applications of OP-AMP
			CO4	Explain semiconductor devices and its applications.
			CO5	Solve numerical based on analog electronic circuits.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
5	0EEPC205	Electrical Measurements	CO1	Explain various concepts of measuring instruments (Analog/Digital), their classification, working principle and range extension technique.
			CO2	Explain different methods for measurement of electrical parameter such as power, energy, resistance, inductance etc.
			CO3	Extend range of measuring instruments by various methods & calculate its value.
			CO4	Determine unknown electrical parameters by using various methods.
			CO5	Describe various analyzers, its types & modern techniques in measurement.
6	0EEMC206	Environmental Studies	CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
			CO3	Write a technical report in team regarding course and impacts of environment related issues
			CO4	Discuss current concern of environment issues.
			CO5	Describe the need of environment protection and ethics.
7	0EEPC251	Electrical Circuits & Networks Laboratory	CO1	Experiment network theorems on linear circuits
			CO2	Demonstrate series and parallel resonance, Calculate two port network parameters of T/Pi networks.
			CO3	Use modern tools/software (like MATLAB/PSPICE) to model and solve power flow problems.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
8	0EEPC252	Analog Electronics Laboratory	CO1	Explain electronic components their pin functions and packages
			CO2	Design and testing of analog electronic circuits.
			CO3	Develop and employ circuit using elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistors
			CO4	Perform testing of circuits with the help of simulation software
			CO5	Demonstrates acceptable presentation skills through experiment report.
			co6	Acquire experience of working individually as well as a team in designing, building and troubleshooting simple analog electronic circuits
9	0EEPC253	Electrical Measurements Laboratory	CO1	Demonstrate mechanism of various measuring instruments.
			CO2	Demonstrate different methods to measure power, energy & appropriate bridge for the measurements of various electrical parameters using appropriate bridge
			CO3	Select proper instrument for measurement of electrical parameter.
			CO4	Respond Effectively in the form of oral and writing journal.
			CO5	Examine the observations and determine the result of experiment.
10	0EEES254	Programming in C++	CO1	Design an algorithm solution by applying logical ability to solve the problems.
			CO2	Use C++ programming development environment, compiling, debugging, linking for executing a program
			CO3	Use features, in-built functions and customized functions in C++ programming for solving the problems
			CO4	Design programs involving decision making, loops and structures
			CO5	Use computer programming to solve engineering problems
			CO6	Interface hardware with computer

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
11	0EEES207	Signals & Systems	CO1	Recall and identify different types of Signals and Systems.
			CO2	Explain the conceptof linear algebra topics like vector space, basis, dimension, inner product, norm and orthogonal basis to signals, process of sampling, properties of CTFT, DTFT, ZT and LT, FIR and IIR response.
			CO3	Classify signals and systems based on their properties.
			CO4	Evaluate the response of LTI system using convolution, and determine the fourier series coefficient of continuous time and discrete time periodic signals, Stability and ROC System by Laplace transform and Z-transform.
			CO5	Construct the signals using basic operations of signal
12	0EEPC208	Generation, Transmission & Distribution	CO1	Describe the electrical energy production methods & major power system components.
			CO2	Explain the terms involved in generation cost& classify different tariff systems.
			CO3	Describe about various types of distribution systems.& calculate the voltage drop of distributor for given parameters
			CO4	Discuss the power factor & voltage improvement methods in electrical power systems.
			CO5	Apply knowledge of overhead & underground transmission system elements to calculate the parameters in mechanical construction of lines.
			CO 6	Derive&Solve the electrical parameter values of overhead transmission lines.
13	0EEPC209	DC Machines & Transformers	CO1	Relate Principle of electromechanical energy conversion and concept oftorque production in electrical machine.
			CO2	Explain Construction details of DC machine & transformer.
			CO3	Solve the numerical on EMF Equation, speed control & testing of dc machine.
			CO4	Solve the numerical on testing of transformer.
			CO5	Analyze performance of particular machine by performing suitable test.
			CO 6	Categories machines for various application.
14	0EEES210	Digital Electronics	CO1	Attempt conversions among various number systems
			CO2	Transform given Boolean equation for minimum number of logic gates
			CO3	Formulate combinational logic circuits
			CO4	Explain architecture and working of 8085 microprocessor and peripherals
			CO5	Interface 8085 microprocessor with various peripheral devices
			CO 6	Develop skill in program writing for 8085 microprocessor and applications
15	0EEPC211	Instrumentation & Communication	CO1	Explain instrumentation system design with block diagram approach.
			CO2	Explain practical implementation issues, such as non-ideal filters, non-ideal sampling pulses, aliasing, and inter symbol interference.
			CO3	Develop understanding about performance of analog communication systems.
			CO4	Convert analog signals to digital while satisfying certain specifications.
			CO5	Convert analog physical into electrical signal with the help of transducer.
			CO 6	Evaluate fundamental communication system parameters, such as bandwidth, power, signal to quantization noise ratio, and data rate.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
16	0EEAC212	Professional Skills-I	CO1	Formulate the problem quantitatively and use appropriate arithmetical and/or statistical methods to solve the problem.
			CO2	Recall Formulae.
			CO3	Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
			CO4	Interpret quantitative information (i.e., formulas, graphs, tables, models, and schematics) and draw implications from them.
			CO5	Critically evaluate various real life situations by resorting to analysis of key issues and factors.
			CO 6	Solve problems related to Logical reasoning & data interpretation.
17	0EEPC255	DC Machines & Transformers Laboratory	CO1	Relate the principle of DC machines and transformer in practical manner.
			CO2	Perform different tests on DC machines.
			CO3	Perform different tests on Transformer.
			CO4	Respond Effectively in the form of oral and writing journal.
			CO5	Examine the observations and determine the result of experiment.
18	0EEES256	Digital Electronics Laboratory	CO1	Identify electronic components their pin functions and packages
			CO2	Operate digital electronics circuit on experimental set ups
			CO3	Tabulate observations and communicate conclusion and results in oral as well as written form
			CO4	Perform on destructive testing of circuits with the help of simulation software
			CO5	Acquire experience of working individually as well as a team in designing, building and troubleshooting simple analog electronic circuits
			CO6	Follow safety measures with ethics
19	0EEPC257	Instrumentation & Communication Laboratory	CO1	Explain the industrial and laboratory applications of instruments
			CO2	Identify electronics/ electrical instruments, their use, peculiar errors associated with the instruments and how to minimize such errors
			CO3	Select and use a transducer for measurement of physical quantity
			CO4	Demonstrate modulation and demodulation of message signal in communication system
			CO5	Acquire experience of working individually as well as a team in designing, building and troubleshooting simple instrumentation system
			CO6	Examine the observations and determine the result of experiment.
20	0EEPC258	Software Tools for Electrical Engineering	CO1	List and explain various features and tools available in software packages: MATLAB for Electrical Engineering.
			CO2	Apply the Knowledge to solve various electrical engineering problems using software tools by programming or simulation.
			CO3	Use the basic LABVIEW functions, useful for measurements of parameters.
			CO4	Develop the electrical engineering machine designs using AutoCAD and power systems using ETAP
			CO5	Describe the significance of Software Packages in Electrical Engineering.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
21	0EEPC301	Feedback Control Systems	CO1	Model a physical system to obtain its transfer function
			CO2	Use the state space technique for representation of a control system
			CO3	Determine the transfer function using block diagram reduction and signal flow graph.
			CO4	Compute the performance parameters for given system
			CO5	Analyze the stability of the given system in time &frequency domain.
22	0EEPC302	Power System Analysis	CO1	Describe the concepts of power system under steady state and fault conditions.
			CO2	Illustrate the model of power system and its elements.
			CO3	Determine the power system network parameters to examine the performance of various transmission lines.
			CO4	Compute the sequence network components of the power system.
			CO5	Determine the load flows of the power system network.
			co6	Analyze the fault conditions for the protection of power system.
23	0EEPC303	AC Machines	CO1	Explain the constructional details and working principle of AC machines
			CO2	Describe the effects of system parameters on performance of AC Machines.
			CO3	Solve numerical to determine the performance parameters of AC machines.
			CO4	Select the suitable starter & speed control method for specific application.
			CO5	Analyze the performance of a AC machine by using appropriate testing methods.
24	0EEPC304	Power Electronics.	CO1	Describe construction, working and operation of power semiconductor devices.
			CO2	Explain working of power electronic converters.
			CO3	Draw switching characteristics of power electronic devices.
			CO4	Solve numerical to find performance parameters of power electronic converters.
			CO5	Analyze the performance of power electronic converters for different configurations of load.
25	0EEPC305	Electromagnetic Engineering	CO1	Apply different technique of vector analysis and appropriate coordinate systems for physical quantities dealt in electromagnetic fields.
			CO2	Derive the physical quantities of electromagnetic fields in different engineering problems.
			CO3	Determine the energy, potential, capacitance, inductance and its energy densities.
			CO4	Illustrate the boundary conditions in different media and interfaces
			CO5	Analyze the Maxwell's equations in different forms and its diverse applications
			CO6	Examine the electromagnetic wave propagation in different media and its means for transporting energy or information
26	0EEAC306	Professional Skills-II	CO1	Communicate with gestures and nonverbal manners with others.
			CO2	Practice writing skills effectively through writing reports, e-mails and letters.
			CO3	Present inter personal skills of leadership.
			CO4	Act as an effective goal oriented team player.
			CO5	Develop time management skills.
			CO6	Follow professionals skills with moral values.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
27	0EEPC351	AC Machines Laboratory	CO1	Determine performance parameters of AC machines by using appropriate testing methods.
			CO2	Demonstrate different tests and speed control methods of Induction machines.
			CO3	Perform different tests on Synchronous Machines to find performance parameters.
			CO4	Communicate effectively in the form of oral and writing journal.
			CO5	Practice safety precautions and ethics while performing practical in AC machines.
28	0EEPC352	Power Electronics Laboratory	CO1	Choose suitable power semiconductor device for a converter.
			CO2	Plot V-I characteristic and switching characteristic of power semiconductor devices.
			CO3	Simulate various power electronic converters using MATLAB.
			CO4	Demonstrate operation of power electronic converters.
			CO5	Work in groups for performing practices in power electronics laboratory.
29	0EEPC353	Power System Analysis Laboratory	CO1	Develop the MATLAB program to determine the power system parameters.
			CO2	Demonstrate the performance of transmission line using transmission line trainer kit.
			CO3	Use the modern software like ETAP/ Power World Simulator/ MATPOWER to understand the concepts of the power system under steady state and fault conditions
			CO4	Present the technical report effectively.
			CO5	Practice the safety rules in the laboratory and behave ethically in time standards
30	0EEPC354	Feedback Control Systems Laboratory	CO1	Sketch the response of system for a given transfer function.
			CO2	Analyze the performance of system in time and frequency domain.
			CO3	Demonstrate relationship between transfer function and state space using MATLAB.
			CO4	Communicate effectively about laboratory work orally and through writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
31	0EEPC307	Control System Design	CO1	Describe the type of controllers and their effects on system performance .
			CO2	Apply the different approaches for analyzing non-linear control systems.
			CO3	Derive z- transform and the relation between z-domain & s-domain for a digital control system.
			CO4	Design the compensators in time and frequency domain
			CO5	Develop a controller in state space using various techniques
32	0EEPC308	Power System Operations & Control	CO1	Describe fundamental concepts in power system stability and control.
			CO2	Explain appropriate method to improve power system stability.
			CO3	Model power system components to study the system performance.
			CO4	Solve numerical on dynamics of synchronous machine, power system control and economical load dispatch.
			CO5	Derive the equations for optimal operation of generation dispatching schemes for thermal and hydro units.
			CO6	Examine stability of power system by numerical and graphical solution technique under different contingencies.
33	0EEPC309	Electrical Drives and Control	CO1	Discuss the parts of electrical drives, advantages and factors affecting the choice of electrical drive.
			CO2	Determine the equivalent parameters, stability and components of load torque for a given motor-load system.
			CO3	Apply the concepts of electrical machines, power electronics and control systems to study electrical drives.
			CO4	Solve numerical to find speed, torque, mode and quadrant of operation of electrical drives.
			CO5	Plot the performance characteristics of electrical drives.
			CO6	Design electrical drives for a given industrial application.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
34	0EEES310	Microcontroller & It's Applications	CO1	Outline architecture and basic concepts in microcontroller.
			CO2	Interface external peripherals with 8051 microcontroller to run various applications
			CO3	Develop assembly language program for given application.
			CO4	Choose an advanced and efficient microcontroller for a given application.
			CO5	Design circuit and program for a microcontroller based application.
35	0EEOE311	Electric and Hybrid Vehicles	CO1	Explain vehicle mechanics & impact on environment of traditional transportation system.
			CO2	Describe suitable energy storage & regeneration system for Electric and Hybrid Electric Vehicles
			CO3	Classify different configuration of Electric and Hybrid Electric Vehicles
			CO4	Choose appropriate propulsion technique for Electric and Hybrid Electric Vehicles
			CO5	Select suitable drive train and control mechanism for Electric and Hybrid Electric Vehicles
36	0EEOE312,	Digital Signal Processing	CO1	Compute the response of FT and IDFT of signals using Various method
			CO2	Apply the knowledge of DFT to find the computational complexity and convolution for duration sequences
			CO3	Design IIR filters using analog and digital filter design techniques
			CO4	Examine the fir filters using windowing functions
			CO5	Select among the modern digital signal processing tools for given application
37	0EEPE313	Industrial Automation	CO1	Illustrate the concept of Automation and Programmable Logic Controllers.
			CO2	Describe the hardware units of architecture of Programmable Logic Controllers.
			CO3	Draw the detail architecture of SCADA
			CO4	Develop ladder diagram program for various application using advanced functions
			CO5	Analyze the performance of PLC and SCADA based practical applications
38	0EEPC355	Electrical Machine Design Laboratory	CO1	Identify the materials to be used for the various parts of Electrical Machines
			CO2	Design the various cooling methods for Electrical Machines
			CO3	Design the DC and AC windings using AutoCAD
			CO4	Model the parts of the DC Machines and Induction Motor using MATLAB
			CO5	Draw different parts of Transformer using AutoCAD
39	0EEPC356	Electrical Drives and Control Laboratory	CO1	Apply the knowledge of electrical machines, power electronics and control system converter to control speed and torque of electrical drives.
			CO2	Implement Adjustable Speed Drives (ASD) and Variable Frequency Drives (VFD) techniques to control speed and torque of electrical drives.
			CO3	Simulate the simple models of electrical drive using MATLAB Simulink.
			CO4	Perform individually and in a team to learn the practices in Electrical Drives & Control Laboratory.
			CO5	Follow professional ethics and responsibilities during conduct of laboratory practice.
40	0EEES357	Microcontroller & It's Applications Laboratory (A)	CO1	Develop programming logic by writing instructions sequentially
			CO2	Execute a given program in Keil software environment.
			CO3	Demonstrate peripheral interfacing applications with microcontroller
			CO4	Simulate a microcontroller based system in Proteus software.
			CO5	Follow professional ethics and responsibilities during conduction of lab sessions

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
41	0EEPC358	Power System Operations & Control Laboratory	CO1	Evaluate the parameters for dynamic operation and optimal power flow operation in power system
			CO2	Sketch the response of synchronous machine, ALFC and AVR under disturbances.
			CO3	Use modern tools/software (like MATLAB/POWER WORLD SIMULATOR/ ETAP) to find response of synchronous machine, ALFC and AVR under disturbances.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
42	0EEPR359	Mini Project	CO1	Apply the knowledge of electric and electronic fundamental for problem definition.
			CO2	Develop methodology to troubleshoot circuit
			CO3	Test the outcomes for desired results
			CO4	Work in groups to assemble Mini Project circuits
			CO5	Demonstrate acceptable presentation skills through Mini Project report.
43	0EEPR360	Seminar	CO1	Encourage the students to study advanced engineering technology and its developments.
			CO2	Promote and develop presentation skills and import a knowledgeable society.
			CO3	Expose to prepare and present technical reports.
			CO4	Encourage the students to use various teaching aids.
			CO5	Set the stage for future recruitment by potential employers.
44	0EEPC401	Electrical Installation, Testing and Maintenance	CO1	Identify tools and accessories use for Electrical Installation Testing & Maintenance and safety measures.
			CO2	Describe various testing on Transformers, Motors & various Electrical Equipment.
			CO3	Explain Laying of Underground Cables and tools used for installation.
			CO4	Discus various methods of Electrical Installation Testing & Maintenance for electrical equipments.
			CO5	Develop a maintenance plan & report on maintenance of Motors, Transmission and Distribution System, Transformers &Grid Substations.
45	0EEPC402	Switchgear and Protection	CO1	Explain various types of CB and Arc Interruption Process
			CO2	Describe modern protection schemes like microprocessor based relays for the protection of the power system equipments
			CO3	Distinguish between various types of relays according to their characteristics and its use.
			CO4	Determine setting parameter for Relay.
			CO5	Analyze performance of Protection Scheme of Transformer, Generator, Busbar, Transmission line and Transformation Technique
46	0EEHS403	Econimics for Engineers	CO1	Explain concept of microeconomics and macroeconomics with parameters.
			CO2	Describe forecasting tools of demand and supply management.
			CO3	Elaborate different monetary policy tools.
			CO4	Compare different direct and indirect taxes in Indian economy
			CO5	Illustrate basic concept budget and its analysis.
			co6	Select application of different Investment analysis methods.

Sr. No.	Course Code	Course Name	CourseOutcome	CO Statement
47	0EEPC404	FACTS & HVDC Systems	CO1	Describe the concepts of High Voltage Direct Current Systems
			CO2	Describe FACTS systems and its various types
			CO3	Demonstrate the working principles and constructions of HVDC Converters, Filters, Protection etc.
			CO4	Apply the control schemes for series and shunt compensating devices
			CO5	Analyze the performance of various control schemes of combined shunt and series compensators
			co6	Analyze voltage & current characteristics for different converters and correlate with actual HVDC systems.
48	0EEOE405	Renewable Energy Sources	CO1	Explain overview of different renewable energy sources
			CO2	describe various energy storage technologies
			CO3	Interpret the concept of solar and wind energy generation
			CO4	Identify different topologies of wind energy generation
			CO5	Analyze various characteristics of Wind energy system
49	0EEOE406	Industrial Automation and SCADA	CO1	Describe fundaments of industrial automation
			CO2	Explain working and operation of PLC
			CO3	Draw ladder diagram for various control tasks
			CO4	Select suitable advanced functions to creating ladder diagrams from various process control descriptions
			CO5	Analyze the industrial automation solution by suitable PLC –SCADA.
50	0EEOE407	Electric Vehicles	CO1	Explain vehicle mechanics & impact on environment of traditional transportation system.
			CO2	Describe suitable energy storage & regeneration system for Electric and Hybrid Electric Vehicles
			CO3	Classify different configuration of Electric and Hybrid Electric Vehicles
			CO4	Choose appropriate propulsion technique for Electric and Hybrid Electric Vehicles
			CO5	Select suitable drive train and control mechanism for Electric and Hybrid Electric Vehicles
51	0EEOE408	Nanotechnology	CO1	Familiar with background of nanotechnology
			CO2	understand future perspectives of nanotechnology
			CO3	Determine the various nanomaterials and their benefits
			CO4	Evaluate the different properties of nanomaterial
			CO 5	Explain the manufacturing process of nanomaterials
			CO6	Application of nanotechnology for various fields
52	0EEMC409	Industrical Training	CO1	Explain the knowledge acquired during industrial training
			CO2	Demonstrate competency in relevant engineering fields through problem identification and formulation
			CO3	Apply appropriate techniques, resources, and modern engineering tools to solve industrial problems.
			CO4	Work & communicate individually or in team in actual industrial environment, showing engineering & management principles.
			CO5	Present an ability to write technical documents and give oral related to the work completed
			co6	Demonstrate the knowledge of professional and ethical responsibilities.

Sr. No.	Course Code	Course Name	CourseOutcome	CO Statement
53	0EEAC410	Professional Skills-	CO1	Recall Formulae .
			CO2	Formulate the problem quantitatively and use appropriate arithmetical, and/or statistical methods to solve the problem.
			CO3	Apply various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
			CO4	Choose methods to solve problems related to Logical reasoning & data interpretation.
			CO5	Use quantitative information (i.e., formulas, graphs, tables, models, and schematics) and draw implications from them.
54	0EEPR451	Project Phase- I	CO1	Identify & Choose the real life institutional, social, local industrial problems relevant to the societal and environmental issues for sustainable development using survey and literature review.
			CO2	Formulate, analyze complex engineering problems and give cost-effective, optimal solution considering societal, health, legal, safety and cultural issues.
			CO3	Design/Development of system components or processes that meet the specified needs by using advance tools/ techniques/ resources
			CO4	Function effectively as an individual and as a team for understanding of the engineering and management principles and apply these to manage projects maintaining professional and ethical principles.
			CO5	Communicate effectively on complex engineering activities, write effective reports, design documentation and make effective presentations.
			co6	Recognize & Engage in independent and life-long learning in the broadest context of technological change
55	0EEPC452	Switchgear and Protection Lab.	CO1	Relate different power system protection components and schemes.
			CO2	Examine performance of different types of relays.
			CO3	Make use of Power World Simulator for relay setting and MATLAB for designing of relay.
			CO4	Communicate effectively about laboratory work both orally and writing.
			CO5	Practice professional and ethical behavior to carry forward in their life.
56	0EEPC453	FACTS & HVDC Systems Lab.	CO1	Analyze the transient performance of TSC & TSR
			CO2	Design & Simulate the various Models of single and three phase rectifier and inverters using MATLAB SIMULINK environment
			CO3	Design Simulation Model of converter using MATLAB
			CO4	Design simulation model of HVDC system using MATLAB
			CO5	Communicate effectively about the laboratory work in oral and written manner
			co 6	Practice professional and ethical behavior to carry forward in their life.
57	0EEPC454	Electrical Installation, Testing and Maintenance Lab	CO1	Select codes and practices pertaining to safety in installation and maintenance of electrical equipment.
			CO2	Categorize the maintenance work done on electrical equipment
			CO3	Determine tools and equipment used for installation and maintenance of Electrical Equipments.
			CO4	Develop report on maintenance of different electrical equipments
			CO5	Function effectively as an individual and as team member

Sr. No.	Course Code	Course Name	CourseOutcome	CO Statement
58	0EEPC411	Electrical Utilization and Traction	CO1	Explain various concepts, laws and types of lamps of illumination system
			CO2	Choose appropriate lightning system for indoor and outdoor application.
			CO3	Select appropriate heating and welding method based on working principle and application
			CO4	Solve numerical on illumination and traction systems.
			CO5	Draw and explain various traction systems.
			co6	Use appropriate motor and control for traction system
59	0EEPC412	High Voltage Engineering	CO1	Explain the generation of high DC, AC, impulse voltages and generation of high DC, AC, and impulse currents.
			CO2	Illustrate the various techniques used in the measurement of high DC, AC, impulse voltages and currents.
			CO3	Interpret the various causes of over voltages in electrical power systems
			CO4	Illustrate the basic concepts of various breakdown processes occurring in gases, vacuum, liquid & solid insulating materials.
			CO5	Solve the numerical on impulse generator, electrostatic voltmeter, rogowski coil & breakdown voltages
			co6	Analyze testing methods of high voltage electrical power apparatus.
60	0EEPE413	Advanced Relaying	CO1	Explain the varios fundamental aspect of the digital computer relaying system
			CO2	Describe the realization of the algorithms of Microprocessors based overcurrent relay ,distance relay
			CO3	Identify the computation techniques and algoritham for a transmission relaying and application
			CO4	apply the various dynamic characteristics of digital relays for protection of transmission line
			CO5	Analyze the various dynamic characteristics of digital relays for protection of power Transformer
			co6	Summarize Different Advanced algorithm for digital relaying
61	0EEPE414	Computer Methods in Power System	CO1	Illustrate rules of writing incidence matrices and methods of obtaining network matrices of an electrical network.
			CO2	Construct incidence matrices of an electrical network.
			CO3	Compute admittance and impedance matrices of an electrical network by applying appropriate method.
			CO4	Discuss the data required and procedure of tformulating load flow problem using computer technology and also calculate unknown parameters at buses of a power network by applying numerical methods.
			CO5	Derive simultaneous faults on the power system by two-port network theory and determine parameters of power network under kinds of simultaneous faults.
			co6	Analyze faults occurs on the power system by two-component method and sketch sequence network diagram.
62	0EEPE415	Power Quality and Harmonics	CO1	Describe different power quality related issues, causes and their effects on power system equipment.
			CO2	Classify the harmonic in three phase and single phase circuit.
			CO3	Distinguish the different methods for mitigation of voltage sags and interruptions.
			CO4	Evaluate the different power quality monitoring techniques.
			CO5	Design the filter for suppression of current harmonics.

Sr. No.	Course Code	Course Name	CourseOutcome	CO Statement
63	0EEPC416	Smart Grid	CO1	Describe the various aspects of the smart grid, including technologies, components, architectures and applications.
			CO2	Apply Power Electronics circuits in Smart Grid.
			CO3	Illustrate the issues and challenges involved in smart grid.
			CO4	Explain smart distribution systems & various energy storage devices.
			CO5	Explain Electric and Hybrid Electric Vehicles
			CO6	Analyze issues of interconnection, protection & control of micro-grid.
64	0EEPE417,	Real time control of Power Systems	CO1	Discuss the terms and state estimation models of power system
			CO2	Describe scada for power system application
			CO3	apply state esimation Techniques to power system
			CO4	Use analytical methods to process data and monitor system
			CO5	analyze the security and contigency condition of power system
			CO6	Estimate the Various Operational issues in real time controll of power system
65	0EEPE418	Energy Audit and Management	CO1	Identify various forms of Energy.
			CO2	Describe concept of demand side management.
			CO3	Explain overall Energy Scenario in electrical system.
			CO4	Explain Energy Auditing and various instruments for energy audit.
			CO5	Analyze various parameter of energy audit for different systems.
66	0EEAC419	Professional Skills-IV	CO1	Explain the nature and function of entrepreneurship
			CO2	Describe Concept and Characteristics of Small Scale Industry
			CO3	Choose institutional support scheme according to business plan
			CO4	Select Finance and marketing solutions for Business
			CO5	Identify business opportunities and common pitfalls during the entrepreneurial process
			CO6	Construct Business plan
67	0EEPR455	Project Phase- II	CO1	Evaluate the output by experimentation with systems/components by applying the knowledge of engineering and science and demonstrate the understanding the responsibilities relevant to the professional engineering practices with the previous work
			CO2	Evaluate, compare and summarize the results by applying the knowledge and skills with interpretation of data for the testing, control of designed electrical system using modern engineering and IT tools.
			CO3	Design, Develop the hardware/software solution to the problem determined with concerns of societal, environmental and Industrial needs with validation and justification of designed solution.
			CO4	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage projects maintaining professional and ethical principles.
			CO5	Communicate effectively on complex engineering activities, write effective reports, design documentation and make effective presentations,
			CO6	Engage in independent and life-long learning in the broadest context of technological change

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
68	0EEES456	Software Packages	CO1	Introduce various software packages applicable for Electrical Engineering industrial applications.
			CO2	Apply the conceptual understanding to analyze the power system issues using software packages.
			CO3	Develop the power system models or circuits using different software tools.
			CO4	Execute system performance using advanced software packages.
			CO5	Design Electrical Engineering systems with advanced open source software packages effectively.
			CO6	Perform individually or in a team to solve open ended problems in Electrical Engineering and communicate effectively to represent.
69	0EEPC457	Design & Estimation Lab	CO1	Choose appropriate steps in Electrical Design Process and determine scope of Electrical Design.
			CO2	Interpret the various components of an Electrical plan, including general and specialize loads, lighting systems and distribution systems.
			CO3	Estimate residential and Industrial wiring plan.
			CO4	Use software tools for Electrical Planning.
			CO5	Develop report on case study.
			CO6	Function effectively as an individual and as team member.
70	0EEPC458	High Voltage Engineering Lab	CO1	Illustrate generation and measurement of high voltage and current
			CO2	Demonstrate electrical breakdown voltage of air & transformer oil
			CO3	Implement field mapping using Electrolyte Tank
			CO4	Demonstrate insulation strength of any solid dielectric material, cables
			CO5	Communicate effectively, both orally and in writing journals
			CO6	Follow professional and ethical principles during laboratory work

Head
Electrical Engineering Department
ADCET, Ashta

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering & Technology, Ashta
(Approved by AICTE, New Delhi, Govt. of Maharashtra and Affiliated to Shivaji University Kolhapur)
An Autonomous Institute

Programme Name	:	Electrical Engineering (Revision 1)

PSO	Statement
1	**PSO1.** Ability to apply electrical engineering knowledge, skills for testing, control & maintenance of electrical systems such as Machines, Power Systems, Drives& Automation.
2	**PSO2.** Ability to identify problems in the diversified areas of Electrical Engineering and determine the hardware or software solutions to support the Societal, Environmental & Industrial needs.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	1EEBS201	Applied Mathematics -III	CO1	Demonstrate basic knowledge of Laplace transform, Fourier series and Z transforms.
			CO2	Solve the problems on Fourier Series, Laplace Transform and Z Transform.
			CO3	Make use of Linear Differential Equation with constant coefficients to solve the Electrical Engineering problem.
			CO4	Solve the problems of vector calculus.
			CO5	Demonstrate numerical ability to solve the problem.
2	1EEPC202	Electrical Circuit Analysis	CO1	Use concepts of electric network topology, nodes, branches, loops to solve circuit problems
			CO2	Apply network theorems to analyze various circuits and networks.
			CO3	Calculate initial conditions for current and voltage in first order and second order circuits.
			CO4	Derive resonance in ac circuits, and analyze various ac circuits and networks
			CO5	Calculate and correlate two port network parameters.
			CO6	Apply the transform analysis to linear circuits and systems.
3	1EEPC203	Analog Electronics	CO1	Explain various semiconductor devises and its applications.
			CO2	List op-amp characteristics and distinguish its configurations
			CO3	Classify feedback amplifiers & analyze various oscillators
			CO4	Compare BJT and JFET.
			CO5	Explain various applications of operational Amplifier.
			CO6	Interpret applications of IC 555 timers and PLL 566.
4	1EEPC204	Electrical Measurements and Instr.	CO1	Illustrate various concepts of measuring instruments (Analog/Digital), their classification, construction, working and range extension technique.
			CO2	Derive the equations of different methods for measurement of resistance, inductance and capacitance.
			CO3	Explain construction and operation of different transducers.
			CO4	Describe various analyzers, its types & modern techniques in measurement.
			CO5	Apply conceptual understanding to solve the numericals in Electrical Measurement and Instrumentation.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
5	1EEES205	Electrical Engineering Materials	CO1	Understand the different properties of Conducting, Insulating, Magnetic and Dielectric Materials in the Electrical
			CO2	Identify the different Conducting, Insulating, Magnetic and Dielectric Materials for Application
			CO3	Explain the phenomenon of the polarization mechanism which use for the Dielectric in the Capacitor
			CO4	Evaluate Conducting, Magnetic and Dielectric Materials use in the Electrical Engineering
			CO5	Explain the Various materials use for construction, working and application of the Direct energy conversion systems
			CO6	Select the rating of battery use for various applications
6	1EEHS206	Industrial Psychology	CO1	Explain Theoretical under pinnigs of industrial psychologgy
			CO2	Explain Theoritical foundation of leadership
			CO3	demonstrate the importance of motivation and involvement in determining satisfaction at work
			CO4	Explain and understand group behaviour
			CO5	Demonstrate aspects of well being and forms of dys functional behavior
7	1EEPC251	Electrical Circuit Analysis Lab	CO1	Apply the knowledge of network solution techniques and theroms to solve a variety of electrical circuit
			CO2	experiment network solution techniques and theorems on linear dc and AC electrical circuits
			CO3	use modern tool software (like PSPICE) to simulate DC analysis Ac analysis and transient analysis for a variety of electrical circuits
			CO4	Communicate effectively about labwork both orally and in writings
			CO5	work effectively in groups by sharing responsibilities and collaborating on findings.
8	1EEPC252	Analog Electronics Laboratory	CO1	Select suitable semiconductor device for particular application.
			CO2	Plot various characteristic of semiconductor devices.
			CO3	Simulate various electronic circuits using MATLAB.
			CO4	Demonstrate operation of semiconductor devices.
			CO5	Work in groups for performing practices in Analog electronics laboratory.
9	1EEPC253	Electrical Measurements and Instr. Laboratory	CO1	Demonstrate mechanism of various measuring instruments.
			CO2	Conduct different measuring methods to measure various electrical parameters.
			CO3	Select proper instrument for measurement of electrical parameters.
			CO4	Respond Effectively in the form of oral and writing journal.
			CO5	Examine the observations and determine the result of experiment.
10	1EEES254	Programming in C++ Lab	CO1	Design an algorithm for given problem by applying logical ability to provide solution.
			CO2	Use C++ programming development environment, compiling, debugging, linking for executing a program
			CO3	Build the programming by using in built functions, customized functions, loops and structure.
			CO4	Create and execute C++ programs to solve given engineering problems
			CO5	Communicate effectively both orally and in writing
			CO6	Practice professional and ethical behavior during performance in the laboratory.
11	1EEMC207,	Environmental Studies	CO1	Explain Importance of environmental studies with necessory of acts
			CO2	Explain importance of public awareness on Environmental problems
			CO3	Write a technical report in team regarding courses and impact of environmental related issues
			CO4	Discuss current concern of environment Issues
			CO5	Describe the need of Envirnment protection and ethics

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
12	1EEPC208	Signals & Systems	CO1	Classify different types of signals & systems.
			CO2	Develop total response of linear time invariant systems by differential equations.
			CO3	Construct the signals using various operations
			CO4	Solve the response of linear systems in time domain.
			CO5	Utilize Fourier Transform technique for continuous & discrete signals.
13	1EEPC209	Fundamentals of power system	CO1	Describe the Electrical power generation methods & major power system components.
			CO2	Explain the terms involved in generation cost & different tariff systems.
			CO3	Discuss the power factor improvement methods in electrical power systems.
			CO4	Calculate the voltage drop of distributor for given parameters
			CO5	Apply knowledge of overhead & underground transmission system elements to calculate the parameters in mechanical construction of lines.
			CO6	Analyze the different electrical parameters of overhead transmission lines.
14	1EEPC210	DC Machines & Transformers	CO1	Explain the constructional details and working principle of DC machines& Transformer
			CO2	Describe the effects of system parameters on performance of DC machines& Transformer.
			CO3	Solve numerical to determine the performance parameters of DC machines& Transformer.
			CO4	Select the suitable starter & speed control method for specific application.
			CO5	Analyze the performance of a DC machines& Transformer by using appropriate testing methods.
15	1EEPC211	Digital Electronics & Microprocessor	CO1	Attempt conversions among various number systems
			CO2	Transform given Boolean equation for minimum number of logic gates
			CO3	Formulate combinational logic circuits
			CO4	Explain architecture and working of 8085 microprocessor and peripherals
			CO5	Interface 8085 microprocessor with various peripheral devices
			CO 6	Design a microprocessor based system for given applications
16	1EEPC212	Electromagnetic Engg.	CO1	Apply different technique of vector analysis and appropriate coordinate systems for physical quantities dealt in Electromagnetic Fields.
			CO2	Derive the physical quantities of electromagnetic fields in different Engineering Problems.
			CO3	Determine the Energy, Potential, Capacitance, Inductance and Energy Densities.
			CO4	Illustrate the boundary conditions at the interfaces of different media
			CO5	Apply the Maxwell's equations in different forms
			CO 6	Examine the electromagnetic wave propagation in different media and its means for transporting energy or information
17	1EEPC255	DC Machine and Trans. Lab	CO1	Determine performance parameters of DC machines& Transformer by using appropriate testing methods.
			CO2	Demonstrate different tests and speed control methods of DC machines.
			CO3	Perform different tests on Transformer to find performance parameters.
			CO4	Communicate effectively in the form of oral and writing journal.
			CO5	Practice safety precautions while performing experiments in Laboratory.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
18	1EEPC256	Digital Electronics & Microprocessor Lab.	CO1	Identify electronic components their pin functions and packages
			CO2	Demonstrate digital electronics circuit on experimental set ups
			CO3	Tabulate observations and communicate conclusion and results in oral as well as written form
			CO4	Develop the skill of writing assembly language program for Microprocessor based practical
			CO5	Acquire experience of working individually as well as a team in designing, building and troubleshooting simple analog electronic circuits :
19	1EEES257	Simulation for Electrical Engg	CO1	List various features and tools available in software MATLAB for Electrical Engineering.
			CO2	Apply the Knowledge to solve electrical engineering problems using MATLAB programming or simulation.
			CO3	Analyze the system parameters using various functions.
			CO4	Implement the simulations of transformer, DC machines, Rectifiers, Inverters, Resonant circuits etc.
			CO5	Execute the system operations using MATLAB
			CO6	Perform individually or in a team to solve open ended problems in Electrical Engineering and communicate effectively to represent.
20	1EEHS258,	English Proficiency	CO1	Prepare and perform better in formal communicative Events
			CO2	Prepare and deliver power point presentation effectively
			CO3	Strengthen their team spirit and perform Effectively in a team
			CO4	Improve their intonation vocabulary and communicative performance
			CO5	Write application letter and resume effectively
21	1EEOE301	Electrical Technology	CO1	Explain the construction & working of electric motors.
			CO2	State the applied principles of electrical engineering.
			CO3	Classify electrical heating methods for industrial furnaces.
			CO4	Choose suitable types of motors for industrial applications of electrical drives.
			CO5	Select suitable starter & speed control methods for electrical motors.
			CO6	Solve numerical to determine the different parameters of electrical motors & energy conversion.
22	1EEOE302	Electrical and Electronics Measurement	CO1	Illustrate various concepts of measuring instruments (Analog/Digital), their classification, construction, working and range extension technique.
			CO2	Explain construction and operation of different transducers.
			CO3	Describe various analyzers, its types & modern techniques in measurement.
			CO4	Derive the equations of different methods for measurement of Various Electrical Parameters.
			CO5	Solve numerical to determine different electrical parameters in Electrical and Electronics Measurement.
23	1EEPC303	Control Systems	CO1	Explain different components and controllers used in control system along with its transfer function
			CO2	Apply the state space for representation for different control system.
			CO3	Determine the transfer function using block diagram reduction and signal flow graph.
			CO4	Compute the performance parameters for given system
			CO5	Analyze the stability of the given system in time &frequency domain.
24	1EEPC304	AC Machines	CO1	Explain the constructional details and working principle of AC machines
			CO2	Describe the effects of system parameters on performance of AC Machines.
			CO3	Solve numerical to determine the performance parameters of AC machines.
			CO4	Select the suitable starter & speed control method for specific application.
			CO5	Analyze the performance of a AC machine by using appropriate testing methods.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
25	1EEPC305	Power Electronics	CO1	Describe construction, working and operation of power semiconductor devices.
			CO2	Draw performance characteristics of power semiconductor devices.
			CO3	Discuss power electronic converters with respect to the power circuit, working and waveforms for different loads.
			CO4	Estimate the performance parameters of power electronic converters.
			CO5	Solve numerical to determine performance parameters of power electronic converters.
			co6	Apply the knowledge of power electronic converters for advanced applications.
26	1EEPC308	Power Systems Analysis	CO1	Explain the fundamentals of power systems analysis under steady state and fault conditions.
			CO2	Model power system components under steady state condition to study the system performance.
			CO3	Calculate power system parameters under steady state conditions.
			CO4	Draw various kinds of network diagram required for power system analysis.
			CO5	Derive an equation of system parameters under steady state and fault condition on transmission lines.
			co6	Determine the system parameters under various kinds of fault on transmission lines.
27	1EEPC351	Control Systems Lab.	CO1	Sketch the response of system for a given transfer function.
			CO2	Analyze the performance of system in time and frequency domain.
			CO3	Demonstrate relationship between transfer function and state space using MATLAB.
			CO4	Communicate effectively about laboratory work orally and through writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
28	1EEPC352	AC Machines Lab.	CO1	Implement the working principle of AC machines in a practical manner
			CO2	Demonstrate different tests on Induction machines.
			CO3	Perform different tests on Synchronous Machines.
			CO4	Respond Effectively in the form of oral and writing journal.
			CO5	Justify the result of the experiment from the observations.
29	1EEPC353	Power Electronics Lab.	CO1	Select a suitable power converter for given application.
			CO2	Plot operating characteristics of various Power Semiconductor Devices.
			CO3	Implement different power electronic circuits.
			CO4	Simulate various power electronic converters using MATLAB
			CO5	Work in groups for perforating experiment.
			co6	Demonstrate acceptable presentation skills through experiment report.
30	1EEPC354	Power Systems Analysis Lab.	CO1	Develop the MATLAB program to determine the power system parameters.
			CO2	Demonstrate the performance of transmission line using transmission line trainer kit
			CO3	Use the modern software like ETAP/ Power World Simulator/ MATPOWER to understand the concepts of the power system under steady state and fault conditions
			CO4	Present the technical report effectively.
			CO5	Practice the safety rules in the laboratory and behave ethically in time standards.
31	1EEMC309	Constitution of India	CO1	Explore the basic features and modalities about Indian constitution
			CO2	Differentiate the functioning of Indian parliamentary system at the center and state level
			CO3	Describe different aspects of Indian Legal System and its related bodies
			CO4	Discuss different laws and regulations related to engineering practices
			CO5	Correlate role of engineers with different organizations and governance models

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
32	1EEOE306	Electrical Wiring Harnessing	CO1	Understand the various electrical principles and tools use in vehicles.
			CO2	Explain the basics of automotive wiring.
			CO3	Describe different components used in automotive wiring.
			CO4	Discuss the advanced installations and interfaces of automotive wiring.
			CO5	Solve the different problems in automotive wiring.
33	1EEOE307	Electrical Economics & Energy Audit	CO1	Explain economics of electrical distribution system.
			CO2	Describe economics of various types of power generation.
			CO3	Explain energy audit terms and various instruments for energy audit.
			CO4	Use of illumination for lighting system.
			CO5	Illustrate various ways of energy conservation in applications.
			CO6	Analyze various parameter of energy audit for different systems.
34	1EEPC310	Electrical Machine & Power System Design	CO1	Identify the various materials use for Electrical Machines.
			CO2	Create the various parts of the single and three phase Transformers.
			CO3	Develop the various parts of the DC Machines and Induction Motors
			CO4	Discuss the various cooling methods use for the Electrical Machines
			CO5	Draft the Regulator, Starters and Control panels for the Particular System.
			CO6	Layout the various parts of Substation.
35	1EEES311	Microcontroller & its Applications	CO1	Outline architecture and basic concepts in microcontroller.
			CO2	Interface external peripherals with 8051 microcontroller to run various applications
			CO3	Write assembly language program for given application of 8051.
			CO4	Choose an advanced and efficient microcontroller for a given application.
			CO5	Design circuit for a microcontroller based application.
			CO6	Develop an algorithm for advanced microcontrollers to execute a given application.
36	1EEPE312	Control System Design	CO1	Describe the type of controllers and their effects on system performance
			CO2	Compute the z- transform and the relation between z-domain & s-domain for a digital control system.
			CO3	Apply the different approaches for analyzing nonlinear control systems.
			CO4	Design the compensators in time and frequency domain
			CO5	Develop a controller in state space using various techniques :
37	1EEPE313	Electrical Drives	CO1	Discuss the concepts in electrical drives with respect to steady state and dynamic conditions, nature of load and parts of drives.
			CO2	Apply the knowledge of power electronics converters, electrical machines, and control systems for given applications of AC and DC drives.
			CO3	Solve numerical to find different parameters related to electrical drives.
			CO4	Sketch performance characteristics of rectifier and chopper fed DC Drives.
			CO5	Draw performance characteristics of inverter and Cyclo-converter fed AC Drives.
			CO6	Apply the knowledge of electrical drives for various industrial applications.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
38	1EEPE314	Power system Dynamics And Control	CO1	Describe Fundamental concepts in power system stability and control
			CO2	Explain Appropriate method to improve power system stability
			CO3	Model power system components to study the system performance
			CO4	Solve numerical on dynamics of synchronus machine power system control and economicall load dispatch
			CO5	Derive the equation for optimal operation of generation dispatching schemes for thermal and hydro units
			CO6	Examine stability of power system by numerical and graphical solution technique under different contagencies
39	1EEPE315	Digital Signal Processing	CO1	Compute DFT and IDFT of various signals using its properties
			CO2	Describe Modern signal processing tools
			CO3	Apply the knowledge of DFT to find the computational complexity and convolution for long duration sequences
			CO4	Use fast and Efficient Algorithm for computing DFT IDFT and FFT for given sequence
			CO5	Construct the structure of FIR & IIR filters in Different forms
40	1EEPE316	Electrical Vehicles & Smart Grid	CO1	Explain Vehicle mechanics and impact on environment of traditional transportation system
			CO2	Describe suitable energy storage and regeneration systems for electrical vehicle
			CO3	Discuss implementation of charging facility for electrical vehicles
			CO4	Select Appropriate propulsion system for electric vehicles
			CO5	Identify impact of electric vehicles on power grid
41	1EEPC355	Electrical Machine & Power System Design Lab.	CO1	Identify the material to be used for the various parts of Electrical Machines
			CO2	Design layout for AC Machine, DC Machine & Transformer Using AutoCAD
			CO3	Develop AC & DC Winding by using AutoCAD
			CO4	Develop layout Substation party by using AutoCAD
			CO5	Prepare Industrial Visit Report.
42	1EEES356	Microcontroller & its Applications Lab	CO1	Develop programming logic by writing instructions sequentially
			CO2	Execute a given program in Kiel software environment.
			CO3	Demonstrate peripheral interfacing applications with microcontroller
			CO4	Simulate a microcontroller based system in Proteus software.
			CO5	Follow professional ethics and responsibilities during conduction of lab sessions
43	1EEPE357	Control System Design Lab.	CO1	Obtain the responses of lead compensators and lag compensators.
			CO2	Determine controller and observer gain in state space by using MATLAB.
			CO3	Demonstrate the effect of controllers on system performance.
			CO4	Communicate effectively about laboratory work orally and through writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
44	1EEPE358	Electrical Drives Lab.	CO1	Apply the knowledge of power electronics converter to control DC Drives.
			CO2	Implement ASD and VSD to control speed & frequency of Induction Motor Drives.
			CO3	Perform individually and in a team to learn the practices in Electrical Drives & Control Library
			CO4	Simulate the simple models of drive using MATLAB Simulink browser.
			CO5	Follow professional ethics and responsibilities during conduct of laboratory practice

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
45	1EEPE359	Power System Dynamics and control Lab	CO1	Evaluate the parameters for dynamic operation and optimal power flow operation in power system
			CO2	Sketch the response of synchronus machine ALFC and AVR under Disturbances
			CO3	Use Modern Tools /Software (Like Matlab /Power world simulator etap) to find response of synchronus machine ALFC and AVR under disturbance
			CO4	Communicate Effectively about lab work both orally and in writing journals
			CO5	Practice proffessional and Ethical behavior to carry forward in their life
46	1EEPR360	Mini Project	CO1	Explain the theme of mini project.
			CO2	Illustrate the facts and ideas by giving description with stating ideas.
			CO3	Examine and break information into parts by identifying motives
			CO4	Evaluate the defend theme by making judgments about information, validity of ideas, or quality of work based on a set of criteria.
			CO5	Build by combining elements in a new pattern or proposing alternative solutions by creating something innovative.
47	1EEOE401,	Electric Vehicles	CO1	Explain vehicle mechanics & impact on environment of traditional transportation system.
			CO2	Choose appropriate propulsion system for Electric and Hybrid Electric Vehicles
			CO3	Select suitable energy storage & regeneration system for Electric and Hybrid Electric Vehicles
			CO4	Classify configurations of Electric and Hybrid Electric Vehicles
			CO5	Discuss energy management and infrastructure requirement for EV charging.
			CO6	Apply the knowledge with respect to charging infrastructure for e-mobility.
48	1EEOE402,	Wind and Solar Energy System	CO1	Determine needs of renewable energy sources and their Utilisation
			CO2	Describe solar power generation system characteristics associated terminologies and algorithms to maximize energy extraction
			CO3	Examine the generation aspects of wind resourse assesments and characterisation
			CO4	Explain grid integrition of renewable energy sources and its economics aspects
			CO5	Focus energy storage in grid integration of renewable energy sources and smart grid system
			Co 6	Design the standalone wind and solar energy system
49.	1EEPC403,	Switchgear & Protection	CO1	Explain the working principle of Circuit breakers, fuses and Arc Interruption process
			CO2	Discuss the operation of numerical relay and phase measurement unit
			CO3	Describe modern protection schemes like microprocessor based relays for the protection of the power system equipment's
			CO4	Distinguish between relays according to their characteristics and its applications
			CO5	Set the reference level for Relay using Plug Setting multiplier and Time Multiplier.
			CO6	Analyze performance of protection scheme of Transformer, Generator, Busbar, Transmission line
50	1EEPC404,	High Voltage Engineering	CO 1	choose the appropriate circuit for generation of high DC/AC impulse voltges and currents
			CO2	Apply the suitable techniques used in measurements of high DC/AC impulse voltages and currents
			CO3	Illustrate the mechanism of breakdown process in gases and vaccumes
			CO4	summarise the breakdown mechanism in solid and liquid insulating material
			CO5	Solve the numerical on impulse generator electrostatic voltmeter rogowski coil and break doen voltages
			CO 6	ANALYZE TESTING METHODS OF HIGH VOLTAGE ELECTRICAL POWER APPARATUS

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
51	1EEHS405	Economics for Engineers	CO1	Explain terms in microeconomics and macroeconomics.
			CO2	Illustrate law of supply and law of demand for managerial Decision making.
			CO3	Describe financial System in India.
			CO4	Classify taxes according to direct, indirect taxes, Import and Export Management and its impact on economy.
			CO5	Analyze market structure and economic theory for firms.
			CO6	Select different financial tools for personal portfolio management
52	1EEPE406,	Industrial Automation and SCADA	CO1	Summarize the fundamental principles of industrial automation
			CO2	Apply the concepts of fundamentals of logic for various processes of automation.
			CO3	Analyze and formulate the requirements of appropriate ladder programs to provide solutions using PLCs.
			CO4	Construct, debug and test the programs developed for digital and analog operations.
			CO5	Build architecture of SCADA and explain the importance of SCADA in critical infrastructure
			CO6	Identify the knowledge of PLC, SCADA and DCS with industrial networking protocols for process industries.
53	1EEPE407,	Embedded Systems	CO1	Describe the building blocks of embedded system processors integration of hardware and software and design technologies
			CO2	Utilise the memory organization techniques and memory devices appropriate for an embedded system
			CO3	Select appropriate embeded networking protocalls based on the distance speed size of data for data transmission and reception in embeded system
			CO4	Apply the knowledge of Embeded design life cycle and operate embeded development strategies
			CO5	Organise the real time operating systemfor embedded system design
			CO 6	Adapt the real world embedded system application and case studies
54	1EEPE408,	Computer Methods in Power Systems	CO1	Illustrate rules of writing incidence material and methods of obtaining network matrices of an electrical network
			CO2	Construct inidence matrices of an electrical network
			CO3	Compute admittance and impedance matrices of an electrical network by applying appropriate
			CO4	Determine the unknown parameters at buses for power network by applying numerical methods for for formulating load flow problames
			CO5	Develop equations for power network faults using two port network theory and the two component method
			co6	Calculate the unknown parameters of power network under kinds of faults
55	1EEPC451,	Switchgear & Protection Laboratory	CO1	Relate different power system protection components and schemes.
			CO2	Examine performance of different types of relays.
			CO3	Make use of Power World Simulator for relay setting and MATLAB for designing of relay.
			CO4	Communicate effectively about laboratory work both orally and writing.
			CO5	Practice professional and ethical behavior to carry forward in their life.
56	1EEPC452,	High Voltage Engineering Laboratory	CO1	Illustrate generation and measurement of high voltage and current
			CO2	Demonstrate electrical breakdown voltage of air & transformer oil
			CO3	Implement field mapping using Electrolyte Tank
			CO4	Demonstrate insulation strength of any solid dielectric material, cables
			CO5	Communicate effectively, both orally and in writing journals
			co6	Follow professional and ethical principles during laboratory work

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
57	1EEPE453,	Industrial Automation and SCADA Laboratory	CO1	Understand all the important components such as PLC, SCADA, I/O modules and field devices of an industrial automation system.
			CO2	Develop PLC program in different languages for industrial applications
			CO3	Experiment with hands on experience in interfacing transmitters and final control elements (Actuators) with PLC/SCADA
			CO4	Use modern tools/software (RsLogix, Proficy) to simulate PLC and SCADA programs for a various process control descriptions.
			CO5	Communicate effectively about laboratory work both orally and in writing.
			co6	Work effectively in groups by sharing responsibilities and collaborating on findings.
58	1EEPE454,	Embedded Systems Laboratory	CO1	Illustrate the programming concepts of microcontroller.
			CO2	Choose appropriate microcontroller for the design specification with reference to a real time problem
			CO3	Implement the interfacing of peripheral devices with embedded processors.
			CO4	Design and develop the programming using IDE
			CO5	Justify the result of the experiment from the observations.
59	1EEPR455	, Computer Methods in Power System Laboratory	CO1	Illustrate rules and methods of writing various incidence and network matrices of electrical network.
			CO2	Apply numerical methods for power flow solution.
			CO3	Use modern tools/software (MATLAB/POWER WORLD SIMULATOR) to model and solve power flow problems.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
60	1EEPE456	Internship industrial training	CO1	Demonstrate compitancy in relevant engineering fields through problems identification and formulation
			CO2	Apply appropriate techniques resources and modern engineering tools to solce industrial problem
			CO3	Communicate on actual industrial environment showing engineering and management principle
			CO4	Present to abilty to write technical documents and give oral related to the work completed
			CO5	Demonstrate the Knowledge of professional and Ethical Ressponcibilities
61	1EEPR457	Project Phase I	CO1	Identify the real time application, social, local industrial problems relevant to the societal and environmental issues for sustainable development using survey and literature review.
			CO2	Formulate, analyse complex engineering problems and give cost-effective, optimal solution considering societal, health, legal, and safety.
			CO3	Design of system components or processes that meet the specified needs by using advance tools/ techniques/ resources.
			CO4	Function effectively as an individual or as a team for understanding of the engineering and management principles and apply these to manage projects for maintaining professional and ethical principles.
			CO5	Communicate effectively on complex engineering activities, write effective reports, documentation and make effective presentations.
			co6	Recognize & Engage in independent and life-long learning in the broadest context of technological change.
62	1EEHS409	, Project Management and Finance	CO1	Demonstrate the principle function planning and organisation of industrial management
			CO2	Describe production concept, cost concept and their impact on business decision
			CO3	utilise the concept of human resource management and system at various leval in general organisation
			CO4	Classify financial sources for business management
			CO5	Illustrate the idea of wage schemes and incentives
			co6	select application of financial analysis methods for project management

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
63	1EEPE410,	Energy Storage Systems	CO1	Determine the requirements of energy storage system
			CO2	describe the recent trends in energy storage system
			CO3	Develop the possibilities of deployment of energy storage systems in smart cities and electric vehicles .
			CO4	Illustrate the design aspect of energy storage system
			CO5	Evaluate an efficiet energy storage systems in electric transportation
			CO6	Outline real time applications in transportation and utility
64	1EEPE411,	Industrial Drives	CO1	Classify the electric drives system based on the natures of load and list the factors affecting the selection of electric drives
			CO2	outline performance parameters of dc drives fed from AC to DC converters
			CO3	Analyze performance parameters of dc drives fed from DC to DC converters operating in multi qudrant operation
			CO4	Illustrate the performance characteristics of electrical AC drives
			CO5	Apply the dynamic operation and characteristics to compute the performance parameters of the induction motor
			co 6	propose suitable drive components and special electrical drives for an industrial drive application
65	1EEPE412,	FACTS	CO1	Describe reactive power compensation and Facts devices on system requirement
			CO2	Analyze the performance of shunt compensators based on operating principle control scheme and loss vs output
			CO3	detect the power and control circuits of series controllers GCSC ,TSSC and TCSC
			CO4	Apply load compensation to the electrical system
			CO5	Illustrate phase angle and voltage regulation in power system
			CO 6	Select the converter based controllers for reactive power compensation
66	1EEPE413,	Power Quality Issues and Mitigation	CO1	Describe different power quality related issues, causes and their effects on power system equipment.
			CO2	Classify the harmonic in three phase and single phase circuit.
			CO3	Distinguish the different methods for mitigation of voltage sags and interruptions.
			CO4	Evaluate the different power quality monitoring techniques.
			CO5	Design the filter for suppression of current harmonics.
67	1EEPE414,	Electrical Installation, Testing & Maintenance	CO1	choose appropriate tools and accessories for electrical installation testing and maintenance and safety measurements
			CO2	Identify electric accidents and artificial respiration methods
			CO3	Describe laying methods of underground cables and tools used for installation
			CO4	classify methods of electrical installation testing and maintenance for electrical Equipement
			CO5	Summarize common troubles in electrical machines transmission and distribution system transformers and grid substations
			CO 6	OUTLINE earthing system for electrical installation and trouble shooting charts
68	1EEPE415,	HVDC Systems	CO1	Develop the concept of high voltage direct current system and hvdc coverters
			CO2	analyze voltage and current characteristics for converters and and relate with HVDC system
			CO3	Demonstrate the over voltage protection and fault clearing technology in HVDC system
			CO4	Analyze the harmonics generated by the converters and role of filters
			co5	describe the reactive power requirement in HVDC system
			CO6	Illustrate the MTDC system configuration and HVDC light

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
69.	IEEPR458,	Project Phase II	CO1	Apply the knowledge of engineering and science to demonstrate the understanding relevant to the previous work.
			CO2	Develop the hardware/software solution to the problem determined with concerns of societal, environmental and Industrial needs.
			CO3	Apply the knowledge and skills to do analyzing and interpretation of data for the testing and control the designed electrical systems.
			CO4	Function effectively as an individual or as a team to understand the engineering and management principles and apply the same to manage projects by maintaining professional and ethical principles.
			CO5	Communicate effectively on complex engineering activities, write effective reports and documentation, and make effective presentations.
			CO6	Engage in independent and life-long learning in the broadest context of technological change.

Head
Electrical Engineering Department
ADCET, Ashta

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering & Technology, Ashta
(Approved by AICTE, New Delhi, Govt. of Maharashtra and Affiliated to Shivaji University Kolhapur)
An Autonomous Institute

Programme Name   :   Electricalcal Engineering - PG (Revision 0)

PSO	Statement
1	**PSO1.** Ability to apply electrical engineering knowledge, skills for testing, control & maintenance of electrical systems such as Machines, Power Systems, Drives& Automation.
2	**PSO2.** Ability to identify problems in the diversified areas of Electricall Engineering and determine the hardware or software solutions to support the Societal, Environmental & Industrial needs.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
1	OEEPS501	Advanced Computer Methods in Power System	CO1	Develop various network Matrices (Cognitive Level 6)
			CO2	Apply different methods to write admitance matrices of power network (Cognitive Level 3)
			CO3	Use different methods to develop impedance matrices of power network (Cognitive Level 3)
			CO4	Explain algorithm of different numerical methods used for power flow solution. (Cognitive Level 2)
			CO5	Develop two port networks parameter equations in case of simultaneous fault. (Cognitive Level 6)
			CO6	Apply two component methods to obtain the result in case of various faults on the power system.
2	OEEPS502	Advaced Power System Protection	CO1	Describe modern protection schemes like applications of microprocessor based relays for the protection of the power
			CO2	Explain use of CT/PT & its modeling for digital protection (2nd Cognitive level).
			CO3	Choose appropriate comparator for different protection (2nd Cognitive level).
			CO4	Explain relay coordination to achive reliability in advanced protection scheme (2nd Cognitive level).
			CO5	Explain approprite different scheme for various machine (2nd Cognitive level).
			CO6	To design suitable digital protection scheme for distance protection (6th Cognitive level).
3	OEEPS503	Application of Power Electronics with Smart Grid	CO1	Uderstand various aspects of the smart grid, including technologies, components, architectures & applications (level-2).
			CO2	Evaluate Power Electronics devices like Multilevel Inverter in Smart Grid. (level-5).
			CO3	Judge the issues and challenges involved in smart grid (level-5).
			CO4	Conclude the role of communication & information technology in smart grid (level-5).
			CO5	Explain various Energy Storage devices. (level-4)
			CO6	Evaluate concepts of microgrid. (level-5)
4	OEEPS503	Extra High Voltage AC Transmission	CO1	Describe the basics of EHVAC transmission lines & determine parameters. (3rd Cognitive level).
			CO2	Determine the voltage gradient on conductor. (3rd Cognitive level)
			CO3	Explain about travling waves & analyze EHVAC lines. (4th Cognitive level).
			CO4	Apply the over voltage knowledge, their causes in EHVAC. (3rd Cognitive level).
			CO5	Explain lightning phenomena & design insulation system for lightning. (5th Cognitive level).
			CO6	Design EHVAC lines. (5th Cognitive level).
5	OEEPS505	Power System Dynamics & Stability	CO1	Understand Basic concepts of Dynamical system. (level 2)
			CO2	Evaluate the power system components. (level 5)
			CO3	Analyze Sub-synchronous osillation (level 4)
			CO4	Analyze small signal stability of SMIB. (level 4)
			CO5	Analyze improving voltage stability. (level 4)
			CO6	Analyze using digital system simulation. (level 4)

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
6.	OEEPS505	Energy Audit and Management	CO1	Explain overall Energy Scenario (Cognitive Level 2)
			CO2	Identify various forms of Energy (Cognitive Level 1)
			CO3	Explain basics of Energy Auditing & Instruments (Cognitive Level 2)
			CO4	Analyze various parameter of audit for different systems (Cognitive Level 4)
			CO5	Understand concept of demand side management (Cognitive Level 2)
			CO6	Implement works with economic feasibility (Cognitive Level 4)
7.	OEEPS551	Power System Lab-I	CO1	Write codes for to measure electrical parameters of transmission line. (Level 6)
			CO2	Create a model in power world simulator. (Level 6)
			CO3	Solve and write codes in MATLAB for load flow problem using Gauss- Seidal & Newton- Raphson method. (Level 6)
			CO4	Analyze the transient performance of transmission system. (Level 4)
			CO5	Analyze the performance of transmission line in MATLAB. (Level 4)
			CO6	Evaluate problem of power of power system in ETAP (Level 5)
8.	OEEPS552	Advanced Power System Protection	CO1	Interpret different protection system components. (2nd cognitive level)
			CO2	Compare different protection schemes. (2nd cognitive level).
			CO3	Illustate of different types of circuit breakers. (3rd cognitive level)
			CO4	Discriminate of different types of relays. (5th cognitive level)
9.	OEEPS507	Power System Planning & Reliability	CO1	Evaluate various aspects of power system planning. (Level 5)
			CO2	Use the basics of load forecasting that will be useful for engineering profession practice in the power sector operation. (Level 3)
			CO3	Understand the concepts of relibility and apply the various techniques to determine the reliability of power system operation & planning. (Level 2)
			CO4	Apply reliability models to determine the reliability of Generation, Transmission & Distribution Expansion planning. (Level 3)
			CO5	Evaluate the optimal power system model based on reliability. (level 5)
10.	OEEPS508	High Voltage Engineering	CO1	Understand the concepts related to electrostatic field stress. (Cognetive Level 2)
			CO2	Illustrate electrical breakdown in air; solid & liquid insulation.(Cognetive Level 3)
			CO3	Analyze generation of high voltage current. (Cognetive Level 4)
			CO4	Demonstrate & Analyze measurement of High Voltage & High Current for testing purpose. (Cognetive Level 4)
			CO5	Testing & Analyzing of Insulation coordinaion, over voltage & trasient in power system. (Cognetive Level 5)
			CO6	Analyze High voltage test on various electrical equipment. (Cognetive Level 4)
11.	OEEPS509	Power System Operation & Deregulation	CO1	Apply generation dispatch economically in power system. (3rd cognitive level)
			CO2	Apply power flows optimum manner. (3rd cognitive level)
			CO3	Propose the deregulated power system & different electricity markets. (3rd cognitive level)
			CO4	Apply forecasting methods to estimate load and price. (5th cognitive level)
			CO5	Apply unit commitment methods to operate power system economically . (3rd cognitive level)
			CO6	Apply various method congestion management & ancillary service to operate power system in deregulated environment. (3rd cognitive level)
12.	OEEPS510	Electrical Power Quality & Harmonics	CO1	Describe different power quality issues, causes & their effects on power system equipments. (Level 2)
			CO2	Classify the harmonics in three phase & single phase circuit. (Level 4)
			CO3	Design the filter for suppression of current harmonics. (Level 6)
			CO4	Distinguish the different methods for mitigation of voltage sags and interruption. (Level 4)
			CO5	Evaluate the different power quality monitoring techniques. (Level 5)

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
13	OEEPS511	Supervisory Control and Data Acquisition & Automation	CO1	Select the appropiate controller for a paticular application. (Cognetive Level 6)
			CO2	Develop and explain the working of PLC with the help of a block diagram.(Cognetive Level 2)
			CO3	Designing various controller used in the industries. (Cognetive Level 6)
			CO4	Develop architecture of SCADA and explain the importance of SCADA in critical infarstructure. (Cognetive Level 4)
			CO5	Execute, dubug and test the programs developed for digital and analog operation. (Cognetive Level 5)
			CO 6	Reproduce block diagram representation on industral applications using PLC and SCADA. (Cognetive Level 6)
14	OEEPS512	Real time control of Power Systems	CO1	Apply analytical methods to process data and monitor system. (3rd cognitive level)
			CO2	Design and apply automatic generation control to maintain frequency. (5th cognitive level)
			CO3	Schedule hydro thermal generation optimally using different control methods. (3rd cognitive level)
			CO4	Design various reactive control methods to maintain voltage within limits. (5th cognitive level)
			CO5	Apply state estimation techniques to power system. (3rd cognitive level)
			CO 6	Describe SCADA for power system application. (3rd cognitive level)
15	OEEPS513	Flexible AC Transmission and High Voltage DC System	CO1	Compare all FACTS devices (Level 4)
			CO2	Apply the control schemes for series and shunt compensating devices (Level 3)
			CO3	Analyze the performance of various control schemes of combined shunt and series compensator. (Level 4)
			CO4	Evaluate performance of TCVR, TCPAR (Level 5)
			CO5	Analyze the working principles and constructions of HVDC Converters, Filters, Protection etc. (Level 4)
			CO 6	Analyze voltage & current characterstics for different converters and correlate with actual HVDC systems. (Level 4)
16	OEEPS514	Optimization Techniques	CO1	Understand the Introduction optimization thoery. (Level 2)
			CO2	Apply Linear Programming problem theory. (Level 2)
			CO3	Apply theory to nonlinear programming . (Level 3)
			CO4	Evaluate the Connstrianed optimzation. (Level 5)
			CO5	Design System Modeling. (Level 5)
			CO6	Apply Convetional tools for linear system modelling. (Level 3)
17.	OEEPS515	Power Systems Transient Analysis	CO1	Explain the propagation, refelection and refraction of travelling waves. (Level 2)
			CO2	Describe the causes of transients. (Level 2)
			CO3	Analyze the impact of voltage transients caused by faults, circuit breaker action, and load rejection on integrated power system. (Level 4)
			CO4	Analyze the switching and lightning transients. (Level 4)
			CO5	Evaluate the transient response of systems. (Level 5)
			CO6	Compare mechanism of lightning discharges and characterstics of lightning strokes. (Level 4)
18	OEEPS516	Research Methodology	CO1	Define research, explain and apply research terms, describe the research process and the principle activities, Skills and ethics assosiated with the research process. (2nd Cognitive Level)
			CO2	Explain the relationship between theory and research. (2nd Cognitive Level)
			CO3	Describe and compare the major quatitative and qualitative research methods. (2nd Cognitive Level)
			CO4	Propose a research study and justify the theory as well as methodological decision including sampling and measurment. (5th Cognitive Level)
			CO5	Summarize the importance of research ethics and integrate it into research process. (2nd Cognitive Level)
			CO6	Construct and effective research proposal that will serve as the launching point for the further study.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
19	0EEPS553	Power System Lab-II	CO1	Design simulation model of converter using MATLAB.
			CO2	Design simulation model of HVDC system using MATLAB.
			CO3	Analyze the harmonics and trasient performance of HVDC transmission system.
			CO4	Analyze and design the simulation model of circuit breaker & surge arresters for HVDC sysytem.
			CO5	Design and analyze simulation model of free switching binary current generation of TBSC & TBSR.
20	0EEPS554	High Voltage Engineering	CO1	Demonstrate electrical breakdown voltage of transformer oil .
			CO2	Illustrate generation and measurement of high voltage and current .
			CO3	Analyze insulation strength of any dielectrical material, Cables.
			CO4	Demonstrate field mapping using Electrolyte Tank.
			CO5	Calculate Capacitance of cables.

Head
Electrical Engineering Department
ADCET, Ashta

Programme Name   :   Civil Engineering   (Revision - Zero)

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PSO	Statement
1	PSO1. An understanding of issues for professional practice such as the procurement of work and interaction with stakeholders during the construction phase of the work
2	PSO2. Identify, analyze, design and execute Civil Engineering problems professionally for industry and society.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
1	0CEBS201,	Applied Mathematics –III	CO1	Describe the statistical data numerically by using lines of regression
			CO2	Solve the problems of vector calculus.
			CO3	Make use of Linear Differential Equation with constant coefficients to solve the Civil Engineering problem.
			CO4	Solve the problems on Fourier Series, Laplace Transform and Partial Differential Equation.
			CO5	Demonstrate numerical ability to solve the problem.
2	0CVPC202,	Surveying	CO1	Discuss the use of Total station
			CO2	Explain plane table surveying methods and its applications
			CO3	Describe various sections required for civil engineering projects
			CO4	Illustrate various methods of leveling and contouring
			CO5	Calculate horizontal angle by theodolite and length of a line by using gale's traverse table
3	0CVPC203,	Fluid Mechanics	CO1	Use the basic properties of fluids and examine their behavior under application of various force systems.
			CO2	Apply the principles developed in fluid statics, fluid kinematics and fluid dynamics in fluid flow problems.
			CO3	Apply the principle and equation for pressure flow and momentum analysis in pipe flow.
			CO4	Apply the analytical knowledge of pressure and velocity distribution open channels in order to solve practical fluid problems.
			CO5	Select the suitable type of turbine and pump according to site conditions.
			CO6	Examine the applications of principles of continuity, momentum and energy to a fluid in motion.

S.	Course Code	Course Name	Course Outcome	CO Statement
4	0CVPC204,	Strength of Materials	CO1	Identify various types of stresses in various structural elements.
			CO2	Construct shear force and bending moment diagrams for various beams and loadings
			CO3	Solve for strength of materials in bending, shear and torsion.
			CO4	Compute safe axial load on columns with different end conditions
			CO5	Calculate shear stresses and bending stresses for different beam sections for given loading and support conditions.
5	0CVPC205,	Building Construction & Materials	CO1	Explain the properties and suitability of various building materials
			CO2	Discuss different building components.
			CO3	Describe different bonds in brick masonry.
			CO4	Explain different types of roof coverings and different types of flooring.
			CO5	Draw different building components.
6	CVPC251	Surveying Laboratory	CO1	Demonstrate the use of dumpy level and auto level
			CO2	Demonstrate the working Total station with its uses
			CO3	Demonstrate the working of Theodolite with its uses
			CO4	Communicate effectively during performing practical work on site and orally
			CO5	Engage in lifelong learning for handling major surveying equipments
7	0CVPC252,	Fluid Mechanics Laboratory	CO1	Explain the behavior of fluid flow rate under various conditions.
			CO2	Illustrate and plot the graphical results and its comparison with experimental results.
			CO3	Examine the fluid motion equations in laboratory.
			CO4	Independently perform the experiments and communicate effectively about the laboratory work orally.
			CO5	Follow the given instructions in laboratory for handling flow measurement equipments.
			CO 6	Summarize the practical application of hydraulic turbines and prepare a report based on the site visit.
8	0CVPC253,	Strength of Materials Laboratory	CO1	Compute various properties of metal.
			CO2	Identify various types of stresses in various structural elements.
			CO3	Handle the equipments and instruments from laboratory.
			CO4	Communicate effectively about properties of material and stresses involved in the material.

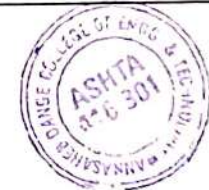| Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
9	0CVPC254,	C- Programming Laboratory	CO1	Develop C Programs for various Civil Engineering problems.
			CO2	Calculate quantities using C Programs for various Civil Engineering problems.
			CO3	Communicate effectively in written and oral ways about laboratory work.
			CO4	Practice professional and ethical behavior in his/her life.
10	0CVPC255,	Building Construction & Materials Laboratory	CO1	Explain various types of building materials, their market rates and units
			CO2	Draw drawing for Isolated footing, Combined Footing and Under Reamed Piles.
			CO3	Draw drawing for various types of bonds in masonry
			CO4	Draw drawing for Stairs ,Doors and windows
			CO5	Communicate effectively about laboratory work both orally and while drawing sheet.
			CO6	Engage in lifelong learning the drawing knowledge of various building components.
11	0CVAC256,	Introduction to Psychology	CO1	Understand theoretical underpinnings of psychology.
			CO2	Proficiently deal with various stresses
			CO3	Integrate the Cognitive Behavior Therapy.
			CO4	Be aware of the theoretical underpinnings of cognitive psychology.
			CO5	Engage in lifelong learning to deal with stress and apply cognitive behavior therapy.
12	0CVPC206,	Engineering Management	CO1	Explain the importance of management in Construction.
			CO2	Discuss various Techniques for Material Management.
			CO3	Explain the importance of legal aspects and Quality management in construction.
			CO4	Apply the various Quantitative Techniques in practice.
			CO5	Apply the concept of Engineering Economy in construction.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
13	0CVES207,	Structural Analysis	CO1	Describe concepts of structural analysis, degree of indeterminacy.
			CO2	Compute principal stresses and strains for a strained material.
			CO3	Calculate combined direct and bending stresses in the various structural elements.
			CO4	Calculate slope, deflections and strain energy stored in different types of materials.
			CO5	Analyze the structures subjected to moving loads.
14	0CVPC208,	Advanced Surveying	CO1	Discuss the vertical photograph concept
			CO2	Describe the knowledge of GPS and GIS in agriculture and environmental applications.
			CO3	Discuss the knowledge of remote sensing in civil engineering.
			CO4	Calculate the horizontal and vertical distance by using methods of tachometry
			CO5	Differentiate the various methods to set out curves
15	0CVPC209,	Building Design and Drawing	CO1	Discuss principle of planning and building bye laws for the residential buildings.
			CO2	Describe building permission procedure and phenomenon of energy efficient building
			CO3	Discuss the concept of ventilation, air conditioning, thermal &sound insulation, types of building finishes, Acoustics &Fire resistance phenomenon in building
			CO4	Explain plumbing system and electrification in building.
			CO5	Draw drawing of residential buildings considering Building By-Laws and regulations.
16	0CVPC210,	Concrete Technology	CO1	Explain properties of concrete & procedure of manufacturing of concrete.
			CO2	Explain the factors affecting the properties of concrete.
			CO3	Explain the different tests on concrete.
			CO4	Classify different types of special concrete.
			CO5	Determine the mix proportion for given grade of concrete.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
17	0CVMC211,	Environmental Studies	CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
			CO3	Write a technical report in team regarding course and impacts of environment related issues.
			CO4	Discuss current concern of environment issues.
			CO5	Describe the need of environment protection and ethics.
18	0CVHS257,	General Proficiency Laboratory	CO1	Identify the key traits in oneself comprising of attitude skill & knowledge
			CO2	Proficiently apply skills for improving presentations of any format.
			CO3	Professionally communicate in both technical and non technical terms.
			CO4	Display the traits required to improve employability skills.
			CO5	Exhibit effective communication techniques.
19	0CVPC258	Advanced surveying Laboratory	CO1	Compute various measurements by use of total station
			CO2	Compute horizontal distance between the various points and assess the grade of line by using tacheometer.
			CO3	Calculate various measurements in simple and transition curves
			CO4	Calculate the area of polygon by using tacheometer
			CO5	Communicate effectively during performing practical work on site and orally
			CO6	Engage in lifelong learning while using modern surveying equipments
20	0CVPC259,	Building Design and Drawing Laboratory	CO1	Draw the plan elevation and section of existing residential building
			CO2	Draw the plan elevation and section of residential building (G+1).
			CO3	Draw plan of foundation, furniture, electrification , water supply and drainage of residential building
			CO4	Function effectively as an individual and as a team member while designing and drawing various Plans
			CO5	Engage in lifelong learning the drawing knowledge of residential building.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
21	0CVPC260,	Concrete Technology Laboratory	CO1	Explain the properties of ingredients of concrete. (K^2)
			CO2	Describe the properties of concrete. (K^2)
			CO3	Design concrete mix & prepare the concrete. (K^6)
			CO4	Independently perform the experiments and communicate effectively about the laboratory work orally. (S^3)
			CO5	Follow the given instructions in laboratory for handling testing equipments. (A^2)
22	0CVPC261 ,	CAD Practice Laboratory	CO1	List out the Auto CAD Commands (K^1)
			CO2	Demonstrate the Auto CAD Commands (K^3)
			CO3	Draw the municipal drawing and working drawing of residential building (G+1) (Using principles of planning, orientation of building, building byelaws) (K^3)
			CO4	Engage in lifelong learning the drawing knowledge of residential building. (A^2)
			CO5	Function effectively as an individual member while drawing various Plans of buildings. (S^1)
23	0CVPC301,	Design of Steel Structures	CO1	Discuss different methods to design of steel member and failure modes and essential elements of steel structures (K^2)
			CO2	Calculate the various parameters of axially and eccentrically loaded welded and bolted connections and different members (K^3)
			CO3	Solve various steel truss members as tension and compression members. (K^4)
			CO4	Examine steel column, built up column and column bases. (K^4)
			CO5	Examine laterally supported & unsupported beams, plate girder and gantry girder, roofing system (K^4)
24	0CVPC302,	Soil Mechanics	CO1	Explain the concept of permeability & seepage in soil. (K^2)
			CO2	Explain the process of compaction and consolidation. (K^2)
			CO3	Calculate the shear strength of soil under different loading condition.(K^2)
			CO4	Illustrate the various phase diagrams and derive various phase relationship of the soil. (K3)
			CO5	Compute the vertical stresses in soil mass due to various Loading conditions.(K3)
			CO6	Calculate Earth pressure on retaining structure.(K3)

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
25	0CVPC303,	Water Supply Engineering	CO1	Summarize the various sources of water with respect to quality (K^2)
			CO2	Summarize the various sources of water with respect to quantity of water. (K^2)
			CO3	Explain the principles of Nanotechnology in Water Treatment. (K^2)
			CO4	Compute the various components related to transmission, water supply appurtenances and distribution of water. (K^3)
			CO5	Compute the various units of water treatment plant. (K^3)
26	0CVES304,	Engineering Geology	CO1	Describe the phenomenon of weathering, erosion, earthquake and landslides along with their civil engineering significance. (K^2)
			CO2	Describe the different types of geological structures with importance on civil engineering aspects (K^2)
			CO3	Summarize the different types of minerals and rocks with their civil engineering significance
			CO4	Explain the concepts of groundwater and building stones.
			CO5	Apply the knowledge of geology to know the suitability of site for construction of dams, reservoirs, bridges and tunnels
			CO6	Solve numerical problems related to RQD, aquifer parameters
27	0CVPC305,	Infrastructure Engineering	CO1	Explain various types of pavement materials used in rigid and flexible pavement
			CO2	Describe railway engineering design parameters and its importance
			CO3	Explain the different terminologies of docks and harbors, various methods of tunneling and the safety measures
			CO4	Describe different techniques of Intelligent Transport System
			CO5	Summarize various engineering aspects of airport
			CO6	Apply the knowledge of highway engineering in geometric design
28	0CVPC351,	Soil Mechanics Laboratory	CO1	Compute the various index properties of given soil.
			CO2	Calculate Engineering Properties of soil.
			CO3	Demonstrate the shear strength test
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
29	0CVPC352,	Water Supply Engineering Laboratory	CO1	Calculate the various physical, Chemical parameters of water.
			CO2	Observe various units of water treatment plant.
			CO3	Compute the of various units of water treatment Plant.
			CO4	Use of EPANET software as a modern tool for designing of pipe network
			CO5	Practice education of water supply system in environmental and societal context
30	0CVES353,	Engineering Geology Laboratory	CO1	Identify engineering properties in mineral and rocks.
			CO2	Draw sections of geological structural maps.
			CO3	Distinguish different physical properties in common rock forming and ore minerals.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
31	0CVPC354,	Infrastructure Engineering Laboratory	CO1	Report on construction of rigid pavement and identify different waste materials in highway construction
			CO2	Observe advanced techniques adopted in infrastructure engineering
			CO3	Compute the grade of bitumen as per IRC recommendations
			CO4	Draw airport layout for particular location
			CO5	Communicate effectively about laboratory work orally while performing experiments.
			CO6	Practice professional and ethical behavior to carry forward in their life.
32	0CVPC355,	Building Planning & Drawing Laboratory	CO1	Draw the line plan of public buildings
			CO2	Draw the municipal drawing of public building considering the design aspect
			CO3	Make the various working drawings of public building
			CO4	Use AutoCAD as a modern tool and software for drawing of public building
			CO5	Practice professional and ethical behavior to carry forward in their life

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
33	0CVAC306,	Professional Lectures and Skill Practices	CO1	Explain the latest developments to improve the civil engineering knowledge.
			CO2	Use various tools and equipments required for construction
			CO3	Demonstrate various construction activities on field
			CO4	Function effectively as an individual and as a team member while performing various construction activities
			CO5	Practice various construction activities
34	0CVPC307	,Theory of Structures	CO1	Explain the concept of statically and kinematically indeterminate structures.
			CO2	Examine the statically indeterminate structure by using Consistent deformation method.
			CO3	Interpret statically indeterminate structure by using Strain energy method.
			CO4	Investigate kinematically indeterminate structure by using Slope deflection method and Moment distribution method.
			CO5	Solve the indeterminate structure by using Matrix methods.
35	0CVPC308,	Foundation Engineering	CO1	Summarize the methods of soil exploration
			CO2	Calculate various dimensions of shallow foundation.
			CO3	Calculate bearing capacity of soil with different methods
			CO4	Compute capacity of deep foundations by various methods
			CO5	Examine slope failures by different methods and modern foundation techniques in civil engineering
36	0CVPC309,	Waste Treatment & Pollution Control	CO1	Explain the sources, characteristics and methods of wastewater collection
			CO2	Discuss the concept of solid waste management.
			CO3	Compute the various units of low cost wastewater treatment.
			CO4	Apply the knowledge of effluent standards for wastewater disposal as per norms.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
37	0CVPC310.	Water Resources Engineering	CO1	Describe the hydrological cycle, and its components.
			CO2	Discuss the basic concepts of stability of Earthen and gravity dam.
			CO3	Explain the basic concepts of ground water hydrology
			CO4	Illustrate different components of hydrograph and problems on it.
			CO5	Calculate water requirements for crops.
38	0CVPE311.	Open Channel Flow	CO1	Explain the basic concepts of fluid flow in open channels.
			CO2	Describe the various types of hydraulic models.
			CO3	Explain the phenomenon of dispersion and hydraulics of mobile beds in open channels
			CO4	Apply the principles and equations of open channel flows for pressure flow and momentum analysis.
			CO5	Apply the analytical knowledge of pressure and velocity distribution in an open channel in order to solve practical problems.
39	0CVPE312.	Pavement Design & Analysis	CO1	Illustrate different stresses and deflections in flexible pavements.
			CO2	Illustrate different stresses and deflections in rigid pavements.
			CO3	Make use of analytical method to design flexible and rigid pavement.
			CO4	Adapt the method of overlay over flexible and rigid pavements.
			CO5	Investigate the distress condition of flexible pavements using various techniques.
40	0CVPE313.	Remote Sensing & GIS Applications in Civil Engineering	CO1	Discuss the brief history of Remote Sensing Technology and GIS.
			CO2	Discuss the various applications of remote sensing technique in civil engineering
			CO3	Explain different photographic elements in aerial photographs.
			CO4	Explain photo interpretation with the help of stereoscope, Parallax bar & computer
			CO5	Apply the results from GIS software in civil engineering field.
			CO 6	Solve numerical problems on scale of aerial photographs.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
41	0CVPE314,	Design of Concrete Bridges	CO1	Describe various construction techniques of bridges
			CO2	Explain types bearings and expansion joints
			CO3	Discuss basics of pre-stress bridges
			CO4	Illustrate various types of bridges and its specification
			CO5	Illustrate design consideration of R.C.C. and P.S.C. bridges
42	0CVPE315,	Advanced Foundation Engineering	CO1	Discuss soil stabilization and their different types.
			CO2	Explain types and various uses of sheet pile and coffer dam.
			CO3	Calculate various dimentions of shallow foundation.
			CO4	Compute various dimentions of machine foundation for static and dynamic loading condition.
			CO5	Compute the pile capacities and their efficiency.
43	0CVPE316,	Town Planning & Transportation Engineering	CO1	Explain importance of town planning and growth patterns
			CO2	Discuss acts and town planning development aspects.
			CO3	Discuss engineering aspects of traffic
			CO4	Describe the urban transportation planning
			CO5	Explain the planning of various public transportation systems
44	0CVPE317,	Solid Waste Management	CO1	Discuss the sources ,objective and functional outlines of Solid Waste Management
			CO2	Describe the various types of material and energy recovery operations .
			CO3	Explain various types of waste management systems
			CO4	Illustrate various economical aspects and methods of refuse
			CO5	Illustrate the concept of land filling and leachate controlling techniques.
45	0CVPC357,	Waste Treatment and Pollution Control Laboratory	CO1	Calculate the level of pollution in wastewater.
			CO2	Observe various units of wastewater treatment plant
			CO3	Compute the of various units of wastewater treatment Plant
			CO4	Use of software for designing of sewer network
			CO5	Practice education of water supply system in environmental and societal context.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
46	0CVPE361	Open Channel Flow Laboratory	CO1	Report on components of canal or weir
			CO2	Compute the various design parameters of open channels
			CO3	Illustrate depth energy relationship for unsteady, non-uniform open channel flow
			CO4	Professionally communicate in both technical and non technical terms.
			CO5	Exhibit effective communication techniques
47	0CVPE362,	Pavement Design & Analysis Laboratory	CO1	Calculate various parameters for design of flexible pavement.
			CO2	Calculate various parameters for design of rigid pavement.
			CO3	Use IIT Pave software for design of pavement.
			CO4	Function effectively as a individual and team member during pavement design.
			CO5	Practice professional and ethical behavior to carry forward in their life.
48	0CVPE363,	Remote Sensing & GIS Applications in Civil Engineering Laboratory	CO1	Identify various photo recognition elements in aerial photograph
			CO2	Describe various rock types in aerial photograph
			CO3	Practice georeferencing, shape file, DEM with the help of QGIS
			CO4	Communicate effectively about laboratory work orally while performing experiments.
			CO5	Practice professional and ethical behavior to carry forward in their life.
49	0CVPE364,	Design of Concrete Bridges Laboratory	CO1	Explain various construction techniques of bridges
			CO2	Explain types of bridges and its design consideration of bridges
			CO3	Discuss bridge bearings and pre-stress bridge
			CO4	Report on site visit of bridge construction site
			CO5	Communicate effectively about laboratory work both orally and in writing journal
50	0CVPE365,	Advanced Foundation Engineering Laboratory	CO1	Discuss soil stabilization and their different types
			CO2	Calculate various dimentions of shallow foundation.
			CO3	Compute various dimentions of machine foundation for static and dynamic loading condition.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
51	0CVPE366,	Town Planning & Transportation Engineering Laboratory	CO1	Report on existing planned city
			CO2	Use of PTV VISSIM for signalize and rotary intersection.
			CO3	Examine traffic volume and its behavior
			CO4	Function effectively as a individual and team member during traffic studies
			CO 5	Use knowledge of contemporary issues relevant to traffic engineering for society
52	0CVPE367,	Solid Waste Management Laboratory	CO1	Calculate the level of pollution in solid waste.
			CO2	Observe various units of solid waste treatment plant
			CO3	Compute various units of land filling site.
			CO4	Function effectively as an individual and as a team member while checking various water quality parameters
			CO5	Practice professional and ethical behavior to carry forward in their life.
53	0CVPC358,	Mini Project I (SDD I)	CO1	Explain different types of methods used for steel design.
			CO2	Solve and draw the various components of the industrial shed with roof truss or portal frame or gable frames
			CO3	Calculate and draw the various components of building frames/ footbridge /welded plate girder.
			CO4	Function effectively as an individual and as a team member while steel structural design.
			CO5	Engage in lifelong learning structural drawing and design.
54	0CVES360,	Soft Computing Skills in Civil Engineering – I	CO1	Adopt software skills in the field of Civil Engineering.
			CO2	List various commands for implementation of software.
			CO3	Compute various technical parameters with the help of software.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and carry forward in their life as lifelong learning.
55	0CVPC401,	Estimating & Costing	CO1	Describe estimate, specifications and their types
			CO2	Explain different terms related to valuation
			CO3	Calculate value of existing properties by various methods
			CO4	Compute quantities and rates for various items of construction
			CO5	Classify different types of contract and essential study of legally valid contract

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
56	0CVPC402.	Design of Concrete Structures I	CO1	Summarize the general stress strain behaviour of reinforced concrete with different design philosophies.
			CO2	Calculate various design parameters of members in shear by limit state method.
			CO3	Examine various design parameters of Slab & Stair case.
			CO4	Calculate various design parameters of beam & column by limit state method.
			CO5	Examine various design parameters of footing by limit state method.
57	0CVPC403.	Earthquake Resistant Structures	CO1	Explain various elements of seismology
			CO2	Summarize earthquake resistant modern techniques
			CO3	Discuss earthquake resistant design of masonry structure
			CO4	Adapt the earthquake resistant design principles
			CO5	Apply theory of vibration and prepare mathematical modelling of structure
			CO6	Calculate lateral force acting on earthquake resistant structure.
58	0CVPE404.	Advance Structural Analysis	CO1	Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition.
			CO2	Produce ILD for reactions, S.F. and B.M. for propped cantilever beam, Fixed beam Portal frames and arches.
			CO3	Illustrate the expressions for max. B.M., slope, deflection for beam –column and beams in elastic foundation subjected to different loading with different support condition.
			CO4	Examine structures for various loading by using stiffness and flexibility matrix method.
			CO5	Evaluate element and global stiffness matrix
59	0CVPE405.	Repair & Rehabilitation of Structures	CO1	Describe causes of deterioration of structures.
			CO2	Explain methods of assessment of structures.
			CO3	Discuss methods and techniques of repairing of structures
			CO4	Illustrate different retrofitting methods
			CO5	Relate methods for repair of structures.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
60	0CVPE406,	Advanced Construction Techniques	CO1	Discuss various construction techniques
			CO2	Summarize construction technique for different underground constructions
			CO3	Explain prefabricated construction techniques.
			CO4	Discuss rehabilitations of bridges and construction methods of retaining structures
			CO5	Illustrate the different types of formwork systems
			CO6	Apply various grouting method for different site condition.
61	0CVPE407,	Legal aspects in Civil Engineering	CO1	Discuss various types of land documents required for land purchasing
			CO2	Summarise administrative procedure and various types of injunctions
			CO3	Explain various types of industrial act and contract and labour laws
			CO4	Discuss phenomenon of arbitration, Indemnity and guarantee in legal aspects
			CO5	Describe the concepts of bailment and legal aspects of various factors.
62	0CVPE408	,Ground Improvement Techniques	CO1	Explain concept of ground improvement techniques
			CO2	Describe earth reinforcement and their stability analysis
			CO3	Apply geo-synthetics techniques to different civil engineering structures
			CO4	Illustrate phenomenon of stone column
			CO5	Classify different ground techniques with their suitability
63	0CVPE409,	Hydraulic Structures	CO1	Identify suitable type of dam depending on the site conditions.
			CO2	Explain the concept and types of spillway.
			CO3	Describe various theories for canal silting and diversion head work stability.
			CO4	Illustrate the function of different parts and components of hydraulic structures
			CO5	Investigate the ability of gravity and earthen dam.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
64	0CVPE410,	Green Building	CO1	Discus orientation and lighting provision in building
			CO2	Explain passive, active architecture and energy audit of building
			CO3	Explain recycling and embodied energy of different building materials.
			CO4	Illustrate various methods of improving efficiency of water uses in green building
			CO5	Apply the different green building rating systems.
65	0CVOE411,	Operation Research	CO1	Discuss the decision theory and game theory
			CO2	Use Assignment model and transportation model for mathematic formulation
			CO3	Apply OR and LP technique for solving Engineering Problems
			CO4	Illustrate various inventory models for cost optimization
			CO5	Adopt non linear and dynamic programming for operational research
66	0CVOE412,	Human Resources Development	CO1	Discuss the significance of human resource development.
			CO2	Explain the process of human resource planning.
			CO3	Describe employee management relation and various schemes of employee benefit.
			CO4	Illustrate different trainings and performance appraisal systems.
			CO5	Apply different recruitment and selection procedure.
67	0CVOE413,	Air Pollution and Control	CO1	Discuss physics of atmosphere
			CO2	Describe concept of dispersion of pollutant in the atmosphere
			CO3	Illustrate concept of particulate matters and various controlling equipment for particulate matter
			CO4	Discuss various control measures for gaseous pollutant
			CO5	Summarize various automobile source of pollution

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
68	0CVOE414,	Research Methodology	CO1	Discuss the basic concepts of research.
			CO2	Summarize data collection methods.
			CO3	Identify various methods for analysis of research problem
			CO4	Explain parameters for writing a research report and thesis.
			CO5	Describe different methods of presentation of research.
69	0CVOE415,	Economics & Management	CO1	Explain the importance of management in industry.
			CO2	Discuss the importance of feasibility study with profitability of project.
			CO3	Summarize business environment and concept of quality management in industry.
			CO4	Apply various technique in material management.
			CO5	Use various economic comparison method in industry.
70	0CVOE416,	Finite Element Method	CO1	Explain terminology used in FEM.
			CO2	Apply variational and direct approach method for 1D, 2D problems.
			CO3	Determine relationship between natural and cartesian coordinate system.
			CO4	Develop stiffness matrix for linear spring, bars, beam and truss (1D, 2D & 3D problem).
			CO5	Formulate element stiffness matrix for axisymmetric elements.
71	0CVOE417,	Disaster Management	CO1	Explain disaster and disaster management cycle
			CO2	Discuss disaster preparedness and response activities various types of disaster
			CO3	Describe Physical and Socio-economic Impacts of Disasters
			CO4	Explain current scenario of disaster management in India
			CO5	Apply various advanced techniques for disaster management

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
72	0CVPC451,	Estimating and costing Laboratory	CO1	Make schedule of reinforcement of various RCC elements.
			CO2	Calculate value of land and existing properties.
			CO3	Generate detailed estimate and rate analysis of various construction items
			CO4	Communicate effectively about laboratory work both orally and in writing Journals.
			CO5	Practice knowledge of quantity estimation and valuation for societal context
73	0CVHS452,	General Proficiency Laboratory II 0CVHS257	CO1	Show the key traits in oneself comprising of attitude skill & knowledge
			CO2	Proficiently apply skills for improving presentations of any format.
			CO3	Professionally communicate in both technical and non technical terms.
			CO4	Display the traits required to improve employability skills.
			CO5	Exhibit effective communication techniques.
74	0CVES453,	Soft Computing Skills in Civil Engineering – II	CO1	Adopt software skills in the field of Civil Engineering.
			CO2	List various commands for implementation of software.
			CO3	Compute various technical parameters with the help of software.
			CO4	Communicate effectively about software work both orally and in writing journals.
			CO5	Practice professional and carry forward in their life as lifelong learning.
75	0CVSE501	, Theory of Elasticity and Plasticity	CO1	Explain behavior of material
			CO2	Explain stress strain behavior at a point in material.
			CO3	Apply theory of elasticity in plane strain and plain stress conditions,bending, and torsion.
			CO4	Apply theory of plasticity in failure of materials.
			CO5	Apply theory of plasticity in practical applications in analysis and design of structures.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
76	0CVSE502,	Advanced Structural Analysis	CO1	Construct of ILD for reactions, S.F. and B.M. for propped cantilever beam. Fixed beam Portal frames and arches.
			CO2	Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition.
			CO3	Develop the expressions for max. B.M.,slope,deflection for beam –column
			CO4	Develop element and global stiffness matrix.
			CO5	Analyze structures for various loading by using stiffness matrix method.
77	0CVSE503,	Advance Design of Concrete Structure	CO1	Analysis and design of various types of slabs as per situation and loading conditions
			CO2	Analysis and design of different types of footings as per superstructure and substructure (soil conditions).
			CO3	Analysis and design of different types of water tanks as per situation and loading combinations.
			CO4	Analysis and design of Silos and bunkers-lateral pressure
			CO5	Analysis and design of Chimney
78	0CVSE504,	Structural Dynamics	CO1	To understand the fundamental theory of structural dynamics and equation of motion.
			CO2	To analyses and study dynamics response of single and multi-degree-of freedom systems.
			CO3	Applying concept of structural dynamics to seismic and wind induced vibrations and understanding the concept of modal analysis and mode combinations
79	0CVSE505	, Advanced Design of Prestressed Members	CO1	Explain the basic principles of Prestressing.
			CO2	Analyze and design circular systems, domes and slabs.
			CO3	Design Pre-stressed Bridges.
			CO4	Design continuous beams, folded plates and shells
			CO5	Design tension and compression members
80	0CVSE509	, Research Methodology	CO1	Know the basic concepts of research.
			CO2	Select and define appropriate research problem and parameters for writing a research report and thesis.
			CO3	Explain measurement and Scaling Techniques.
			CO4	Analysis of Variance and Co-variance.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
81	0CVSE551,	Advanced Design of Concrete Structures Lab	CO1	Analysis and design of various types of slabs as per situation and loading conditions.
			CO2	Analysis and design of different types of footings as per superstructure and substructure (soil conditions).
			CO3	Analysis and design of different types of water tanks as per situation and loading combinations.
			CO4	Analysis and design of Silos and bunkers-lateral pressure
			CO5	Analysis and design of Chimney
82	0CVSE552	Software Application Lab- I	CO1	Judge the quality of the numerical solution and improve accuracy inan efficient manner by optimal selection of solution variables
			CO2	Analyze complex structural systems, using analysis softwares including interfacing with CAD models.
			CO3	Design various RCC and Steel structural components using softwares.
			CO4	Design Multistoried RCC Buildings using codes of various countries.
			CO5	Design foundations of complex structures.
83	0CVSE553,	Seminar I	CO1	Identify research problem.
			CO2	Prepare and present statement of purpose.
			CO3	Perform analysis work.
			CO4	Demonstrate with outside agencies.
			CO5	Generate report and Present the work carried out.
84	0CVSE510,	Theory of Plates and Shells	CO1	Understand the fundamentals of continuum mechanics.
			CO2	Understand the classical plate theory and First order shear deformation theory for the static analysis of plates.
			CO3	Analyze the plates for various boundary and loading conditions using Navier's and Levi's solution.
			CO4	Analyze the plates for the dynamic loading and under the vibrations with different boundary conditions.
			CO5	Analyze all the type of shells with and without edge beams.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
85	0CVSE511,	Finite Element Method	CO1	Explain the fundamentals of the finite element method for the analysis of engineering problems arising in solids and structures.
			CO2	Illustrate the quality of the numerical solution and improve accuracy in an efficient manner by optimal selection of solution variables
			CO3	Formulate the design problems into FEA
			CO4	Apply commercially available, state-of-the-art finite element an analysis software to analyze and design complex structural systems, including interfacing with CAD models
86	0CVSE512,	Design of Earthquake Resisting Structures	CO1	Understand the behavior of structure under dynamic loading.
			CO2	Model the structure mathematically.
			CO3	Analyze dynamic analysis of structures.
			CO4	Design of earthquake resistant structures.
87	0CVSE513,	Advanced Design of Steel Structure	CO1	Understand the concept of design of steel structures.
			CO2	Analyze the forces in members of steel structures.
			CO3	Design the various steel structure members.
88	0CVSE514,	Advances in Concrete Composites	CO1	Describe the weakness of plain concrete, and illustrate the latest development in trend in concrete composites
			CO2	Illustrate the advanced applications of composite materials.
			CO3	Explain the manufacturing and properties of concrete composites such as fibre reinforced concrete, ferro-cement, silica fume concrete and polymer concrete
89	0CVSE518,	Structural Audit	CO1	Know the basic concepts of Structural Audit.
			CO2	Define Structural Audit and parameters for visual inspection.
			CO3	Describe NDT and SDT techniques.
			CO4	Explain the methods of interpretation the testing reports.
90	0CVSE554	,Structural Lab	CO1	Practice the compression test on concrete cubes / cylinders.
			CO2	Practice the tensile test Steel / Composite bars.
			CO3	Perform the compression test on fibre reinforced / carbon reinforced cube.
			CO4	Compare the analysis of deflection and stresses of steel / concrete beam with practical test with manual analysis of the same.
			CO5	Perform axial compression test on FRP Column.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
91	0CVSE555,	Seminar II	CO1	Identify research problem.
			CO2	Prepare and present statement of purpose.
			CO3	Perform analysis work.
			CO4	Demonstrate with outside agencies.
			CO5	Generate report and Present the work carried out.
92	0CVSE651,	Industrial Training Assessment	CO1	Perform practical / field work on site.
			CO2	Design and analysis of any structure has to be done in consultancy company.
			CO3	Compare the manual design and design prepared by consultant.
93	0CVSE652,	Dissertation Phase – I	CO1	Identify research problem from literature survey.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Present the work carried out.
94	0CVSE653,	Dissertation Phase – II	CO1	Prepare the set up for experimentation/software.
			CO2	Perform experimental/software analysis for validation of research work.
			CO3	Prepare research design for above problem.
			CO4	Generate synopsis report.
			CO5	Present the work carried out.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
95	0CVSE654,	Dissertation Phase – III	CO1	Perform experimental/software analysis for developing research work.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Publish a research paper in journals/conference.
			CO5	Write total work as dissertation report.
96	0CVSE655	, Dissertation Phase – IV	CO1	Perform experimental/software analysis for developing research work.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Publish a research paper in journals/conference.
			CO5	Write total work as dissertation report.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
95	0CVSE654.	Dissertation Phase – III	CO1	Perform experimental/software analysis for developing research work.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Publish a research paper in journals/conference.
			CO5	Write total work as dissertation report.
96	0CVSE655	, Dissertation Phase – IV	CO1	Perform experimental/software analysis for developing research work.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
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Programme Name	:	Civil Engineering (Revision -First)
	PSO	Statement
	1	PSO1. An understanding of issues for professional practice such as the procurement of work and interaction with stakeholders during the construction phase of the work.
	2	PSO2. Identify, analyze, design and execute Civil Engineering problems professionally for industry and society.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	1CVBS201,	Applied Mathematics- III	CO1	Solve the problems of vector calculus.
			CO2	Solve the problems on Partial Differential Equation.
			CO3	Construct the Fourier Series for the any functions.
			CO4	Solve Algebraic and transcendental Equations using numerical method.
			CO5	Solve the Civil engineering problems using Linear Differential Equation
			CO6	Evaluate Laplace Transform and inverse Laplace transform of any function.
2	1CVPC202,	Advance Surveying	CO1	Explain the phenomenon of leveling and contouring.
			CO2	Discuss use and applications of modern surveying techniques.
			CO3	Describes the field applications of tacheometry in distance and elevation calculations.
			CO4	Illustrate the field procedure for the traverse computation and leveling.
			CO5	Calculate the various parameters for setting out curves.
3	1CVPC203,	Fluid Mechanics	CO1	Summarize the basic properties of fluids and examine their behavior under application of various force systems.
			CO2	Identify the different types of turbines and explain their working principle.
			CO3	Apply the principles developed in fluid statics, fluid kinematics and fluid dynamics in fluid flow problems.
			CO4	Illustrate the applications of principles of continuity, momentum and energy to a fluid in motion.
			CO5	Use the principle and equations for pressure flow and momentum analysis in open channel flows
4	1CVPC204,	Strength of Materials	CO1	Identify various types of stress and strain in various structural elements.
			CO2	Draw shear force and bending moment diagrams for beam supports and various loading conditions.
			CO3	Calculate dimensions of structural member subjected to Torsion.
			CO4	Calculate shear stresses and bending stresses for different beam sections.
			CO5	Compute strain energy stored in material under different loadings.
5	1CVPC205,	Building Technology	CO1	Explain the properties and suitability of various building materials
			CO2	Discuss different building components.
			CO3	Describe different bonds in masonry
			CO4	Summarize different types of roof coverings and different types of flooring.
			CO5	Draw different building components.

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			CO3	Describe different bonds in masonry
			CO4	Summarize different types of roof coverings and different types of flooring.
			CO5	Draw different building components.

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6	ICVPC251,	CAD Practice Laboratory	CO1	Summarize various Commands of Auto CAD
			CO2	Demonstrate the Auto CAD Commands
			CO3	Draw components of building.
			CO4	Engage in lifelong learning the drawing knowledge of residential building.
			CO5	Use Auto Cad software as a modern tool for Civil Engineering drawing.
7	ICVPC252,	Advance Surveying Laboratory	CO1	Compute the area and levels of points by taking field observation by leveling instruments and theodolite.
			CO2	Apply the principle of tacheometry to find the required parameters from field observation.
			CO3	Calculate the necessary data for setting out the curve.
			CO4	Express the knowledge of surveying for solving the civil engineering problems.
			CO5	Use the advance surveying instruments and its applications.
8	ICVPC253,	Strength of Materials Laboratory	CO1	Compute tensile strength on Mild steel and tor steel.
			CO2	Calculate compressive strength of timber and Bricks.
			CO3	Observe structural properties of different materials.
			CO4	Communicate effectively about laboratory work both orally and while performing experiments.
			CO5	Participate effectively in performing laboratory work.
9	ICVPC254,	Fluid Mechanics Laboratory	CO1	Explain the behavior of fluid flow rate under various conditions.
			CO2	Illustrate and plot the graphical results and its comparison with experimental results.
			CO3	Examine the fluid motion equations in laboratory.
			CO4	Communicate effectively about the laboratory work orally.
			CO5	Follow the given instructions in laboratory for handling flow measurement equipment's.
			CO6	Prepare a report based on the site visit.
10	ICVPC255,	Building Technology Laboratory	CO1	Summarize the market rates of various building materials and construction units
			CO2	Draw various types of foundations.
			CO3	Draw brick bonds, Stairs ,Doors and window
			CO4	Communicate effectively about laboratory work both orally and while drawing sheet.
			CO5	Display the professional and ethical behavior while performing laboratory work
11	ICVHS206,	Engineering Management	CO1	Explain the importance of management and entrepreneurship in Construction.
			CO2	Discuss various Techniques for Material Management.
			CO3	Illustrate the importance of legal aspects and Quality management in construction.
			CO4	Choose various Quantitative Techniques for problem solving.
			CO5	Apply the concept of Engineering Economy in construction.
12	ICVES207,	Structural Analysis	CO1	Describe concepts of structural analysis and degree of indeterminacy.
			CO2	Compute principal stresses and strains for a strained material.
			CO3	Draw Influence line diagram for determinate structure.
			CO4	Calculate slope and deflections of determinate beams
			CO5	Calculate combined, direct and bending stresses in the various structural elements.
			CO6	Compare elastic stability of column by using Euler's and Rankine's theory

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13	1CVPC208,	Water Resource Engineering	CO1	Explain different types of dams.
			CO2	Discuss the processes involved in surface water and groundwater hydrology
			CO3	Describe various irrigation types for different crops.
			CO4	Calculate various surface and ground water hydrology parameters.
			CO5	Solve numerical on determining flood discharge.
14	1CVPC209,	Building Design and Drawing	CO1	Summarize principle of planning and building bye laws for the residential buildings.
			CO2	Describe building permission procedure and phenomenon of energy efficient building
			CO3	Discuss the concept of ventilation, air conditioning, thermal &sound insulation, types of building finishes, Acoustics &Fire resistance phenomenon in building
			CO4	Explain plumbing system and electrification in building.
			CO5	Draw Plan of residential buildings considering Building By-Laws and regulations.
15	1CVPC210,	Concrete Technology	CO1	Describe properties of ingredients of concrete.
			CO2	Explain procedure of manufacturing of concrete.
			CO3	Summarize the properties of concrete and different tests on concrete.
			CO4	Discuss different types of special concrete.
			CO5	Calculate the mix proportion for given grade of concrete
16	1CVMC211,	Environmental Studies	CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
			CO3	Write a technical report in team regarding course and impacts of environment related issues.
			CO4	Discuss current concern of environment issues.
			CO5	Describe the need of environment protection and ethics.
17	1CVHS212,	Introduction to Psychology	CO1	Discuss importance of learning industrial psychology.
			CO2	Explain relation between attitude, emotions and behavior.
			CO3	Discuss about leadership and collect information about specific one ideal leader.
			CO4	Summarize the theories of motivation.
			CO5	Describe importance of concept personality
18	1CVPC256,	Building Design and Drawing Laboratory	CO1	Make plan elevation and section of existing residential building
			CO2	Draw plan elevation and section of residential building (G+1).
			CO3	Draw plan of foundation, furniture, electrification , water supply and drainage
			CO4	of residential building
			CO5	Independently use AutoCAD as modern tool for drawing sheets
			CO6	Display drawing skill in laboratory work and carry drawing knowledge as lifelong learning.
19	1CVPC257,	Concrete Technology Laboratory	CO1	Observe the properties of ingredients of concrete.
			CO2	Calculate the mix proportion for given grade of concrete.
			CO3	Examine the properties of concrete
			CO4	Use NDT equipments as a modern tool for calculating the strength of concrete.
			CO5	Apply basics of concrete technology for advances in Civil Engineering

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
20	ICVHS258,	General Proficiency I Laboratory	CO1	Identify the key traits in oneself comprising of attitude skill & knowledge
			CO2	Proficiently apply skills for improving presentations of any format.
			CO3	Professionally communicate in both technical and non-technical terms.
			CO4	Display the traits required to improve employability skills.
			CO5	Exhibit effective communication techniques.
21	ICVOE301,	Air Pollution and Control	CO1	Discuss physics of atmosphere
			CO2	Describe concept of dispersion of pollutant in the atmosphere
			CO3	Illustrate concept of particulate matters and various controlling equipment for particulate matter
			CO4	Discuss various control measures for gaseous pollutant
			CO5	Summarize various automobile source of pollution
22	ICVOE302,	Remote Sensing & GIS Applications	CO1	Discuss the brief history of Remote Sensing Technology and GIS.
			CO2	Identify the various applications of remote sensing technique in engineering
			CO3	Explain different photographic elements in aerial photographs.
			CO4	Describe photo interpretation with the help of stereoscope, Parallax bar & computer
			CO5	Compare the results from GIS software in engineering field.
23	ICVPC303,	Design of Steel Structures	CO1	Discuss different methods to design of steel member and failure modes and essential elements of steel structures
			CO2	Calculate the various parameters of axially and eccentrically loaded welded and bolted connections and different members
			CO3	Solve various steel truss members as tension and compression members.
			CO4	Examine steel column, built up column and column bases.
			CO5	Examine laterally supported & unsupported beams, plate girder and gantry girder, roofing system
24	ICVPC304,	Geotechnical Engineering I	CO1	Illustrate the various phase diagrams and derive various phase relationship of the soil.
			CO2	Compute the verticalstresses in soil mass due to various loading conditions.
			CO3	Calculate bearing capacity of soil with different methods
			CO4	Adapt the concept of permeability & seepage in soil.
			CO5	Compare the process of compaction and consolidation.
			CO6	Determine the shear strength of soil under different drainage condition.
25	ICVPC305,	Environmental Engineering	CO1	Summarize the various sources of water with respect to quality
			CO2	Summarize the various sources of water with respect to quantity of water.
			CO3	Explain the principles of Nanotechnology in Water Treatment.
			CO4	Compute the various components related to transmission, water supply appurtenances and distribution of water.
			CO5	Compute the various units of the water treatment plant.

Sr.No	Course Code	Course Name	CourseOutcome	CO Statement
26	ICVPE306.	Engineering Geology	CO1	Describe the important content related to engineering geology
			CO2	Explain the different types of geological structures with importance on civil engineering aspects
			CO3	Summarize the different types of minerals and rocks with their civil engineering significance
			CO4	Solve numerical problems related to RQD, aquifer parameters
			CO5	Compare the suitability of site for construction of dams, reservoirs, bridges and tunnels etc.
27	ICVPE307.	Advanced Structural Analysis	CO1	Explain the concept of statically and kinematically indeterminate structures.
			CO2	Discuss the basic concepts of Influence Line Diagrams
			CO3	Identify approximate Method for Analysis
			CO4	Interpret theory of torsion
			CO5	Investigate methods of analysis of Space Trusses.
			CO6	Solve Unsymmetrical Bending and Shear Center
28	ICVPE308.	Open Channel Flow	CO1	Explain the basic concepts of flow in open channels and flow computations.
			CO2	Choose the type of hydraulic model according to site conditions.
			CO3	Apply the principle and equation for non-uniform, non-linear and non-prismatic flow in open channels
			CO4	Make use of the principle and equation for pressure flow and momentum analysis in a notch or weir.
			CO5	Analyze the unsteady gradually varied flow in open channels
29	ICVPE309.	Town Planning & Traffic Engineering	CO1	Explain importance of town planning and growth patterns
			CO2	Discuss acts and town planning development aspects.
			CO3	Discuss engineering aspects of traffic
			CO4	Describe the urban transportation planning
			CO5	Explain the planning of various public transportation systems
30	ICVPE310	Safety Aspects In Construction	CO1	Discuss about the importance of safety management in construction.
			CO2	Describe various safety standards and act.
			CO3	Adapt safety culture, safety assurance in construction project.
			CO4	Classify different causes of accident and safety precautions in various construction activities.
			CO5	Recommend various safety activities for different construction work.
31	ICVPC351.	Geotechnical Engineering –I Laboratory	CO1	Compute the various index properties of given soil.
			CO2	Calculate Engineering Properties of soil.
			CO3	Demonstrate the shear strength test
			CO4	Communicate effectively about laboratory work both orally and in writing Journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
26	1CVPE306,	Engineering Geology	CO1	Describe the important content related to engineering geology
			CO2	Explain the different types of geological structures with importance on civil engineering aspects
			CO3	Summarize the different types of minerals and rocks with their civil engineering significance
			CO4	Solve numerical problems related to RQD, aquifer parameters
			CO5	Compare the suitability of site for construction of dams, reservoirs, bridges and tunnels etc.
27	1CVPE307,	Advanced Structural Analysis	CO1	Explain the concept of statically and kinematically indeterminate structures.
			CO2	Discuss the basic concepts of Influence Line Diagrams
			CO3	Identify approximate Method for Analysis
			CO4	Interpret theory of torsion
			CO5	Investigate methods of analysis of Space Trusses.
			CO6	Solve Unsymmetrical Bending and Shear Center
28	1CVPE308,	Open Channel Flow	CO1	Explain the basic concepts of flow in open channels and flow computations.
			CO2	Choose the type of hydraulic model according to site conditions.
			CO3	Apply the principle and equation for non-uniform, non-linear and non-prismatic flow in open channels
			CO4	Make use of the principle and equation for pressure flow and momentum analysis in a notch or weir.
			CO5	Analyze the unsteady gradually varied flow in open channels
29	1CVPE309,	Town Planning & Traffic Engineering	CO1	Explain importance of town planning and growth patterns
			CO2	Discuss acts and town planning development aspects.
			CO3	Discuss engineering aspects of traffic
			CO4	Describe the urban transportation planning
			CO5	Explain the planning of various public transportation systems
30	1CVPE310	Safety Aspects In Construction	CO1	Discuss about the importance of safety management in construction.
			CO2	Describe various safety standards and act.
			CO3	Adapt safety culture, safety assurance in construction project.
			CO4	Classify different causes of accident and safety precautions in various construction activities.
			CO5	Recommend various safety activities for different construction work.
31	1CVPC351,	Geotechnical Engineering –I Laboratory	CO1	Compute the various index properties of given soil.
			CO2	Calculate Engineering Properties of soil.
			CO3	Demonstrate the shear strength test
			CO4	Communicate effectively about laboratory work both orally and in writing Journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
32	ICVPC352,	Building Planning and Drawing Laboratory	CO1	Draw the line plan of public buildings
			CO2	Draw the municipal drawing of public building considering the design aspect
			CO3	Make the various working drawings of public building
			CO4	Use AutoCAD software for drawing of public building
			CO5	Practice professional and ethical behavior to carry forward in their life
33	ICVPE353,	Engineering Geology Laboratory	CO1	Identify engineering properties in mineral and rocks.
			CO2	Draw sections of geological structural maps
			CO3	Distinguish different physical properties in common rock forming and ore minerals.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
34	ICVPE354,	Advanced Structural Analysis Laboratory	CO1	Draw Influence Line Diagrams
			CO2	Identify approximate Method for Analysis
			CO3	Solve the indeterminate structure
			CO4	Communicate effectively about laboratory work both orally and in writing
			CO5	Practice professional and ethical behavior to carry forward in their life.
35	ICVPL355	Open Channel Flow Laboratory	CO1	Illustrate the depth energy relationship in open channels.
			CO2	Distinguish various types of notches and weirs
			CO3	Develop models of various hydraulic structures
			CO4	Professionally communicate in both technical and non-technical terms.
			CO5	Exhibit professional behavior during the industrial visit.
36	ICVPL356,	Town Planning & Traffic Engineering Lab	CO1	Report on existing planned city
			CO2	Design of signalize and rotary intersection using Software
			CO3	Examine traffic volume and its behavior
			CO4	Function effectively as a individual and team member during traffic studies
			CO5	Use knowledge of contemporary issues relevant to traffic engineering for society
37	ICVPE357,	Safety Aspects In Construction Laboratory	CO1	Identify current practices followed on site related with safety management.
			CO2	List different safety equipment and safety acts in construction project
			CO3	Recommend suitable site safety management system for a construction project.
			CO4	Professionally present site safety scenario both verbally and with the help of poster
			CO5	Practice professional and ethical behavior while collecting data from site
38	ICVPC358,	Environmental Engineering Laboratory	CO1	Calculate the various physical, Chemical parameters of water
			CO2	Observe various units of water treatment plant
			CO3	Compute the of various units of water treatment Plant
			CO4	Use of EPANET software as a modern tool for designing of pipe network
			CO5	Practice education of water supply system in environmental and societal context

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
32	1CVPC352,	Building Planning and Drawing Laboratory	CO1	Draw the line plan of public buildings
			CO2	Draw the municipal drawing of public building considering the design aspect
			CO3	Make the various working drawings of public building
			CO4	Use AutoCAD software for drawing of public building
			CO5	Practice professional and ethical behavior to carry forward in their life
33	1CVPE353,	Engineering Geology Laboratory	CO1	Identify engineering properties in mineral and rocks.
			CO2	Draw sections of geological structural maps.
			CO3	Distinguish different physical properties in common rock forming and ore minerals.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
34	1CVPE354,	Advanced Structural Analysis Laboratory	CO1	Draw Influence Line Diagrams
			CO2	Identify approximate Method for Analysis
			CO3	Solve the indeterminate structure
			CO4	Communicate effectively about laboratory work both orally and in writing
			CO5	Practice professional and ethical behavior to carry forward in their life.
35	1CVPE355	Open Channel Flow Laboratory	CO1	Illustrate the depth energy relationship in open channels.
			CO2	Distinguish various types of notches and weirs.
			CO3	Develop models of various hydraulic structures.
			CO4	Professionally communicate in both technical and non-technical terms.
			CO5	Exhibit professional behavior during the industrial visit.
36	1CVPE356,	Town Planning & Traffic Engineering Lab	CO1	Report on existing planned city
			CO2	Design of signalize and rotary intersection using Software
			CO3	Examine traffic volume and its behavior
			CO4	Function effectively as a individual and team member during traffic studies
			CO5	Use knowledge of contemporary issues relevant to traffic engineering for society
37	1CVPE357,	Safety Aspects In Construction Laboratory	CO1	Identify current practices followed on site related with safety management.
			CO2	List different safety equipment and safety acts in construction project.
			CO3	Recommend suitable site safety management system for a construction project.
			CO4	Professionally present site safety scenario both verbally and with the help of poster.
			CO5	Practice professional and ethical behavior while collecting data from site.
38	1CVPC358,	Environmental Engineering Laboratory	CO1	Calculate the various physical, Chemical parameters of water.
			CO2	Observe various units of water treatment plant.
			CO3	Compute the of various units of water treatment Plant.
			CO4	Use of EPANET software as a modern tool for designing of pipe network
			CO5	Practice education of water supply system in environmental and societal context

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
39	ICVSE359,	Professional Skill Practices	CO1	Explain the latest developments to improve the civil engineering knowledge.
			CO2	Use various tools and equipment's required for construction
			CO3	Demonstrate various construction activities on field
			CO4	Function effectively as an individual and as a team member while performing various construction activities
			CO5	Practice various construction activities
40	ICVPR360,	SEMINAR	CO1	Describe recent trends in Civil Engineering.
			CO2	Apply acquired knowledge in the field of Civil Engineering.
			CO3	Develop technical knowledge in the field of Civil Engineering
			CO4	Function effectively as an individual and as a team member while steel structural design.
			CO5	Engage in lifelong learning structural drawing and design.
41	ICVOE310,	Operation Research	CO1	Explain the concept behind Decision theory and Decision Tree
			CO2	Solve various engineering problems by Transportation and Assignment Approach.
			CO3	Apply the Queuing theory & Game theory in practice
			CO4	Use Replacement policy for equipment, group & individual.
			CO5	Analyze detailed idea about LPP and methods to solve LPP by various methods
			CO6	Interpret various inventory control technique adopted in Engineering
42	ICVOE311,	Economics & Management	CO1	Discuss importance of management and various techniques used for Material Management.
			CO2	Identify various techniques used in Quality Management.
			CO3	Apply the various Quantitative Techniques in practice
			CO4	Apply the various methods of Engineering Economy in industry.
			CO5	Identify various techniques used in Human Resource Management.
43	ICVPC312,	Theory of Structures	CO1	Calculate static and kinematic indeterminacy of structures.
			CO2	Examine the statically indeterminate structure by using appropriate Force method.
			CO3	Interpret kinematically indeterminate structure by using appropriate Displacement method.
			CO4	Interpret statically indeterminate structure by Flexibility matrix method.
			CO5	Investigate kinematically indeterminate structure by Stiffness matrix method.
44	ICVPC313,	Infrastructure Engineering	CO1	Identify various materials used in highway construction
			CO2	Describe railway engineering design parameters and its importance
			CO3	Demonstrate the highway construction techniques.
			CO4	Explain the different terminologies of docks and harbors, various methods of tunneling and the safety measures
			CO5	Summarize various engineering aspects of airport
			CO6	Apply the knowledge of highway engineering in geometric design
45	ICVPE314,	Repair & Rehabilitation of Structures	CO1	Explore the causes of deterioration of structures.
			CO2	Distinguish the methods of assessment of structures.
			CO3	Discuss methods and techniques of repairing of structures
			CO4	Adopt different methods for retrofitting of structures.
			CO5	Categorize the methods for repair of structures.

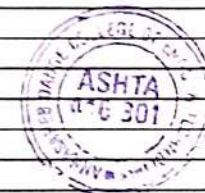| Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
46	ICVPE315,	Solid Mechanics	CO1	Explain stress strain behavior at a point in material
			CO2	Draw Mohr's circle for different stress conditions
			CO3	Apply theory of failure to isotropic materials
			CO4	Analyze of circular and non-circular section for torsion
			CO5	Investigate plastic behavior of beam member
47	ICVPE316,	Disaster Management	CO1	Outline disaster and disaster management cycle
			CO2	Summarize disaster preparedness and response activities for various types of Disaster
			CO3	Apply various advanced techniques for disaster management
			CO4	Examine the Physical and Socio-economic Impacts of Disasters
			CO5	Dissect the disaster management scenario in India
48	ICVPE317,	Ground Improvement Technique	CO1	Explain concept of ground improvement techniques
			CO2	Describe earth reinforcement and their stability analysis.
			CO3	Apply geo-synthetics techniques to different civil engineering structures.
			CO4	Illustrate phenomenon of stone column.
			CO5	Classify different ground techniques with their suitability.
49	ICVPE318,	Geotechnical Engineering	CO1	Summarize the methods of soil exploration
			CO2	Compute various dimensions of shallow foundation.
			CO3	Calculate effect of Earth pressure on retaining structure
			CO4	Interpret capacity of deep foundations by various methods
			CO5	Examine slope failures by different methods
50	ICVPE319,	Site Investigations Methods & Practices	CO 1	Discuss scope of site investigation and its applications in Civil Engineering.
			CO2	Explain subsurface exploration techniques with its suitability.
			CO3	Use geophysical methods and its interpretation techniques.
			CO4	Apply basic concepts site investigation in field.
			CO5	Recommend site suitability by preparing site investigation report.
51	ICVPE320,	Structural Masonry	CO1	Explain engineering properties and uses of masonry units, defects and crack in masonry.
			CO2	Select suitable design considerations for masonry structures.
			CO3	Explain design criteria as per IS: 1905 and SP-20.
			CO4	Design different masonry walls.
			CO5	Explain different types of masonry structures with behavior under different kind of loadings.
52	ICVPE321,	Waste Treatment & Pollution Control	CO1	Explain the sources, characteristics and methods of wastewater collection
			CO2	Discuss the concept of solid waste management.
			CO3	Compute the various units of low-cost wastewater treatment.
			CO4	Apply the knowledge of effluent standards for wastewater disposal as per norms.
			CO5	Compute the primary and secondary wastewater treatment units.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
53	1CVPE322,	Advanced Construction Techniques	CO1	Summarize construction technique for different underwater constructions
			CO2	Explain prefabricated construction techniques.
			CO3	Identify different advanced formwork system used in construction
			CO4	Select advanced construction techniques used in construction industries
			CO5	Apply various grouting method for different site condition.
			CO 6	Identify different advanced methods of pile construction
54	1CVPE323,	Structural Auditing	CO1	Discuss the basic concepts of Structural Audit and its legal aspects
			CO2	Identify parameters of visual inspection for Structural Audit
			CO3	Describe NDT and SDT techniques.
			CO4	Summarize methods of interpretation of testing reports
			CO5	Explain various schemes of Repairs and Rehabilitation.
55	1CVMC324,	Constitution of India	CO1	Illustrate about law depiction and importance of Constitution
			CO2	Summarize Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities.
			CO3	Outline the National Emergency, Financial Emergency and their impact on Economy of the country.
			CO4	Plan for suitable solutions while keeping rights and duties of the citizen keeping in mind.
			CO5	Identify powers and functions of Local Self Government.
56	1CVPC361,	Infrastructure Engineering Laboratory	CO1	Report on construction of rigid pavement and identify different waste materials in highway construction
			CO2	Observe advanced techniques adopted in infrastructure engineering
			CO3	Compute the grade of bitumen as per IRC recommendations
			CO4	Draw airport layout for particular location
			CO5	Communicate effectively about laboratory work orally while performing experiments
			co6	Practice professional and ethical behavior to carry forward in their life.
57	1CVPE362,	Site Investigations Methods and Practices Laboratory	CO1	Explain subsurface exploration techniques with its suitability.
			CO2	Apply knowledge geophysical methods and its interpretation techniques.
			CO3	Compare various test results of soil samples for site investigation.
			CO4	Communicate effectively about laboratory work both orally and in writing Journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
58	1CVPE363,	Structural Masonry Laboratory	CO1	Explain engineering properties, uses, defects and cracks in masonry structures.
			CO2	Select suitable design considerations for masonry structures.
			CO3	Select proper masonry structure for different loadings conditions.
			CO4	Communicate effectively about laboratory work both orally and in writing Journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
59	ICVPE364,	Waste Treatment and Pollution Control Laboratory	CO1	Calculate the level of pollution in wastewater.
			CO2	Observe various units of wastewater treatment plant
			CO3	Compute the of various units of wastewater treatment Plant
			CO4	Use of software for designing of sewer network
			CO5	Practice education of water supply system in environmental and societal context.
60	ICVPE365,	Advanced Construction Techniques Laboratory	CO1	Discuss various construction techniques
			CO2	Explain prefabricated construction techniques.
			CO3	Illustrate the different types of formwork systems, grouting, pilling
			CO4	Proficiently apply skills for improving presentations of any format.
			CO5	Professionally communicate in both technical and non-technical terms.
61	ICVPE366,	Structural Auditing laboratory	CO1	Identify reinforcement position in the concrete
			CO2	Calculate strength of concrete by different equipment
			CO3	Report of visual inspection and structural audit of structure
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Practice professional and ethical behavior to carry forward in their life.
62	ICVPR367,	Structural Design And Drawing - I	CO1	Explain different types of methods used for steel design.
			CO2	Solve and draw the various components of the industrial shed with roof truss orportal frame or gable frames
			CO3	Calculate and draw the various components of building frames/ footbridge /welded plate girder.
			CO4	Function effectively as an individual and as a team member while steel structural design.
			CO5	Engage in lifelong learning the structural drawing and design.
63	ICVES368,	Software training in Civil Engineering	CO1	Adopt software skills in the field of Civil Engineering.
			CO2	List various commands for implementation of software.
			CO3	Compute various technical parameters with the help of software.
			CO4	Communicate effectively about software work both orally and in writing journals.
			CO5	Practice professional and carry forward in their life as lifelong learning.
64	ICVOE401,	Structural Auditing	CO1	Discuss the concept of smart materials, sensor materials and structural health monitoring.
			CO2	Choose the appropriate procedure for structural health monitoring of concrete and steel structures.
			CO3	Identify different methods, equipment's, sensors and materials used in structural audit.
			CO4	Explain condition survey and Non-Destructive Evaluation of the different concrete and steel structures.
			CO5	Select appropriate method of NDT for the purpose of structural audit.
			CO 6	Make use of structural audit data for audit report writing.
65	ICVOE402,	Disaster Management	CO1	Interpret disaster and disaster management cycle.
			CO2	Explain types, trends, causes and consequences of disasters
			CO3	Develop a disaster management plan considering the disaster management cycle.
			CO4	Plan the initiatives necessary to be undertaken for efficient disaster management in Indian Scenario.
			CO5	Choose the advanced techniques in Geo-Informatics for disaster management.
66	ICVPC403,	Design of Reinforced Concrete Structures	CO1	Identify the different parameters used in limit state method.
			CO2	Analyse shear parameters of different structural members by limit state method.
			CO3	Determine the reinforcement details of slab and staircase.
			CO4	Evaluate various design parameters of beams by limit state method.
			CO5	Estimate sectional properties of column and footing by limit state method.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
67	ICVPE404,	Entrepreneurship	CO1	Illustrate the sickness in small business and plans for succession
			CO2	Make use of entrepreneurial skills, SWOT analysis for selection of business
			CO3	Identify industry developing agency and procedure to start a small scale industry
			CO4	List the market surveying techniques for selection of a product
			CO5	Assess the financial and accountancy aspect of running a business
			CO 6	Create project profiles and detailed project report
68	ICVPE405,	Hydraulic Structures	CO1	Explain various concepts and components used in reservoirs and dams.
			CO2	Illustrate the working and design procedure of canals and allied hydraulic structures.
			CO3	Select a suitable type of spillway and energy dissipation method according to given site condition.
			CO4	Analyze the stability of gravity and earthen dam.
			CO5	Compare various theories for diversion head work design.
69	ICVPE406,	Pavement Design & Analysis	CO1	Illustrate different stresses and deflections in flexible pavements.
			CO2	Calculate different stresses and deflections in rigid pavements.
			CO3	Design flexible and rigid pavement using various methods.
			CO4	Utilize the method of overlay over flexible and rigid pavements.
			CO5	Evaluate the distress condition of flexible pavements using various techniques.
70	ICVPE407,	Advanced Design of Concrete Structures	CO1	Analyze different types of retaining walls.
			CO2	Examine losses in prestressed members.
			CO3	Evaluate various design parameters of water tank by working stress method.
			CO4	Determine suitable dimensions of beam for limit state of collapse in flexure.
			CO5	Decide appropriate section for post tensioned slab and beam.
			CO6	Design rectangular and trapezoidal combined footing.
71	ICVPE408,	Design of Foundation	CO1	Analyze the machine foundation for static and dynamic loading condition.
			CO2	Examine the forces acting on well and remedial measure to sinking of well.
			CO3	Determine the reinforcement for retaining wall.
			CO4	Design the pile and raft type of foundation in structural point of view.
			CO5	Solve the problems on slab type and slab beam type of combined footing.
72	ICVPC409,	Earthquake Resistant Structures	CO1	Explain various elements of seismology.
			CO2	Summarize earthquake resistant modern techniques.
			CO3	Classify various retrofitting and strengthening techniques for masonry structures.
			CO4	Examine dynamic properties of a SDOF system.
			CO5	Analyze and design earthquake resistant structures as per IS code provisions.
73	ICVPC410,	Quantity Surveying and Valuation	CO1	Describe the estimate, specifications, and their types.
			CO2	Compare the different terms related to valuation and its type.
			CO3	Evaluate value of existing properties by various valuation methods.
			CO4	Estimate the quantities and rates for various items of construction.
			CO5	Categorize different types of contract and essential study of legally valid contract.
74	ICVPC451,	Quantity Surveying and Valuation Laboratory	CO1	Make schedule of reinforcement of various RCC elements.
			CO2	Evaluate the value of land and existing properties.
			CO3	Create detailed estimate and rate analysis of various construction items.
			CO4	Describe detailed specification of various construction item.
			CO5	Estimate various quantities of sub structure and super structure of a building.
75	ICVPR452,	Structural Design and Drawing	CO1	Choose primary and combination design loads on building consulting appropriate standards and handbooks
			CO2	Examine the detailing of design data on sheet
			CO3	Determine the design parameters for Retaining Wall.
			CO4	Design the component parts of the building manually
			CO5	Develop model and analyze building using any standard software

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76	ICVHS454,	General Proficiency Laboratory II	CO1	Solve aptitude problems within given time and with relevant logic.
			CO2	Show skills needed for approaching different types of interviews.
			CO3	Prepare a resume that describes the education, skills, experience and measurable achievements with proper grammar and format.
			CO4	Demonstrate behavior and communication skills required for group discussion and debate.
			CO5	Identify the component of selection process and evaluate the skills need to develop in order to improve employment prospect.
77	ICVPC455,	Field Training	CO1	Summarize the importance of ethical and professional responsibility and practices as civil engineer.
			CO2	Adapt optimum use of resources in the context of environmental sensitivity, sustainable development and occupational safety.
			CO3	Demonstrate necessary knowledge, skills and attitudes required to become an entrepreneur in civil engineering related business.
			CO4	Organize and manage civil engineering project related activities /practices/ resources effectively.
			CO5	Plan, design, construct and maintain civil engineering structures and buildings.
78	ICVPE411,	Design of Bridges	CO1	Describe various construction techniques of bridges.
			CO2	Explain type's bearings and expansion joints.
			CO3	Discuss basics of pre-stress bridges
			CO4	Illustrate various types of bridges and its specification.
			CO5	Design of R.C.C. and P.S.C. component bridges.
79	ICVPE412,	Management Information System	CO1	Explain management information systems used in organizations.
			CO2	Utilize computer programming for decision making.
			CO3	Select and design appropriate MIS systems to meet management requirements.
			CO4	Make use of management information systems for various organizations.
			CO5	Examine the cases related to application of MIS in different organizations.
80	ICVPE413,	Advanced Engineering Geology and Rock Mechanics	CO1	Discuss the behavior of subsurface water, natural resources and environmental impact in civil engineering structures.
			CO2	Compute the knowledge of tectonic activities in evolution of Deccan traps.
			CO3	Illustrate knowledge of the preliminary geological investigations for civil engineering projects.
			CO4	Classify the stratigraphic sequence of India.
			CO5	Apply skills of geophysical methods for geological investigation of civil engineering sites.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
81	ICVPE414,	Industrial Waste Water Treatment	CO1	Explain basics of industrial waste water and need for treatment
			CO2	Classify various industrial waste water and manufacturing processes
			CO3	Discuss various effluent quality standards for industrial waste water.
			CO4	Describe various industrial waste water treatment techniques
			CO5	Explain recent developments in industrial waste water treatment
82	ICVPE415,	Human Resources Development	CO1	Discus organization design, strategies significance objective and function of human resources management.
			CO2	Make use of human resource planning for construction sector.
			CO3	Identify the different methods for Employee Benefits and also explain the concept of Management Information System.
			CO4	Select appropriate trainings and performance appraisals systems for employees.
			CO5	Apply proper technique of recruitment for selection procedure of employees.
			CO6	Utilize of different motivation theory and SWOT analysis techniques in construction industries.
83	ICVPC416,	Project & Finance Management	CO1	Describe the basic concept of project management.
			CO2	Explain the concept of finance of project and preparation of accounting records.
			CO3	Correlate the risk Management with safety engineering in construction projects.
			CO4	Draw network diagram and identify the critical path by using CPM technique.
			CO5	Calculate various time estimates by the use of PERT technique.

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Programme Name	:	Civil Engineering (Revision -Zero)

PG

PSO	Statement
1	PSO1. An understanding of issues for professional practice such as the procurement of work and interaction with stakeholders during the construction phase of the work
2	PSO2. Identify, analyze, design and execute Civil Engineering problems professionally for industry and society.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
1	0CVSE501	Theory of Elasticity and Plasticity	CO1	Explain behavior of material
			CO2	Explain stress strain behavior at a point in material.
			CO3	Apply theory of elasticity in plane strain and plain stress conditions,bending, and torsion.
			CO4	Apply theory of plasticity in failure of materials.
			CO5	Apply theory of plasticity in practical applications in analysis and design of structures.
2	0CVSE502,	Advanced Structural Analysis	CO1	Construct of ILD for reactions, S.F. and B.M. for propped cantilever beam. Fixed beam Portal frames and arches.
			CO2	Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition.
			CO3	Develop the expressions for max. B.M.,slope,deflection for beam –column
			CO4	Develop element and global stiffness matrix.
			CO5	Analyze structures for various loading by using stiffness matrix method.
3	0CVSE503,	Advance Design of Concrete Structure	CO1	Analysis and design of various types of slabs as per situation and loading conditions
			CO2	Analysis and design of different types of footings as per superstructure and substructure (soil conditions).
			CO3	Analysis and design of different types of water tanks as per situation and loading combinations.
			CO4	Analysis and design of Silos and bunkers-lateral pressure
			CO5	Analysis and design of Chimney

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
4	0CVSE504,	Structural Dynamics	CO1	To understand the fundamental theory of structural dynamics and equation of motion.
			CO2	To analyses and study dynamics response of single and multi-degree-of freedom systems.
			CO3	Applying concept of structural dynamics to seismic and wind induced vibrations and understanding the concept of modal analysis and mode combinations
5	0CVSE505	, Advanced Design of Prestressed Members	CO1	Explain the basic principles of Prestressing.
			CO2	Analyze and design circular systems, domes and slabs.
			CO3	Design Pre-stressed Bridges.
			CO4	Design continuous beams, folded plates and shells
			CO5	Design tension and compression members
6	0CVSE509	, Research Methodology	CO1	Know the basic concepts of research.
			CO2	Select and define appropriate research problem and parameters for writing a research report and thesis.
			CO3	Explain measurement and Scaling Techniques.
			CO4	Analysis of Variance and Co-variance.
7	0CVSE551,	Advanced Design of Concrete Structures Lab	CO1	Analysis and design of various types of slabs as per situation and loading conditions.
			CO2	Analysis and design of different types of footings as per superstructure and substructure (soil conditions).
			CO3	Analysis and design of different types of water tanks as per situation and loading combinations.
			CO4	Analysis and design of Silos and bunkers-lateral pressure
			CO5	Analysis and design of Chimney
8	0CVSE552	,Software Application Lab- I	CO1	Judge the quality of the numerical solution and improve accuracy inan efficient manner by optimal selection of solution variables
			CO2	Analyze complex structural systems, using analysis softwares including interfacing with CAD models.
			CO3	Design various RCC and Steel structural components using softwares.
			CO4	Design Multistoried RCC Buildings using codes of various countries.
			CO5	Design foundations of complex structures.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
9	OCVSE553,	Seminar I	CO1	Identify research problem.
			CO2	Prepare and present statement of purpose.
			CO3	Perform analysis work.
			CO4	Demonstrate with outside agencies.
			CO5	Generate report and Present the work carried out.
10	OCVSE510,	Theory of Plates and Shells	CO1	Understand the fundamentals of continuum mechanics.
			CO2	Understand the classical plate theory and First order shear deformation theory for the static analysis of plates.
			CO3	Analyze the plates for various boundary and loading conditions using Navier's and Levi's solution.
			CO4	Analyze the plates for the dynamic loading and under the vibrations with different boundary conditions.
			CO5	Analyze all the type of shells with and without edge beams.
11	OCVSE511,	Finite Element Method	CO1	Explain the fundamentals of the finite element method for the analysis of engineering problems arising in solids and structures.
			CO2	Illustrate the quality of the numerical solution and improve accuracy in an efficient manner by optimal selection of solution variables
			CO3	Formulate the design problems into FEA
			CO4	Apply commercially available, state-of-the-art finite element an analysis software to analyze and design complex structural systems, including interfacing with CAD models
12	OCVSE512,	Design of Earthquake Resisting Structures	CO1	Understand the behavior of structure under dynamic loading.
			CO2	Model the structure mathematically.
			CO3	Analyze dynamic analysis of structures.
			CO4	Design of earthquake resistant structures.
13	OCVSE513,	Advanced Design of Steel Structure	CO1	Understand the concept of design of steel structures.
			CO2	Analyze the forces in members of steel structures.
			CO3	Design the various steel structure members.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
14	0CVSE514,	Advances in Concrete Composites	CO1	Describe the weakness of plain concrete, and illustrate the latest development in trend in concrete composites
			CO2	Illustrate the advanced applications of composite materials.
			CO3	Explain the manufacturing and properties of concrete composites such as fibre reinforced concrete, ferro-cement, silica fume concrete and polymer concrete
15	0CVSE518,	Structural Audit	CO1	Know the basic concepts of Structural Audit.
			CO2	Define Structural Audit and parameters for visual inspection.
			CO3	Describe NDT and SDT techniques.
			CO4	Explain the methods of interpretation the testing reports.
16	0CVSE554	,Structural Lab	CO1	Practice the compression test on concrete cubes / cylinders.
			CO2	Practice the tensile test Steel / Composite bars.
			CO3	Perform the compression test on fibre reinforced / carbon reinforced cube.
			CO4	Compare the analysis of deflection and stresses of steel / concrete beam with practical test with manual analysis of the same.
			CO5	Perform axial compression test on FRP Column.
17	0CVSE555,	Seminar II	CO1	Identify research problem.
			CO2	Prepare and present statement of purpose.
			CO3	Perform analysis work.
			CO4	Demonstrate with outside agencies.
			CO5	Generate report and Present the work carried out.
18	0CVSE651,	Industrial Training Assessment	CO1	Perform practical / field work on site.
			CO2	Design and analysis of any structure has to be done in consultancy company.
			CO3	Compare the manual design and design prepared by consultant.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
19	0CVSE652.	Dissertation Phase – I	CO1	Identify research problem from literature survey.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Present the work carried out.
20	0CVSE653.	Dissertation Phase – II	CO1	Prepare the set up for experimentation/software.
			CO2	Perform experimental/software analysis for validation of research work.
			CO3	Prepare research design for above problem.
			CO4	Generate synopsis report.
			CO5	Present the work carried out.
21	0CVSE654.	Dissertation Phase – III	CO1	Perform experimental/software analysis for developing research work.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Publish a research paper in journals/conference.
			CO5	Write total work as dissertation report.
22	0CVSE655	, Dissertation Phase – IV	CO1	Perform experimental/software analysis for developing research work.
			CO2	Prepare research design for above problem.
			CO3	Generate synopsis report.
			CO4	Publish a research paper in journals/conference.
			CO5	Write total work as dissertation report.

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Basic Sciences- First Revision & New Courses

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	0ADBS101	AppliedMathematics- I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Use Cayley-Hamilton theorem to find higher powers of matrix, also determine Eigen values and Eigen vectors of matrix.
			CO3	Apply least square method to fit the polynomials for bi-variate data.
			CO4	Express any function in terms of power series.
			CO5	Calculate the roots of complex number by using De-Moivre's Theorem.
2	0ADES102	Basic Electrical Engineering	CO1	Explain basic terminologies related to DC, AC and magnetic circuits.
			CO2	Apply the magnetic circuit concepts to understand the working of electrical devices.
			CO3	Explain principle of operation, construction & applications of AC and DC Machines.
			CO4	Describe wiring circuits, earthing system and three phase connections.
			CO5	Apply conceptual understanding to solve numerical related to DC circuits and Single phase AC circuits.
3	0ADES103	Engineering Graphics	CO1	Explain basic concepts in drawing and its application.
			CO2	Construct simple engineering curves.
			CO3	Sketch projection of simple geometries.
			CO4	Sketch the Orthographic projections.
			CO5	Prepare the Isometric view of simple objects.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
4	OICES104	Analog Electronics	CO1	Explain the construction, working principle and characteristics of passive electronic Components.
			CO2	Illustrate the working principle and characteristics of active electronic components.
			CO3	Build the different wave shaping circuits with the help of passive electronic components.
			CO4	Compute different parameters of different circuits like rectifiers and filters.
			CO5	Explain the construction and working of transducers and sensors.
			CO6	Comprehend applications of analog electronics.
5	OADBS105	Applied Mathematics- II	CO1	Develop basic knowledge of vector space.
			CO2	Use the numerical methods to find the roots of algebraic and transcendental equations.
			CO3	Apply numerical techniques for finding differentiation and integration.
			CO4	Solve the problems on partial differentiation and its applications.
			CO5	Solve problems on ordinary differential equations by using analytical and numerical methods.
6	OADES106	Digital Electronics	CO1	Solve various numerical on number system and its conversion.
			CO2	Apply Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms
			CO3	Illustrate Logic Families
			CO4	Design of combinational circuits like comparators multiplexers, de-multiplexers, encoder, decoder and different code converters
			CO5	Interpret working of flip-flops, its characteristics and conversion.
			CO6	Design of sequential circuit like counters and shift registers
7	OADBS107	Engineering Physics and Chemistry	CO1	Apply fundamental concepts in optics and LASER to determine wavelength of light.
			CO2	Describe various properties of engineering materials in view of crystallography study.
			CO3	Explain the concept of nanotechnology and its Engineering applications.
			CO4	Calculate total hardness of water and calorific values of the fuels.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Choose proper energy material from its properties and applications in given environment.
			CO6	Discuss chemical synthesis, properties and uses of some advanced materials.
8	0ADPC108	ComputerNetworks	CO1	Explain the fundamental concepts of data communication and networking.
			CO2	Describe the different coding schemes of digital transmission and transmission media.
			CO3	Apply various error detection and correction mechanism.
			CO4	Solve examples of logical addressing using various techniques.
			CO5	Make use of different protocols of network, transport and application layer.
9	0ADES151	Problem Solving Using 'C'	CO1	Think logically to come up with algorithmic approach for problem solving
			CO2	Use various constructs for structuring and implementing the C program.
			CO3	Explain and Demonstrate various constructs for efficient memory management
			CO4	Solve simple real world problems using modular approach and data management using file handling.
			CO5	Prepare and present a power point presentation on assigned topic
			CO6	Demonstrate structured approach to solve a problem. (A2)
10	0ADHS152	Professional Communication	CO1	Develop his communicative performancethat enable him considerable success in English Language competency tests.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Write relevant professional letters and able to maintain official correspondence.
11	0ADES153	Engineering Graphics Laboratory	CO1	Draw the projections the different lines, Planes in different positions.
			CO2	Draw orthographic, sectional and isometric views.
			CO3	Use/Handle different engineering drawing instruments accurately & carefully.
			CO4	Produce drawings with accuracy and proficiency.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Display a high degree of certainty in drawings and projections of complex components.
12	0ADHS154	Design Thinking	CO1	Explore the techniques of User Research
			CO2	Practice brainstorming techniques for ideation
			CO3	Select Design Thinking techniques for business problems
			CO4	Create prototype, test and present the solution
13	0ADES155	Object Oriented Programming	CO1	Explain the fundamentals of object oriented programming.
			CO2	Apply the concept of class, object, array and pointers inheritance and polymorphism in C++
			CO3	Apply the concept of inheritance and polymorphism in C++.
			CO4	Apply various library utilities and advanced features- template, STL
			CO5	Communicate effectively, both orally and in preparing documentation of code
			CO6	Follow given instructions during practical performance.
14	0ADES156	Digital Electronics Laboratory	CO1	Build Digital Circuits using Logic Gates
			CO2	Examine Digital Circuits as Boolean expressions, Combinational and Sequential Circuits
			CO3	Accept professional and ethical responsibility of engineering technology profession
			CO4	Acquire individual and team work skills for working effectively in groups
			CO5	Communicate effectively in technical and non-technical environments
15	0ADBS157	Engineering Physics & Chemistry Laboratory	CO1	Calculate wavelength of light and specific rotation of sugar solution.
			CO2	Apply various optical formulae to determine wavelength and divergence of LASER and
			CO3	Identify hardness, alkalinity, and chloride content of water.
			CO4	Analyze given materials using various instruments.
			CO5	Communicate effectively and work in a team for laboratory activities.
			CO6	Follow professional and ethical principles during laboratory.
			CO1	Simulate, configure and analyze the network using network analyzer tools.
			CO2	Demonstrate the installation and various features of computer network packet tracer tool.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
16	OADPC158	Computer Networks Laboratory	CO3	Demonstrate the communication between computer nodes using TCP/UDP socket.
			CO4	Propose LAN Design and make use of various network troubleshooting commands.
			CO5	Follow given instructions during practical performance.
			CO6	Proficiently use various networking protocols.
1	OFTBS101	Organic Chemistry-I	CO1	Discuss the nomenclature and stereochemistry of organic compounds.
			CO2	Describe the fundamentals in mechanisms of simple organic reactions.
			CO3	Summarize the chemistry of alkanes, alkenes and alkynes.
			CO4	Identify chemical reactivity of organic compounds like alcohols, phenols, aldehydes and ketones.
			CO5	Describe the concepts related to Chemistry of alcohols, phenols, aldehydes and ketones.
2	OFTBS102	Inorganic Chemistry	CO1	Recognize periodic properties such as ionization potential, electronegativity, oxidation states.
			CO2	Describe isomerism and chelation in complex substances.
			CO3	Summarize the role of some bioinorganic and organometallic materials.
			CO4	Explain concepts of acids, bases and inorganic polymers.
			CO5	Discuss the concept of catalysis in inorganic chemistry
3	OFTBS103	Applied Mathematics - I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Calculate eigen values and eigen vectors and power of matrix by using Cayley-Hamilton theorem.
			CO3	Describe the statistical data numerically by using lines of regression and curve fittings.
			CO4	Apply Taylor series to find the expansion of functions.
			CO5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
4	OFTES104	Basic Electrical & Electronics Engineering	CO1	Explain various terms related to electric & electronic circuits
			CO2	Describe the construction, working of Electric machines, Electronic components, Transducers & their Applications
			CO3	Illustrate the wiring system for different work space
			CO4	Apply conceptual understanding to solve numerical related to Electrical circuits, Electronic circuits
			CO5	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques
5	OFTES105	Basic Mechanical Engineering	CO1	Distinguish different operations/machines involved in manufacturing processes.
			CO2	Describe power generation processes from different energy sources.
			CO3	Explain the basic concept of Gas laws and IC engines.
			CO4	Distinguish between various mechanical systems.
			CO5	Explain principles of power transmission devices and its types.
			CO6	Calculate the operating and geometric parameters in thermodynamics and power transmission systems
6	OFTBS106	Organic Chemistry-II	CO1	Discuss concepts of aromaticity and chemistry of aromatic compounds.
			CO2	Describe the chemistry of nitro and amino arenes & dyes.
			CO3	Identify the chemistry of carboxylic acids, ethers and related organic compounds.
			CO4	Explain characteristics and simple reactions of heterocyclic compounds.
			CO5	Discuss the organic chemistry of some natural products.
7	OFTBS107	Analytical Chemistry	CO1	List different analytical techniques.
			CO2	Describe the basic principles of different analytical techniques.
			CO3	Compute the mean from a set of measurements.
			CO4	Identify possible analytical techniques for identification and quantification of chemicals.
			CO5	Summarize the applications of various analytical techniques in Food Analysis.
8	OFTBS108	Applied Physics	CO1	Explain the basic concepts in optics (Diffraction and Polarisation)
			CO2	Discuss interaction of radiation with matter and applications of LASER.
			CO3	Describe various properties of engineering materials in view of crystallography study.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO4	Explain the concept of nanotechnology and its Engineering applications.
			CO5	Explain the concepts related to acoustics and nuclear energy.
9	OFTBS109	Applied Mathematics - II	CO1	Use partial derivatives to solve the problems based on functions of two or more variables.
			CO2	Solve problems on Ordinary Differential Equations by using analytical method and numerical techniques.
			CO3	Solve the mathematical problems involving the Numerical Differentiation and Integration.
			CO4	Apply the concept of Special Functions to solve improper integrals.
			CO5	Make use of multiple integral to find area and mass of plane lamina.
10	OFTES110	Engineering Graphics	CO1	Summarize basic concepts in drawing and its applications.
			CO2	Sketch projection of simple geometries.
			CO3	Sketch projection of solids.
			CO4	Prepare sectional vies of solids and develop the lateral surface of the solids.
			CO5	Sketch the Orthographic projection.
			CO6	Prepare the Isometric view of simple objects.
11	OFTHS111	Professional Communication	CO1	Strengthen his communicative competence and able to achieve considerable success in English Language competency tests such as IELTS.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare and modify his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Compose relevant professional letters and able to maintain official correspondence.
12	OFTBS151	Organic Chemistry Laboratory-I	CO1	List steps for identifying simple organic compounds.
			CO2	Summarize some methods of organic quantitative analysis and preparation of organic
			CO3	Carry out experimental tasks by handling different glassware's and reagents.
			CO4	Perform various experiments by following written instructions.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Express involvement by understanding concepts in organic chemistry.
13	OFTBS152	Inorganic Chemistry Laboratory	CO1	Determine strength, quantity, percentage purity of given solutions.
			CO2	Identify constituents in inorganic substances.
			CO3	Carry out experimental tasks by handling different glassware's.
			CO4	Perform various experiments by following written instructions.
			CO5	Express involvement by understanding concepts in organic chemistry.
14	OFTES153	Computer Fundamentals and Programming Laboratory	CO1	Explain fundamental concepts of information technology
			CO2	Demonstrate structured approach to solve a problem.
			CO3	Explain C programming fundamentals.
			CO4	Illustrate concepts like array, functions, structures, C Programming language.
			CO5	Apply C Programming constructs to solve a given problem.
			CO6	Practice c programs for various problem statements .
15	OFTES 154	Basic Electrical & Electronics Engineering Lab	CO1	Identify Electrical and Electronic components & equipment
			CO2	Interpret the measurement of different electrical parameters of Electric circuits and Electronic circuits with appropriate measuring instruments
			CO3	Perform different tests to study the characteristics of different Electrical & Electronic components
			CO4	Correlate the observations and results of experiment with different laws and theorem
			CO5	Practice safety precautions required for electrical engineering practices
16	OFTBS155	Organic Chemistry Laboratory-II	CO1	List steps for identifying simple organic compounds.
			CO2	Summarize some methods of organic quantitative analysis and preparation of organic compounds.
			CO3	Carry out experimental tasks by handling different glassware's and reagents.
			CO4	Perform various experiments by following written instructions.
			CO5	Express involvement by understanding concepts in organic chemistry.
17	OFTBS156	Analytical Chemistry Laboratory	CO1	Demonstrate various analytical methods of chemical analysis.
			CO2	Analyze the given samples using various instruments.
			CO3	Carry out experimental tasks by handling different glassware's.
			CO4	Perform various experiments by following written instructions.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Express involvement by understanding concepts in analytical chemistry.
			CO1	Interpret the characteristics of LASER such as mono-chromaticity and divergence.
18	OFTBS157	Applied Physics Lab	CO2	Calculate band gap energy, specific rotation, wavelength of light and verify Inverse Square law.
			CO3	Demonstrate fourteen Bravais lattices; explain symmetries of cube and different properties of cubic lattices.
			CO4	Communicate effectively and work in a team for laboratory activities.
			CO5	Follow professional and ethical principals during laboratory.
19	OFTES158	Engineering Graphics Laboratory	CO1	Draw the projections of different lines, planes and solids in different positions develop the lateral surface of the object.
			CO2	Draw orthographic, isometric and sectional views.
			CO3	Use/ handle different engineering drawing instruments accurately and carefully.
			CO4	Produce drawing with accuracy and proficiency.
			CO5	Display a high degree of certainty in drawings and projection of complex components.
1	OICBS101	Applied Mathematics I	CO1	Solve the system of linear equations by using matrix method and numerical techniques
			CO2	Use Cayley-Hamilton theorem to find higher powers of matrix, also determine Eigen values and Eigen vectors of matrix.
			CO3	Apply least square method to fit the polynomials for bi-variate data.
			CO4	Express any function in terms of power series.
			CO5	Calculate the roots of complex number by using De-Moivre's Theorem.
2	OICES102	Basic Electrical Engineering	CO1	Explain basic terminologies related to DC, AC and magnetic circuits.
			CO2	Apply the magnetic circuit concepts to understand the working of electrical devices.
			CO3	Explain principle of operation, construction & applications of AC and DC Machines.
			CO4	Describe wiring circuits, earthing system and three phase connections.
			CO5	Apply conceptual understanding to solve numerical related to DC circuits and Single phase AC circuits.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
3	OICES103	Engineering Graphics	CO1	Explain basic concepts in drawing and its application.
			CO2	Construct simple engineering curves.
			CO3	Sketch projection of simple geometries.
			CO4	Sketch the Orthographic projections.
			CO5	Prepare the Isometric view of simple objects.
4	OICES104	Analog Electronics	CO1	Explain the construction, working principle and characteristics of passive electronic Components.
			CO2	Illustrate the working principle and characteristics of active electronic components.
			CO3	Build the different wave shaping circuits with the help of passive electronic components.
			CO4	Compute different parameters of different circuits like rectifiers and filters.
			CO5	Explain the construction and working of transducers and sensors.
			CO6	Comprehend applications of analog electronics.
5	OICBS105	Applied Mathematics- II	CO1	Develop basic knowledge of vector space.
			CO2	Use the numerical methods to find the roots of algebraic and transcendental equations.
			CO3	Apply numerical techniques for finding differentiation and integration.
			CO4	Solve the problems on partial differentiation and its applications.
			CO5	Solve problems on ordinary differential equations by using analytical and numerical methods.
6	OICES106	Digital Electronics	CO1	Solve various numerical on number system and its conversion.
			CO2	Apply Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms
			CO3	Illustrate Logic Families
			CO4	Design of combinational circuits like comparators multiplexers, de-multiplexers, encoder, decoder and different code converters
			CO5	Interpret working of flip-flops, its characteristics and conversion.
			CO6	Design of sequential circuit like counters and shift registers

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
7	OICBS107	Engineering Physics and Chemistry	CO1	Apply fundamental concepts in optics and LASER to determine wavelength of light.
			CO2	Describe various properties of engineering materials in view of crystallography study.
			CO3	Explain the concept of nanotechnology and its Engineering applications.
			CO4	Calculate total hardness of water and calorific values of the fuels.
			CO5	Choose proper energy material from its properties and applications in given environment.
			CO6	Discuss chemical synthesis, properties and uses of some advanced materials.
8	OICPC108	Computer Networks	CO1	Explain the fundamental concepts of data communication and networking.
			CO2	Describe the different coding schemes of digital transmission and transmission media.
			CO3	Apply various error detection and correction mechanism.
			CO4	Solve examples of logical addressing using various techniques.
			CO5	Make use of different protocols of network, transport and application layer.
9	OICES151	Problem Solving Using 'C'	CO1	Think logically to come up with algorithmic approach for problem solving
			CO2	Use various constructs for structuring and implementing the C program
			CO3	Explain and Demonstrate various constructs for efficient memory management
			CO4	Solve simple real world problems using modular approach and data management using file handling
			CO5	Prepare and present a power point presentation on assigned topic
			CO6	Demonstrate structured approach to solve a problem.
10	OICHS152	Professional Communication	CO1	Develop his communicative performancethat enable him considerable success in English Language competency tests.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Write relevant professional letters and able to maintain official correspondence.
11	OICES153	Engineering Graphics Laboratory	CO1	Draw the projections the different lines, Planes in different positions.
			CO2	Draw orthographic, sectional and isometric views.
			CO3	Use/Handle different engineering drawing instruments accurately & carefully.
			CO4	Produce drawings with accuracy and proficiency.
			CO5	Display a high degree of certainty in drawings and projections of complex components.
12	OICHS154	Design Thinking	CO1	Explore the techniques of User Research
			CO2	Practice brainstorming techniques for ideation
			CO3	Select Design Thinking techniques for business problems
			CO4	Create prototype, test and present the solution(
13	OICES155	Object Oriented Programming.	CO1	Explain the fundamentals of object oriented programming.
			CO2	Apply the concept of class, object, array and pointers inheritance and polymorphism in C++
			CO3	Apply the concept of inheritance and polymorphism in C++.
			CO4	Apply various library utilities and advanced features- template, STL
			CO5	Communicate effectively, both orally and in preparing documentation of code
			CO6	Follow given instructions during practical performance.
14	OICES156	Digital Electronics Laboratory	CO1	Build Digital Circuits using Logic Gates
			CO2	Examine Digital Circuits as Boolean expressions, Combinational and Sequential Circuits
			CO3	Accept professional and ethical responsibility of engineering technology profession
			CO4	Acquire individual and team work skills for working effectively in groups
			CO5	Communicate effectively in technical and non-technical environments
15	OICBS157	Engineering Physics & Chemistry Laboratory	CO1	Calculate wavelength of light and specific rotation of sugar solution.
			CO2	Apply various optical formulae to determine wavelength and divergence of LASER and demonstrate Bravais lattices.
			CO3	Identify hardness, alkalinity, and chloride content of water.
			CO4	Analyze given materials using various instruments.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Communicate effectively and work in a team for laboratory activities.
			CO6	Follow professional and ethical principles during laboratory.
16	OICPC158	Computer Networks Laboratory	CO1	Simulate, configure and analyze the network using network analyzer tools.
			CO2	Demonstrate the installation and various features of computer network packet tracer tool.
			CO3	Demonstrate the communication between computer nodes usingTCP/UDP socket.
			CO4	Propose LANDesign and make use of various network troubleshooting commands.
			CO5	Follow given instructions during practical performance.
			CO6	Proficiently use various networking protocols.
1	1MEBS101	Engineering Chemistry	CO1	Identify water quality parameters and methods for water softening.
			CO2	Discuss types, properties and applications of engineering materials and lubricants.
			CO3	Summarize theories of corrosion and methods to prevent metals from corrosion.
			CO4	Describe types, properties, applications of fuels and principles of instrumental techniques of analysis.
			CO5	Calculate total hardness of water and calorific values of fuel.
2	1MEBS102	Engineering Mathematics - I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Calculate eigen values and eigen vectors and power of matrix by using Cayley-Hamilton theorem.
			CO3	Describe the statistical data numerically by using lines of regression and curve fittings.
			CO4	Apply Taylor series to find the expansion of functions.
			CO5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
3	1MEES103	Engineering Graphics	CO1	Summarize basic concepts in drawing and its applications.
			CO2	Sketch projection of simple geometries.
			CO3	Sketch projection of solids.
			CO4	Prepare sectional vies of solids and develop the lateral surface of the solids.
			CO5	Sketch the Orthographic projection.
			CO5	Prepare isometric view of simple objects
4	1MEES104	Basic Civil Engineering and Mechanics	CO1	Describe building construction materials and foundations.
			CO2	Apply knowledge of resolution and composition of forces.
			CO3	Analyze the beam by drawing shear force and bending moment diagram.
			CO4	Compute centroid and moment of inertia of a plane lamina.
			CO5	Apply the knowledge of dynamics to analyze rigid bodies (in motion).
			CO6	Apply the concepts of equilibrium to find unknown forces acting on rigid bodies.
5	1MEES105	Computer Programming	CO1	Demonstrate structured approach to solve a problem.
			CO2	Explain C programming fundamentals.
			CO3	illustrate concepts like array, functions, structures, and pointers and file handling in C Programming language.
			CO4	Apply C Programming constructs to solve a given problem.
			CO5	Prepare and present a power point presentation on assigned topic
6	1MEBS106	Engineering Physics	CO1	Explain the basic requirement of Architectural acoustics and theoretical aspects of ultrasonic.
			CO2	Discuss basic principle, concepts and applications of LASER and fibre optics.
			CO3	Describe various properties of engineering materials in view of crystallography study.
			CO4	Explain the concept of nanotechnology and its Engineering applications.
			CO5	Explain the basic concepts of thermodynamics.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
7	1MEBS107	Engineering Mathematics - II	CO1	Use partial derivatives to solve the problems based on functions of two or more variables.
			CO2	Solve problems on Ordinary Differential Equations by using analytical method and numerical techniques.
			CO3	Solve the mathematical problems involving the Numerical Differentiation and Integration.
			CO4	Apply the concept of Special Functions to solve improper integrals.
			CO5	Make use of multiple integral to find area and mass of plane lamina.
8	1MEES108	Basic Electrical & Electronics Engineering	CO1	Explain various terms related to Electric and Electronics ckt.
			CO2	Describe the construction,working of electric machines Electronic componants,Transducer and their applications
			CO3	Iillustrate the wiring system for different work space
			CO4	Apply conceptual understanding to solve numerical related to electrical ckt, electronic ckt.
			CO5	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques.
9	1MEPC109	Machine Drawing	CO1	Draw mechanical engineering components and sketches of standard machine components using BIS conventions,
			CO2	Assign limits, fits and tolerances on drawings,
			CO3	Prepare detailed drawings from given assembly drawing and vice versa,
			CO4	Draw true shape of inclined surface using auxiliary projection,
			CO5	Produce curves of intersections of the surfaces of solids.
10	1MEES110	Computer Programming Using C++	CO1	Explain object-oriented programming concept.
			CO2	Illustrate the concept of class and object in programs.
			CO3	Explain concept of Inheritance for reusability.
			CO4	Define concept of overloading and polymorphism for solving the task in C++.
			CO5	Apply their knowledge and programming skills to solve various graphical and mechanical problems.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
11	1MEHS111	Professional Communication	CO1	Strengthen his communicative competence and able to achieve considerable success in English Language competency tests such as IELTS.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare and modify his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Compose relevant professional letters and able to maintain official correspondence.
12	1MEBS151,	Engineering Chemistry Laboratory	CO1	Identify hardness, acidity, alkalinity, chloride content of water and percentage of elements in some alloys.
			CO2	Produce various advanced materials and analyze aqueous solutions using instruments.
			CO3	Carry out experimental tasks by handling different glassware's.
			CO4	Perform various experiments by following written instructions.
			CO5	Express involvement by understanding concepts in engineering chemistry.
13	1MEES152	Engineering Graphics Laboratory	CO1	Draw the projections of different lines, planes and solids in different positions develop the lateral surface of the object.
			CO2	Draw orthographic, isometric and sectional views.
			CO3	Use/ handle different engineering drawing instruments accurately and carefuly.
			CO4	Produce drawing with accuracy and proficiency.
			CO5	Display a high degree of certainty in drawings and projection of complex components.
14	1MEES153	Computer Programming Laboratory	CO1	Write, compile and debug programs in C language.
			CO2	Make use of different data types in a computer program
			CO3	Make use of conditional expressions and looping statements to solve problems associated with conditions and repetitions

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
		Laboratory	CO4	Construct the C code using a modular approach.
			CO5	Demonstrate C Programs for various problem statements.
			CO6	Practice C program for various Mechanical Engineering problem statements
15	1MEES154	Workshop Practice-I	CO1	Select appropriate instruments and handle them carefully and safely to make
			CO2	measurements of the physical quantity.
			CO3	Create a male-female joint by carrying out different fitting operations.
			CO4	Prepare a job with different joining operations (electric arc welding).
			CO5	Produce a component using different sheet metal operations and tools.
16	1MEBS155	Engineering Physics Lab	CO1	Interpret the characteristics of LASER such as mono-chromaticity and divergence.
			CO2	Calculate band gap energy, specific rotation, wavelength of light and verify Inverse Square law.
			CO3	Demonstrate fourteen Bravais lattices; explain symmetries of cube and different properties of cubic lattices.
			CO4	Communicate effectively and work in a team for laboratory activities.
			CO5	Follow professional and ethical principals during laboratory.
17	1MEES156	Basic Electrical & Electronics Engineering Laboratory	CO1	Identify Electrical and Electronic components& equipment.
			CO2	Interpret the measurement of different electrical parameters of Electric circuits and Electronic circuits with appropriate measuring instruments.
			CO3	Perform different tests to study the characteristics of different Electrical &Electronic components.
			CO4	Correlate the observations and results of experiment with different laws and theorem.
			CO5	Practice safety precautions required for electrical engineering practices.
18	1MEPC157	Machine Drawing & Auto CAD Laboratory	CO1	Produce sketeches ofdetail and assembly drawing on drawing sheet
			CO2	Prepare the 2 D, drawing using AutoCAD,
			CO3	Construct a basic three dimensional drawing using AutoCad
			CO4	Communicate effectively and work in a team for laboratory activities.
			CO5	Follow professional and ethical principals during laboratory.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
19	1MEES158	Computer Programming Using C++ Laboratory	CO1	Explain the basic concept of object-oriented programming.
			CO2	Apply the concepts of class, object, inheritance, overloading, polymorphism and transformation in C++.
			CO3	Develop programming skills to solve problems using object-oriented concept in Turbo C++.
			CO4	Communicate effectively, both orally and in writing journals and complete assigned tasks in team.
			CO5	Follow given instructions during practical performance.
			CO5	Engage in independent and life long learning in the programming domain
1	1EEBS101	Applied Mathematics- I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Calculate eigen values and eigen vectors and power of matrix by using Cayley-Hamilton theorem.
			CO3	Describe the statistical data numerically by using lines of regression and curve fittings.
			CO4	Apply Taylor series to find the expansion of functions.
			CO5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem.
2	1EEBS102	Applied Chemistry	CO1	Identify water quality parameters and methods for water softening.
			CO2	Discuss properties and applications of various energy resources.
			CO3	Summarize basic principles of electrochemistry and properties of some electronic engineering materials.
			CO4	Describe principles of chemical and instrumental techniques of analysis.
			CO5	Calculate total hardness of water and calorific values of fuel.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
3	1EEES103	Fundamentals of Electrical Engineering	CO1	Describe the terms related to electric & magnetic circuit.
			CO2	Relate the concepts of AC fundamentals to single phase and three phase AC circuit.
			CO3	Interpret the relationship between line and phase quantities for three phase AC circuit.
			CO4	Explain wiring methods, illumination schemes emerging trends for different applications.
			CO5	Solve numerical related to DC circuits, energy conversions, magnetic circuits, single phase AC circuits.
4	1EEES104	Fundamentals of Mechanical Engineering	CO1	Distinguish different operations/machines involved in manufacturing processes
			CO2	Describe power generation processes from different energy sources.
			CO3	Explain the basic concept of Gas laws and IC engines.
			CO4	Distinguish between various mechanical systems.
			CO5	Explain principles of power transmission devices and its types.
			CO6	Calculate the operating and geometric parameters in power transmission systems.
5	1EEES105	Fundamental of Civil Engineering & Applied Mechanics	CO1	Discuss the suitability of materials for construction.
			CO2	Describe the knowledge principles of planning and surveying.
			CO3	Apply the knowledge of resolution and composition of forces.
			CO4	Apply the concepts of equilibrium to find reactions at beam supports.
			CO5	Calculate forces in members of truss with their nature.
			CO6	Compute Centroid and Moment of Inertia of a given plane lamina.
6	1EEBS106	Applied Mathematics - II	CO1	Use partial derivatives to solve the problems based on functions of two or more variables.
			CO2	Solve problems on Ordinary Differential Equations by using analytical method and numerical techniques.
			CO3	Solve the mathematical problems involving the Numerical Differentiation and Integration.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO4	Apply the concept of Special Functions to solve improper integrals.
			CO5	Make use of multiple integral to find area and mass of plane lamina.
7	1EEBS107	Applied Physics	CO1	Memories the concepts such as 'diffraction, polarization and their applications.
			CO2	Discuss interaction of radiation with matter and applications of LASER.
			CO3	Compare Nuclear Fission and Fusion to overcome the energy crises.
			CO4	Describe various properties of engineering materials in view of crystallography study
			CO5	Explain the preface of Band theory, Magnetism and its recent need in Engineering field.
8	IEEES108	Fundamentals of Electronics Engineering	CO1	Explain fundamental concept of number system and its conversion amongst them
			CO2	Interpret logic functions, circuits, truth tables and Boolean algebra expression.
			CO3	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques.
			CO4	Explain characteristics and working of basic electronic components like diode and FET.
			CO5	Apply knowledge of different sensors to explain working of various appliances.
9	1EEES109	Engineering Graphics	CO1	Understand basic concepts in drawing and its application.
			CO2	Sketch projection of simple geometries.
			CO3	Sketch projection of solids.
			CO4	Prepare sectional views of solids.
			CO5	Sketch the Orthographic projections.
			CO6	Prepare the Isometric view of simple objects.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
10	1EEHS110	Professional Communication	CO1	Strengthen his communicative competence and able to achieve considerable success in English Language competency tests such as IELTS.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare and modify his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Compose relevant professional letters and able to maintain official correspondence.
11	1EEBS151	Applied Chemistry Laboratory	CO1	Identify hardness, acidity, alkalinity, chloride content of water and percentage of elements in some alloys.
			CO2	Produce various advanced materials and analyze aqueous solutions using instruments.
			CO3	Carry out experimental tasks by handling different glassware's and reagents.
			CO4	Perform various experiments by following written instructions.
			CO5	Express involvement by understanding concepts in organic chemistry.
12	1EEES152	Fundamentals of Electrical Engineering Laboratory	CO1	Identify electrical components, equipment, Lamps and different illumination schemes
			CO2	Measure electrical parameters with appropriate measuring instruments.
			CO3	Demonstrate the circuital law's to find the solutions.
			CO4	Correlate and comment the observations and results of experiment with different laws.
			CO5	Practice safety precautions in day to day life.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
13	1EEES153	Fundamental of Civil Engineering & Applied Mechanics Lab	CO1	Calculate linear distances and angles between survey lines.
			CO2	Compute resultant, moments of a force system to verify the Laws for forces.
			CO3	Calculate and compare support reactions of a simply supported beam by experimental and analytical methods.
			CO4	Calculate and compare centroid of lamina by experimental and analytical methods.
			CO5	Solve numerical for rigid bodies in static states.
			CO6	Follow the teacher and repeat the experiment performances individually and interpret the results.
			CO7	Express involvement and understanding concepts and applications in the laboratory.
14	1EEES154	Electrical Workshop Practice	CO1	Connect electric circuits and use electric instruments to perform experiments.
			CO2	Check ratings of commonly used house hold electrical appliances.
			CO3	Troubleshoot the small problems occurring in their house-hold devices like fan, iron, washing machine, electric kettle, mixer, etc.
			CO4	Calculate sample energy bill and apply energy conservation to reduce it.
			CO5	Compare different types of electric batteries.
15	1EEBS155	Applied Physics Lab	CO1	Interpret the characteristics of LASER such as mono-chromaticity and divergence.
			CO2	Calculate band gap energy, specific rotation, wavelength of light and verify Inverse Square law.
			CO3	Demonstrate fourteen Bravais lattices; explain symmetries of cube and different properties of cubic lattices.
			CO4	Communicate effectively and work in a team for laboratory activities.
			CO5	Follow professional and ethical principals during laboratory.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
16	1EEES156	Fundamentals of Electronics Engineering Laboratory	CO1	Implement combinational & sequential circuits by applying the knowledge of logic gates .
			CO2	Explain the characteristics of different electronics devices such as diodes, transistors etc. and simple circuits like rectifiers.
			CO3	Use Laboratory equipment for testing and measurement of various electronic components.
			CO4	Construct and take measurement of various circuits to compare experimental results in the laboratory with theoretical analysis.
			CO5	Interact effectively with the instructor and the teaching assistant(s) during lab hours and discussions in order to their further learning experience and their interest.
17	1EEES157	Engineering Graphics Laboratory	CO1	Draw the projections the different lines, Planes and solids in different positions
			CO2	Draw orthographic and isometric views.
			CO3	Use/Handle different engineering drawing instruments & AUTOCAD software accurately & carefully.
			CO4	Produce drawings with accuracy and proficiency.
			CO5	Display a high degree of certainty in drawings and projections of complex components.
18	1EEES158	Programming in 'C' Laboratory	CO1	Write, compile and debug programs in C language.
			CO2	Make use of different data types in a computer program
			CO3	Make use of conditional expressions and looping statements to solve
			CO4	Construct the C code using a modular approach.
			CO5	Demonstrate C Programs for various problem statements.
			CO6	Practice C program for various problem statements.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	1CSBS101	Applied Maths-I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Calculate eigen values and eigen vectors and power of matrix by using Cayley-Hamilton theorem.
			CO3	Describe the statistical data numerically by using lines of regression and curve fittings.
			CO4	Apply Taylor series to find the expansion of functions.
			CO5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem.
2	1CSBS102	Engineering Physics and Chemistry	CO1	Describe different concepts related to, laser and optical fibre.
			CO2	Explain various phenomenon and properties in solid state and nano physics.
			CO3	Identify water quality parameters and methods for water softening.
			CO4	Discuss properties and applications of various energy resources.
			CO5	Summarize basic principles of general terms used in software's of chemistry.
3	1CSES103	Basic Electrical Engineering	CO1	Explain various terms related to DC Circuits , AC Circuits.
			CO2	Apply magnetic ckt concepts to understand the working of electrical devices
			CO3	Explain working principle , construction and applications of transformer, DC Motor and single phase AC Motor
			CO4	Describe various writing ckts and earthing system for different workspace.
			CO5	Apply conceptual understanding to solve numerical related to DC Ckt magnetic ckts, single phase AC Ckts transformer.
4	1CSES104	Engineering Mechanics	CO1	Apply knowledge of resolution and composition of forces.
			CO2	Apply the concepts of equilibrium to find unknown forces acting on rigid bodies.
			CO3	Solve numerical on the simple & Compound Beam.
			CO4	Apply the knowledge of dynamics to analyze rigid bodies (in motion).
			CO5	Solve numerical on the Collision.
5	1BSES105	Engineering Graphics	CO1	Explain basic concepts in drawing and its application.
			CO2	Sketch projection of simple geometries.
			CO3	Sketch projection of solids.
			CO4	Prepare sectional views of solids & develop the lateral surfaces of solids.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Sketch the Orthographic projections.
			CO6	Prepare the Isometric view of simple objects.
6	1CSBS106	Applied Mathematics-II	CO1	Utilize the knowledge of vector space, subspace and examine the Dependence and Independence of vectors.
			CO2	Solve the mathematical problems involving algebraic and transcendental equations.
			CO3	Solve the mathematical problems involving the Numerical Differentiation and Integration.
			CO4	Use partial derivatives to solve the problems based on functions of two or more variables.
			CO5	Solve problems on ordinary differential equations by using analytical method and numerical techniques.
7	1CSPC107	Data Communication	CO1	Explain the fundamental of data communication.
			CO2	Explain different transmission media with analog and digital data transmission methods.
			CO3	Apply the data encoding methods.
			CO4	Explain working of multiplexing and switching methods.
			CO5	Summarize the layered architecture of network models with topologies and its types.
8	1CSES108	Basic Mechanical Engineering	CO1	Distinguish different operations/machines involved in manufacturing processes.
			CO2	Describe power generation processes from different energy sources.
			CO3	Explain the basic concept of Gas laws and IC engines.
			CO4	Distinguish between various mechanical systems.
			CO5	Explain principles of power transmission devices and its types.
			CO6	Calculate the operating and geometric parameters in power transmission systems.
			CO1	Explain fundamental concept of number system and its conversion amongst them
			CO2	Interpret logic functions, circuits, truth tables and Boolean algebra expression.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
9	1CSES109	Basic Electronics Engineering	CO3	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques.
			CO4	Explain different Electronic components like resistor, capacitor, inductor etc.
			CO5	Explain characteristics and working of basic electronic components like diode, transistor.
10	1CSBS110	Biology for Engineers	CO1	Explain the fundamental of cell biology & neural network.
			CO2	Define the various disorders & infectious diseases.
			CO3	Explain the biological significance & applied energetics of carbohydrates, lipids, amino acids.
			CO4	Understand the basics of genetic code & nucleic acids with mechanism of genetic inheritance.
			CO5	Explain the basics & importance of microbiology with classification & cultivation of bacteria fungi ,viruses
11	1CSBS151	Engineering Physics and Chemistry Laboratory	CO1	Calculate wavelength of light and specific rotation of sugar solution.
			CO2	Apply various optical formulae to determine wavelength and divergence of LASER and demonstrate Bravais lattices.
			CO3	Identify hardness, alkalinity, chloride content of water.
			CO4	Analyze given samples using various instruments.
			CO5	Communicate effectively and work in a team for laboratory activities
			CO6	Follow professional and ethical principles during laboratory.
12	1CSES152	Engineering Graphics Laboratory	CO1	Draw the projections the different lines, Planes and Solids in different positions, develop the lateral surface of object.
			CO2	Draw orthographic, sectional and isometric views.
			CO3	Use/Handle different engineering drawing instruments accurately & carefully.
			CO4	Produce drawings with accuracy and proficiency.
			CO5	Display a high degree of certainty in drawings and projections of complex components.
			CO1	Strengthen his communicative competence and able to achieve considerable success in English Language competency tests such as IELTS.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
13	1BSHS153	Professional Communication	CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare and modify his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Compose relevant professional letters and able to maintain official correspondence.
14	1CSES154	Basic Electronics Engineering Lab	CO1	Implement combinational & sequential circuits by applying the knowledge of logic gates .
			CO2	Explain the characteristics of different electronics devices such as diodes , transistors etc.
			CO3	Use Laboratory equipment's for testing and measurement of various electronic components.
			CO4	Construct and take measurement of various circuits to compare experimental results in the laboratory with theoretical analysis.
			CO5	Interact effectively with the instructor and the teaching assistant(s) during lab hours and discussions in order to further their learning experience and their interest.
15	1CSBS155	Biology for Engineers Lab	CO1	Make use of different equipment's used in microbiology.
			CO2	Identify the carbohydrates & proteins by using various chemical tests
			CO3	Determine salivary amylaze activities on starch.
			CO4	Understand the concepts of sub culturing of bacteria, fungi and its stenning techniques or methods.
			CO5	Perform different biological experiments.
			CO6	Follow professional and ethical principles during laboratory work in a team for laboratory activities.
			CO1	Write, compile and debug programs in C language.
			CO2	Make use of different data types in a computer program

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
16	1CSES156	Computer Programming Laboratory	CO3	Make use of conditional expressions and looping statements to solve problems associated with conditions and repetitions
			CO4	Construct the C code using a modular approach.
			CO5	Demonstrate C Programs for various problem statements.
			CO6	Practice C program for various problem statements
1	1AEBS101	Applied Mathematics - I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Calculate eigen values and eigen vectors and power of matrix by using Cayley-Hamilton theorem.
			CO3	Describe the statistical data numerically by using lines of regression and curve fittings.
			CO4	Apply Taylor series to find the expansion of functions.
			CO5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem.
2	1AEBS102	Applied Physics	CO1	Explain the basic requirement of Architectural acoustics and theoretical aspects of ultrasonic.
			CO2	Discuss basic principle, concepts and applications of LASER and fibre optics.
			CO3	Describe various properties of engineering materials in view of crystallography study.
			CO4	Explain the concept of nanotechnology and its Engineering applications.
			CO5	Discuss the basic concepts of thermodynamics.
3	1AEES103	Engineering Mechanics	CO1	Apply knowledge of resolution and composition of forces.
			CO2	Apply the concepts of equilibrium to find unknown forces acting on rigid bodies.
			CO3	Calculate forces in members of truss with their nature.
			CO4	Compute Centroid and Moment of Inertia of a given plane lamina.
			CO5	Apply the knowledge of dynamics to analyze rigid bodies (in motion).

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
4	1AEES104	Basic Electrical, Electronics & Communication Engineering	CO1	Explain various terms related to electric & electronic circuits
			CO2	Describe the construction, working of Electric machines, Electronic components and their Applications.
			CO3	Apply conceptual understanding to solve numerical related to Electrical circuits, Electronic circuits
			CO4	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques.
			CO5	Describe the various radio communication modulation used for communication and role of communication systems in satellites.
5	1AEES105	Computer Programming in C	CO1	Demonstrate structured approach to solve a problem.
			CO2	Explain computer and C programming fundamentals.
			CO3	Illustrate concepts like array, functions, structures, and pointers and file handling in C Programming language.
			CO4	Apply C Programming constructs to solve a given problem.
			CO5	Prepare and present a power point presentation on assigned topic
6	1AEHS106	Professional Communication	CO1	Strengthen his communicative competence and able to achieve considerable success in English Language competency tests such as IELTS.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare and modify his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Compose relevant professional letters and able to maintain official correspondence.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
7	1AEBS107	Applied Chemistry	CO1	Identify water quality parameters and methods for water softening.
			CO2	Discuss properties and applications of fuels and some alloys.
			CO3	Summarize different methods to prevent metals from corrosion.
			CO4	Describe principles of analytical instruments and properties of some advanced materials with their uses.
			CO5	Calculate total hardness of water and calorific values of fuel.
8	1AEBS108	Applied Mathematics - II	CO1	Use partial derivatives to solve the problems based on functions of two or more variables.
			CO2	Solve problems on Ordinary Differential Equations by using analytical method and numerical techniques.
			CO3	Solve the mathematical problems involving the Numerical Differentiation and Integration.
			CO4	Apply the concept of special functions to solve improper integrals
			CO5	Make use of multiple integral to find area and mass of plane lamina.
9	1AEES109	Engineering Graphics	CO1	Summarize basic concepts in drawing and its applications.
			CO2	Sketch projection of simple geometries.
			CO3	Sketch projection of solids.
			CO4	Prepare sectional vies of solids and develop the lateral surface of the solids.
			CO5	Sketch the Orthographic projection.
			CO5	Prepare the Isometric view of simple objects.
10	1AEES110	Engineering Mechanics: Dynamics	CO1	Define various terminologies associated with dynamics of mechanical systems
			CO2	Analyze the force system in space.
			CO3	Analyze motion of a body projected on target.
			CO4	Explain rotation of rigid bodies for uniform angular velocity and uniformly accelerated rotation.
			CO5	Explain work, power and energy for a system under the action of given force systems.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO6	Analyze impulse and momentum for given system of particles and impact and collision of rigid bodies
11	1AEES111	Basic Mechanical Engineering	CO1	Distinguish different operations/machines involved in manufacturing processes.
			CO2	Describe power generation processes from different energy sources.
			CO3	Explain the basic concept of Gas laws and IC engines.
			CO4	Distinguish between various mechanical systems.
			CO5	Explain principles of power transmission devices and its types.
			CO6	Calculate the operating and geometric parameters in thermodynamics and power transmission systems
12	1AEES151	Computer Programming in C Laboratory	CO1	Write, compile and debug programs in C language.
			CO2	Make use of different data types in a computer program
			CO3	Make use of conditional expressions and looping statements to solve problems associated with conditions and repetitions
			CO4	Construct the C code using a modular approach.
			CO5	Demonstrate C Programs for various problem statements.
			CO6	Practice C program for various problem statements
13	1AEBS152	Applied Physics Lab	CO1	Interpret the characteristics of LASER such as mono-chromaticity and divergence.
			CO2	Calculate band gap energy, specific rotation, wavelength of light and verify Inverse Square law.
			CO3	Demonstrate fourteen Bravais lattices; explain symmetries of cube and different properties of cubic lattices.
			CO4	Communicate effectively and work in a team for laboratory activities.
			CO5	Follow professional and ethical principals during laboratory.
14	1AEES153	Basic Electrical & Electronics Engineering Lab	CO1	Identify Electrical and Electronic components& equipment
			CO2	Interpret the measurement of different electrical parameters of Electric circuits and Electronic circuits with appropriate measuring instruments
			CO3	Perform different tests to study the characteristics of different Electrical & Electronic components

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO4	Correlate the observations and results of experiment with different laws and theorem
			CO5	Practice safety precautions required for electrical engineering practices
15	1AEES154	Engineering Graphics Laboratory	CO1	Draw the projections of different lines, planes and solids in different positions develop the lateral surface of the object.
			CO2	Draw orthographic, isometric and sectional views.
			CO3	Use/ handle different engineering drawing instruments accurately and carefuly.
			CO4	Produce drawing with accuracy and proficiency.
			CO5	Display a high degree of certainty in drawings and projection of complex components.
16	1AEBS155	Applied Chemistry Laboratory	CO1	Identify hardness, acidity, alkalinity, chloride content of water and percentage of elements in some alloys.
			CO2	Produce various advanced materials and analyze aqueous solutions using instruments.
			CO3	Carry out experimental tasks by handling different glassware's.
			CO4	Perform various experiments by following written instructions.
			CO5	Express involvement by understanding concepts in applied chemistry.
17	1AEES156	Workshop - I	CO1	Select appropriate instruments and handle them carefully and safely to make measurements of the physical quantity.
			CO2	Create a male-female joint by carrying out different fitting operations.
			CO3	Prepare a job with different joining operations (electric arc welding).
			CO4	Produce a component using different sheet metal operations and tools.
			CO5	Work effectively in team to accomplish the assigned task.
			CO6	Create aircraft wing using different cutting and joining techniques

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
18	1AEES157	Basic Mechanical Engineering Lab	CO1	Gain knowledge of different conventional and non-conventional energy resourses
			CO2	Illustrate construction and working of Pump, Compressor and Air conditioner
			CO3	Perform experiement of calculation thermal conductivity and COP of Refregeration system.
			CO4	Follow the teacher and repeat the experiment performance individually and interpret the results. .
			CO5	Express involvement and understanding of concepts and their applications in the laboratory.
1	1CVBS101	Applied Physics	CO1	Explain the factors affecting the architectural acoustics.
			CO2	Explain the basic terms related to Kinematics and nanophysics.
			CO3	Discuss the basic principle, concepts and applications of LASER and fibre optics.
			CO4	Describe various properties of engineering materials in view of crystallography study.
			CO5	Discuss the concept of diffraction and polarization.
2	1CVBS102	Applied Mathematics- I	CO1	Solve the system of linear equations by using matrix method and numerical techniques.
			CO2	Calculate eigen values and eigen vectors and power of matrix by using Cayley- Hamilton theorem.
			CO3	Describe the statistical data numerically by using lines of regression and curve fittings.
			CO4	Apply Taylor series to find the expansion of functions.
			CO5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem.
3	1CVES103	Fundamentals of Civil Engineering	CO1	Discuss the principles of planning and building bye laws
			CO2	Explain various building components.
			CO3	Discuss various Property Transaction rules
			CO4	Explain fundamentals of Transportation Environmental and Irrigation Engineering.
			CO5	Apply the knowledge of civil engineering, surveying techniques

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
4	1CVES104	Engineering Graphics	CO1	Disscus basic concepts in drawing and its application.
			CO2	Make projection of simple geometries.
			CO3	Draw projection of Orthographic
			CO4	Make projection of Isometric
			CO5	Draw projection of Prespective
5	1CVHS105	Professional Communication	CO1	Strengthen his communicative competence and able to achieve considerable success in English Language competency tests such as IELTS.
			CO2	Solve the exercise related to Reading comprehension and Listening comprehension.
			CO3	Prepare and modify his portfolio considering own strength, weakness and career opportunities.
			CO4	Construct grammatically sound and meaningful sentences necessary for effective communication.
			CO5	Compose relevant professional letters and able to maintain official correspondence.
6	1CVBS106	Applied Chemistry	CO1	Identify water quality parameters and methods for water softening.
			CO2	Discuss types, properties, applications of engineering materials and energy resources.
			CO3	Summarize theories of corrosion and methods to prevent metals from corrosion.
			CO4	Describe principles of chemical and instrumental techniques of analysis.
			CO5	Calculate total hardness of water and calorific values of fuel.
7	1AEBS107	Applied Mathematics- II	CO1	Use partial derivatives to solve the problems based on functions of two or more variables.
			CO2	Solve problems on Ordinary Differential Equations by using analytical method and numerical techniques.
			CO3	Solve the mathematical problems involving the Numerical Differentiation and Integration.
			CO4	Apply the concept of Special Functions to solve improper integrals.
			CO5	Make use of multiple integral to find area and mass of plane lamina.

Basic Sciences- Zero Revision

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
1	OBSBS101	Applied Physics	CO1	Describe different concepts related to diffraction, polarization, ultrasonic, acoustics, laser and optical fibre
			CO2	Explain various phenomenon and properties in nuclear energy, crystallography and nano physics
			CO3	Derive formulae related to optics, acoustic and crystallography
			CO4	Calculate energy released in nuclear reactions like fission and fusion
			CO5	Solve relevant problems in optics, acoustic and crystallography
2	OBSBS102	Applied Mathematics I	CO1	Reduce matrices to normal and echelon form and apply the concept of rank of a matrix to solve system of linear equations
			CO2	Utilize the knowledge of vector space, subspace and examine the dependence and independence of vectors
			CO3	Identify Eigen values and make use of it for finding Eigen vectors and use Cayley-Hamilton theorem to find higher power of matrix
			CO4	Solve problems involving complex numbers making use of different forms and properties of complex numbers, hyperbolic functions
			CO5	Apply Taylor theorem to find the expansion of functions and identify the indeterminate forms
			CO6	Identify the convergence of infinite series

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
3	OBSES103	Basic Electrical Engineering	CO1	Define various terms related to electric & magnetic circuits
			CO2	State and explain the significance of power factor improvement in single phase AC system
			CO3	Express the relations of line and phase quantities in balanced star and delta connected three phase system
			CO4	Explain working principle, construction & applications of transformer, DC Motor, single phase AC motor & universal motor
			CO5	Apply conceptual understanding to solve numerical related to DC circuits, energy conversions, magnetic circuits, single phase AC circuits, transformer
4	OBSES104	Basic Civil Engineering	CO1	Describe scope of civil engineering and suitability of materials for construction
			CO2	Apply the knowledge of surveying techniques
			CO3	Discuss the principles of planning with building bye laws and property transaction
			CO4	Explain various building components
			CO5	Discuss fundamentals of Transportation, Environmental and Irrigation Engineering
5	OBSES105	Engineering Graphics	CO1	Explain basic concepts in drawing and its application
			CO2	Sketch projection of simple geometries
			CO3	Sketch projection of solids
			CO4	Prepare sectional views of solids & develop the lateral surfaces of solids
			CO5	Sketch the Orthographic projections
			CO5	Prepare the isometric view of simple objects
6	OBSHS106	Professional Communication	CO1	Recognize ICT based communication and its importance
			CO2	Illustrate concepts and facets of Oral and written Communication
			CO3	Describe need of behavioral skills and professional correspondence in profession
			CO4	Write emails, professional letters and reports effectively
			CO5	Use knowledge of English grammar properly

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
7	OBSBS107	Applied Mathematics II	CO1	Reduce matrices to normal and echelon form and apply the concept of rank of a matrix to solve system of linear equations
			CO2	Utilize the knowledge of vector space, subspace and examine the dependence and independence of vectors
			CO3	Identify Eigen values and make use of it for finding Eigen vectors and use Cayley-Hamilton theorem to find higher power of matrix
			CO4	Solve problems involving complex numbers making use of different forms and properties of complex numbers, hyperbolic functions
			CO5	Apply Taylor theorem to find the expansion of functions and identify the indeterminate forms
			CO6	Identify the convergence of infinite series
8	OBSBS108	Applied Chemistry	CO1	Identify water quality parameters and methods for water softening
			CO2	Discuss properties and applications of fuels and some alloys
			CO3	Summarize different methods to prevent metals from corrosion
			CO4	Describe principles of analytical instruments and properties of some advanced materials with their uses
			CO5	Calculate total hardness of water and calorific values of fuel
9	OBSES109	Basic Electronic Engineering	CO1	Explain fundamental concept of number system and its conversion amongst them
			CO2	Interpret logic functions, circuits, truth tables and Boolean algebra expression
			CO3	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques
			CO4	Explain characteristics and working of basic electronic components like diode, BJT and FET
			CO5	Apply knowledge of electronic components to explain working of electronic circuits such as rectifiers, amplifiers
10	OBSES110	Engineering Mechanics	CO1	Apply knowledge of resolution and composition of forces
			CO2	Apply the concepts of equilibrium to find unknown forces acting on rigid bodies
			CO3	Calculate forces in members of truss with their nature
			CO4	Compute Centroid and Moment of Inertia of a given plane lamina
			CO5	Apply the knowledge of dynamics to analyze rigid bodies (in motion)

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
11	OBSES111	Basic Mechanical Engineering	CO1	Define different manufacturing processes and properties of material
			CO2	Describe power generation processes from different energy sources
			CO3	Explain the basic concept of refrigeration and classify the different refrigerants
			CO4	Explain principles of power transmission devices and its types
			CO5	Calculate the various thermodynamic Properties
			CO6	Determine the efficiency of air standard cycles
12	OBSES112	Computer Programming	CO1	Use structured approach to solve a problem
			CO2	Comprehend C programming fundamentals
			CO3	Comprehend concepts like array, functions, structures, and pointers and file handling in C Programming language
			CO4	Apply C Programming constructs to solve a given problem
13	OBSBS113	Applied Mathematics II	CO1	Identify different types of ordinary differential equations and use analytical methods to solve them
			CO2	Using partial derivatives solve the problems based on functions of two or more variables
			CO3	Make use of differential equations for finding orthogonal trajectories, to solve simple electrical problems and to calculate maxima and minima of functions of two variables
			CO4	Apply the concept of Beta function, Gamma function and DUIS rules to solve improper integrals
			CO5	Identify and sketch the approximate shape of the curve in Cartesian and polar form and estimate their length by integration method
			CO6	Solve multiple integration and make use of it to find area and mass
14	OBSBS114	Applied Mathematics II (Tut)	CO1	Identify different types of ordinary differential equations and use analytical methods to solve them
			CO2	Using partial derivatives solve the problems based on functions of two or more variables
			CO3	Make use of differential equations for finding orthogonal trajectories, to solve simple electrical problems and to calculate maxima and minima of functions of two variables

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO4	Apply the concept of Beta function, Gamma function and DUIS rules to solve improper integrals
			CO5	Identify and sketch the approximate shape of the curve in Cartesian and polar form and estimate their length by integration method
			CO6	Solve multiple integration and make use of it to find area and mass
15	OBSES151	Workshop Practice I	CO1	Apply appropriate instrument and handle them carefully and safely to make measurements of the physical quantity
			CO2	Make male female joint by carrying out different fitting operations
			CO3	Prepare a job with different joining operations
			CO4	Produce a components using different sheet metal operations
16	OBSBS152	Applied Physics Lab	CO1	Calculate band gap energy, lattice constants of crystal and refractive index of water
			CO2	Apply various optical formulae to determine wavelength, Divergence, Intensity and Specific rotation of light
			CO3	Use spectrometer to calculate wavelength of light and Polarimeter to calculate specific rotation of sugar solution
			CO4	Communicate effectively and work in a team for laboratory activities
			CO5	Follow professional and ethical principals during laboratory
17	OBSES153	Basic Electrical Engineering	CO1	Identify electrical components and equipments
			CO2	Interpret the measurement of different electrical parameters with appropriate measuring instruments
			CO3	Perform different tests and evaluate performance parameters of Transformer
			CO4	Correlate the observations and results of experiment with different laws and theorem
			CO5	Practice safety precautions required for electrical engineering practices

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
18	OBSES154	Basic Civil Engineering Lab	CO1	Draw building outline by using chaining, ranging and offsetting
			CO2	Calculate corrected included angles by compass and reduced levels of different points by leveling
			CO3	Compute the area of an irregular shape of figure mechanical and digital Planimetre and use of Total Station for various measurement
			CO4	Communicate effectively about laboratory work both orally and in writing journals
			CO5	Practice professional and ethical behavior to carry forward in their life (A2)
19	OBSES155	Engineering Graphics Lab	CO1	Draw the projections the different lines, Planes and Solids in different positions; develop the lateral surface of object
			CO2	Draw orthographic, sectional and isometric views
			CO3	Use/Handle different engineering drawing instruments accurately & carefully
			CO4	Produce drawings with accuracy and proficiency
			CO5	Display a high degree of certainty in drawings and projections of complex components
20	OBSHS156	Professional Communication Lab	CO1	Prepare and perform better in formal communicative events
			CO2	Write well organized essays and paragraphs
			CO3	Strengthen their team spirit and perform effectively in a team
			CO4	Improve their intonation, vocabulary and communicative performance
			CO5	Write relevant professional emails, letters and reports effectively
21	OBSES157	Basic Electronic Engineering Lab	CO1	Implement combinational & sequential circuits by applying the knowledge of logic gates
			CO2	Explain the characteristics of different electronics devices such as diodes , transistors etc and simple circuits like rectifiers ,amplifiers
			CO3	Use Laboratory equipments for testing and measurement of various electronic components
			CO4	Construct and take measurement of various circuits to compare experimental results in the laboratory with theoretical analysis
			CO5	Interact effectively with the instructor and the teaching assistant(s) during lab hours and discussions in order to further their learning experience and their interest

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
22	OBSBS158	Applied Chemistry Lab	CO1	Identify hardness, acidity, alkalinity, chloride content of water and percentage of elements in some alloys
			CO2	Produce various advanced materials and analyze aqueous solutions using instruments
			CO3	Carry out experimental tasks by handling different glassware's
			CO4	Perform various experiments by following written instructions
			CO5	Express involvement by understanding concepts in applied chemistry
23	OBSES159	Engineering Mechanics Laboratory	CO1	Compute resultant, moments of a force system to verify the Laws for forces
			CO2	Calculate and compare support reactions of a simply supported beam by experimental and analytical methods
			CO3	Calculate and compare Centroid of lamina by experimental and analytical methods
			CO4	Solve numerical for rigid bodies in static and dynamic states
			CO5	Calculate coefficient friction of different material surfaces
			CO6	Follow the teacher and repeat the experiment and interpret the results
			CO7	Express involvement and understanding of concepts and their applications in the laboratory
24	OBSES160	Basic Mechanical Engineering Lab	CO1	Gain knowledge of different conventional and non conventional energy resources
			CO2	Illustrate construction and working of Pump, Compressor and heat engines
			CO3	Perform experiment of calculation thermal conductivity and COP of referigeration system
			CO4	Follow the teacher and repeat the experiment performance individually and interpret the results
			CO5	Express involvement and understanding of concepts and their applications in the laboratory
25	OBSES161	Computer Programming Lab	CO1	Write, compile and debug programs in C language
			CO2	Make use of different data types in a computer program
			CO3	Make use of conditional expressions and looping statements to solve problems associated with conditions and repetitions
			CO4	Construct the C code using a modular approach
			CO5	Demonstrate C Programs for various problem statements

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
1	0AEBS201	Applied Mathematics III	CO1	Solve the problems on Fourier Series and Laplace Transform.
			CO2	Make use of Linear Differential Equation to solve the Aeronautical Engineering problems.
			CO3	Make use of Partial Differential Equation to solve the Aeronautical Engineering problems.
			CO4	Solve the problems of vector calculus.
			CO5	Demonstrate Numerical ability to solve the problem.
2	0AEPC202	Applied Thermodynamics	CO1	Explain the basic physical quantities & their Units, principles of thermodynamics such as systems, properties, and thermodynamics laws.
			CO2	Explain the concept of Entropy & its significance in the irreversible & reversible process.
			CO3	Apply the First Law of Thermodynamics to solve problems related to the Flow & Non Flow Processes.
			CO4	Explain the Fundamentals of combustion process, form the balanced combustion equation and calculate the heat released from the combustion process.
			CO5	Apply the Second Law of Thermodynamics to solve problems related to thermodynamic cycles.
			CO6	Solve the problems based on the air standard cycles such as Otto cycle, Diesel and Brayton cycle, etc.
			CO1	Explain the fluid properties, their definitions & SI units.
			CO2	Apply the basic laws of nature to derive the fluid flow governing equations & use them for solving the problems related to fluid mechanics.

3	0AEPC203	Fluid Mechanics	CO3	Apply the dimensional analysis technique to obtain the equations for the problems related to fluid mechanics and use the similarity laws for carrying out the prototype testing.	
			CO4	Explain basic terminology & the working principle of various fluid machinery and will be able to draw the velocity triangle of the turbo machinery.	
			CO5	Comment on the significance of the Governing equations of the fluid flow in solving the fluid mechanics problems using the computational methods and explain the basic terminology involved in computational fluid dynamics.	
			CO6	Calculate the losses that occur when a fluid passes through closed conduits and analyze them to select the dimensions and material for the minimum loss.	
			CO7	Determine the lift & drag forces on the bodies like flat plate, cylinder & aerofoil and comment on the comparative study.	
4	0AEPC204	Solid Mechanics	CO1	Describe basic concept of stress, strain, transformation of stress/strain and strength of materials.	
			CO2	Calculate the shear forces and bending moment variation for different beams and loads and draw shear force and bending moment diagram.	
			CO3	Calculate the bending and shear stresses in beams for different sections.	
			CO4	Calculate the deflection of beams under the different end conditions & loading conditions.	
			CO5	Explain the concept of torsion and apply it for design of power transmission shaft.	
			CO6	Describe and Analyze the buckling in columns.	
5	0AEPC205	Introduction to	CO1	Explain the historical developments in the Aeronautical Engineering, Current Trends in the Aviation Industry	
			CO2	Comment & Explain in detail the basic components, systems & subsystems of the Aircraft and their functions	
			CO3	Explain the fundamentals of Aerodynamics, Propulsion, Structures & Their classifications	

5	0AEPC203	Aerospace Engineering	CO4	Comment & Explain in detail the basics of Air Transportation & Airport Operations & the Components of the Flight Deck Instruments & Systems	
			CO5	Comment & Explain on the material requirements for the Aeronautical application	
			CO6	Identify & Comment on the various configurations of the aircraft	
6	0AEES251	Computer Programing with C++	CO1	Explain the concepts of object oriented programming concepts using C++.	
			CO2	Apply their knowledge and programming skills to solve various computing problems	
			CO3	Write a C++ program for the simple cases.	
			CO4	Execute & Debug the C++ program for the simple cases for the Syntax & Logical Errors	
			CO5	Follow professional and ethical principles, standards while writing the C++ Codes	
			CO6	Recognize the need for learning the Programming Language for solving complex Problems related to Engineering.	
7	0AEPC252	Applied Thermodynamics Laboratory	CO1	Conduct the experiment as per standard process to find properties of lubricants such as Aniline point, cloud and pour point, flash and fire point and grease penetration no., dropping point etc.	
			CO2	Evaluate the isothermal efficiency and volumetric efficiency of an air compressor.	
			CO3	Evaluate the calorific value of any given substance.	
			CO4	Perform the experiments in a group as a leader as well as a member	
			CO5	Communicate the results and write the report effectively	
			CO6	Pursue professional and ethical principles during laboratory work	
			CO1	Differentiate and explain the working principle of air breathing and non-air breathing engines.	
			CO2	Distinguish and explain the intakes and exhaust systems and gas turbine combustions used in aircrafts.	
			CO3	Apply control volume analysis and the integral momentum equation to estimate the forces produced by Aircraft Propulsion systems	

8	0AEPC210	Propulsion-I	CO4	Describe the principal design parameters and constraints that set the performance of gas turbine engines, and to apply ideal-cycle analysis to a gas turbine engine to relate thrust and air fuel ratio
			CO5	Use velocity triangles to estimate the performance of a compressor or turbine stage
			CO6	Comment of the factors that affect combustion process and design factors of combustion chamber.
9	0AEPC209	Aerodynamics I	CO1	Explain the Fluid properties, & their Governing Equations in the Integra Form
			CO2	Apply the basics of Fluid Mechanics to derive the Lift & Drag Equations acting over the bodies.
			CO3	Calculate the Lift Force Coefficient & Lift Distribution over the Finite Wing of an Aircraft
			CO4	Calculate the Induced & Skin Friction Drag over the Finite Wings & Comment on the Flow control techniques to control the boundary layer
			CO5	Explain & Determine the Thrust & Thrust Coeffienct acting on the Propellers applied to Aircraft, Helicopter & Hovercraft
10	0AEPC208	Aircraft Materials	CO1	Describe the basic concepts of crystallography and crystal defects
			CO2	Describe mechanical behavior of different materials under different loading conditions.
			CO3	Explain different phase diagrams, predict and calculate amount of phases using the phase diagram.
			CO4	Explain use and effect of different heat treatment processes.
			CO5	Explain composition, properties and use of different materials used in aircraft construction.
			CO6	Explain the composite materials, their types and applications.
11	0AEPC207	Aircraft Production	CO1	Describe the technique of manufacturing different parts of aircraft like Casting, Joining, shaping and forming
			CO2	Take a decision on manufacturing technique for manufacturing given components

11	0AEPC207	Technology	CO3	Explain the concept of NDT Used to check the quality of Manufactured Product
			CO4	Comment on the advanced manufacturing technologies used in the Aircraft component Production
12	0AEBS206	Numerical Analysis	CO1	Analyze the errors and perform the curve fitting & the statistical analysis of the experimental data generated.
			CO2	Solve the mathematical problems involving the algebraic & Transcended equations
			CO3	Provide solutions for the mathematical problems involving the Linear simultaneous equations
			CO4	Solve the mathematical problems involving the Numerical Integration & Differentiation
			CO5	Obtain the the solutions of Ordinary & Partial Differential Equations with the give boundary conditions.
T.Y COURSES				
13	0AEPC301	Aircraft Structures	CO1	Identify the basic elements of aircraft structures and their classifications and explain the basic concepts involved in their structural analysis.
			CO2	Explain the basic laws of physics, mathematics and engineering to obtain structural response of open/closed thin walled idealized structures under the action of bending, buckling, shear, and twisting loads.
			CO3	Apply principles of structural analyses to calculate deformations and direct stresses of complex normal/idealized aircraft structural elements under the action of flexural loads.
			CO4	Apply principles of structural analyses to obtain the shear flow pattern in the open and closed thin walled normal/idealized sections subjected to shear and torsional loads.
			CO5	Explain the concept of stability and mathematical modelling for the analysis of stiffened panels and shells.
			CO1	Understand the characteristics of compressible flow in various flow regimes – subsonic, transonic, supersonic and hypersonic.

14	0AEPC302	Aerodynamics II	CO2	Use Quasi one dimensional theory to analyze compressible flow problems.	
			CO3	Estimate the normal and oblique shock properties.	
			CO4	Analyze the flow behavior over a convex corner, estimate the flow properties through a constant area duct.	
			CO5	Analyze the flow characteristics over different aerodynamic profiles at various flow regimes.	
			CO6	Predict the supersonic flow characteristics over the various wing types and various aircraft configurations.	
15	0AEPC303	Linear Control Theory	CO1	Explain the fundamentals of (feedback) control systems.	
			CO2	Apply Basic Engineering Mathematics and laws of physics to formulate Mathematical models of any dynamic systems in forms suitable for use in the analysis and design of control systems.	
			CO3	Solve system equations in state-variable form (state variable models).	
			CO4	Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs.	
			CO5	Determine the absolute stability of a closed-loop control system	
			CO 6	Apply root-locus technique to analyze and design control systems.	
16	0AEPC304	Aircraft Performance	CO1	Derive the mathematical expressions of the aircraft flight performance under the operational envelope such as Take-off, climb, cruise, descent, turn, glide and Landing.	
			CO2	Calculate the Properties of Atmosphere at a given altitude under the ISA Conditions and Apply them for the calculation of Aircraft Flight Performance.	
			CO3	Apply the mathematical expressions for calculating the aircraft flight performance under the different operational envelopes.	
			CO4	Analyze the factors/parameters affecting the aircraft flight performance under the various operational conditions.	
			CO1	Understand various concepts of advanced propulsion techniques.	

17	0AEPC305	Propulsion-II	CO2	Describe solid, liquid and hybrid rocket motors and their composition.
			CO3	Explain the fundamentals of rocket propulsion and working of individual rocket propulsion components.
			CO4	Understand various concepts of electric propulsion system in application to electric thrusters.
			CO5	Evaluate the various parameters of Electrostatic and Ion thrusters.
18	0AEPC311	Composite Materials &Structures	CO1	Distinctly identify composite materials with their advantages, applications and classification along with nomenclature, types of laminated composites along with their fabrication processes.
			CO2	Interpret the effect of fiber and matrix content on the composite lamina and laminate subjected to external loads.
			CO3	Explain the stress strain relations, elastic constants for isotropic, anisotropic and orthotropic composite laminates.
			CO4	Derive the governing equations for the analysis of general laminated composite plates along with the understanding of hydro-thermal stresses and strains and failure theories of laminated composites.
			CO5	Explain the concept of smart materials and structural health monitoring.
19	0AEPC310	Aircraft Design	CO1	Describe about the various design process and methodology, and will be able to explain about various types of configuration alternatives and their significance
			CO2	Describe about various cost factors involved in the operation of an aircraft and about airline economics
			CO3	Apply the knowledge of design and estimate take-off weight and the dimensional parameters of wing, fuselage, tail, control surfaces and Engine based on the requirements
			CO4	Estimate the performance characteristics- take-off, landing level turn, climb for the given aircrafts
			CO5	Estimate the Drag characteristics, air loads, V-n diagram gust load diagrams for the Aircrafts
			CO6	Perform constrain and performance analysis for the given design problem
			CO1	Describe the necessity of stability for dynamic systems like Aircraft.
			CO2	Apply the rigid body dynamics to aircraft for representing aircraft in mathematical model.

20	0AEPC309	Aircraft Stability and Control	CO3	Calculate the control surfaces control power for different aircraft configurations.
			CO4	Estimate the longitudinal and directional parameters with the help of the linearized equations of aircraft motion.
			CO5	Analyze the different type of modes in longitudinal, lateral and directional motion of aircraft, and recovery from those modes.
21	0AEHS308	Economics Management	CO1	Describe the role of economics involved in the decision making process
			CO2	Calculate the rate of return, depreciation charges and taxes.
			CO3	Enumerate different cost entities in estimation, and Explain the importance of finance functions.
			CO4	Describe the significance of Marketing Management and Product Management in the success of an organization.
22	0AEPC307	Computational Fluid Dynamics	CO1	Describe components of the CFD algorithms, the role of CFD algorithms in the product design cycle & the governing equations of the fluid flow applicable for the general & special cases of the fluid flows.
			CO2	Discuss the need for grids, types of grid generation techniques & the advancements in the grid generation process.
			CO3	Categorize the Partial Differential Governing Equations applicable for specific fluid flow cases by applying the principles of mathematics.
			CO4	Describe the various Finite Difference & Finite Volume schemes used in the Computational Algorithms & Apply them for solving simple fluid flow cases.
			CO5	Describe the role of Turbulence Models in the CFD Solution Procedure and Apply and use the appropriate Turbulence Models for solving the cases.
			CO6	Analyze the Stability characteristics of the various Finite Difference schemes.
			CO1	Carryout and analysis the design of UAV Systems and Apply them to make an UAV System as a Team.

23	0AEPC358	Unmanned Aerial Vehicles Laboratory	CO2	Use the Modern Software Tool for solving & simulation the UAV Systems.
			CO3	Recognize the need for life-long learning of the modern tools & techniques used for providing solutions to the complex engineering problems.
			CO4	Follow professional and ethical principles during laboratory work
24	0AEPC360	Aircraft Design Laboratory	CO1	Analyze and Estimate the take-off weight and other dimensional parameters for the aircraft and Estimate the performance characteristics
			CO2	Carry out a conceptual and preliminary design of an Aircraft as a Team.
			CO3	Use the Modern Software Tool for solving & simulation the simple fluid flow cases.
			CO4	Effectively record the analysis reports of the Analysis Report carried out using the software tool and present them orally.
			CO5	Recognize the need for life-long learning of the modern tools & techniques used for providing solutions to the complex engineering problems.
25	0AEPC357	Composite Materials & Structures Laboratory	CO1	Learn and demonstrate the basic knowledge in MATLAB/SCILAB.
			CO2	Evaluate the material properties of a composite using experimental/analytical methods.
			CO3	Demonstrate the macro-mechanical analysis of composite lamina and laminates.
			CO4	Learn the best & effective practices for carrying out the experimentation
			CO5	Follow the professional practices like maintaining a laboratory journal and completion of work on time.
			CO1	Carryout the analysis of complex engineering problems related to Aerodynamics to provide solutions.
			CO2	Use the Modern Software Tool for solving & simulation the simple fluid flow cases.

26	0AEPC357	Computational Fluid Dynamics Laboratory	CO3	Effectively record the analysis reports of the Analysis Report carried out using the software tool and present them orally.
			CO4	Recognize the need for life-long learning of the modern tools & techniques used for providing solutions to the complex engineering problems.
			CO5	Follow professional and ethical principles during laboratory work
27	0AEPC355	Computer Aided Drafting Laboratory	CO1	Prepare solid, assembly and surface models with suitable constraints and 2D drafting.
			CO2	Prepare 3 dimensional design of typical aircraft & its component.
			CO3	Demonstrate kinematics of assembly for aircraft engine components using CATIA software.
			CO4	Communicate effectively, both orally and in writing journals.
			CO5	Practice professional and ethical behaviour to carry forward in their life.
			CO6	Recognize the need of modeling software and utilize it for their project work.
28	0AEPC354	Non Destructive Testing Laboratory	CO1	Learn about various methods of Non Destructive Testing.
			CO2	Locate surface as well as sub surface flaws of the components.
			CO3	Identify use of suitable non-destructive method for particular application in industry.
			CO4	Use non-destructive techniques in maintenance practices in aerospace industry
			CO5	Follow the professional practices like mainlining a laboratory journal and completion of work on time
29	0AEPC353	Aircraft Performance Laboratory	CO1	Apply their knowledge and programming skills to compute the Aircraft Performance Equations.
			CO2	Write a MATLAB Codes for the Generating Aircraft Performance Curves.
			CO3	Execute & Debug the MATLAB Code for the Syntax & Logical Error
			CO4	Follow professional and ethical principles, standards while writing the MATLAB Codes

			CO5	Recognize the need for learning the Programming Language for solving complex Problems related to Engineering.
30	0AEPC352	Aerodynamics II Laboratory	CO1	Explain the different types of wind tunnels and experimentations used for aerodynamic studies.
			CO2	Conduct simulations on typical test cases moving at supersonic flow.
			CO3	Predict the kind of shock waves generated over the test models using computational simulations.
			CO4	Explain the different experimentation techniques that can be performed in a supersonic wind tunnel.
			CO5	Perform test on supersonic wind tunnel to visualize the shock waves generated over the test model.
			CO6	Recognize the needs for wind tunnel testing while designing real world models.
31	0AEPC351	Aircraft Structures Laboratory	CO1	Recognize the defects present in the materials.
			CO2	Determine the Stresses and Deformations of the specimen by using different loading condition.
			CO3	Determine the sectional properties of the specified structure under various loading conditions.
			CO4	Perform the experiment on given topic and explain with the help of knowledge acquired in theory classes.
			CO5	Perform the experiments in the most effective manner without damaging the apparatus or specimen.
B.TECH				
32	0AEPC401	Vibration and Structural Dynamics	CO1	Describe the basic concepts of vibration
			CO2	Explain different vibration measuring instruments
			CO3	Describe the interaction among the aerodynamic, elastic and inertia forces
			CO4	Determine natural frequency of mechanical vibrating system/element
			CO5	Compute the parameters of vibration isolation system
			CO6	Identify the vibratory response of mechanical system/element
			CO1	Understand Aircraft Maintenance Practices and Tool usages.

			CO2	Carryout Inspections and maintenance checks on aircraft piston engines
33	)AEPC402	Aircraft General Engineering and Maintenance	CO3	Classify repair procedure that occur in plastic and composite component of an Aircraft
			CO4	Select the maintenance procedure of various systems of aircraft according to various manuals
			CO5	Express the safety practices while handling Aircraft hazardous materials
34	)AEOE403	Introduction to Flight	CO1	Explain the historical developments in the Aeronautical Engineering, Current Trends in the Aviation Industry
			CO2	Comment & Explain in detail the basic components, systems & subsystems of the Aircraft and their functions
			CO3	Explain the fundamentals of Aerodynamics, Propulsion, Structures & Their classifications
			CO4	Comment & Explain in detail the basics of Air Transportation & Airport Operations
			CO5	Comment & Explain on the material requirements for Aeronautical applications
			CO6	Identify & Comment on the various configurations of the aircraft
35	0AEOE404	Experimental Aerodynamics	CO1	Describe and recognize various types of wind tunnels, measuring equipment's and their applications.
			CO2	Explain various techniques of pressure, force and velocity measurement.
			CO3	Analyse qualitative and quantitative flow behaviour over various bodies.
			CO4	Select data acquisition system for the aerodynamic characteristic measurements.
			CO5	Design and develop models to be tested on wind tunnels.
		Gas Dynamics and Jet	CO1	Discuss the effects of variable area duct under the effect of varying back pressure.
			CO2	Estimate the flow parameters over convex and concave corner and comment on the downstream flow

36	0AEOE405	Gas Dynamics and Jet Propulsion	CO3	Give an insight into advanced jet & rocket propulsion systems and compare one another
			CO4	Perform the engine cycle analysis for all thermodynamic cases
			CO5	Interpret and design various propulsive systems suitable for the application and operation
37	0AEOE406	Introduction to UAV	CO1	Classify the UAV's and will be equipped with knowledge of Design process involved
			CO2	Explain the basic aerodynamics and performance concepts associated with Fixed wing UAV
			CO3	Derive the Equations of motion of an UAV and explain the PID control strategy associated with it
			CO4	Derive and explain the mathematics associated with Launch and recovery systems
			CO5	Explain the PID control strategy involved in altitude hold of a quadcopter
38	0AEPE407	Experimental Aerodynamics	CO1	Describe and recognize various types of wind tunnels, measuring equipments and their applications.
			CO2	Explain various techniques of pressure, force and velocity measurement.
			CO3	Analyze qualitative and quantitative flow behavior over various bodies.
			CO4	Select data acquisition system for the aerodynamic characteristic measurements.
			CO5	Design and develop models to be tested on wind tunnels.
39	0AEPE408	Heat and Mass Transfer	CO1	Apply the concept of one dimensional steady state heat conduction to solve problems in Plane, Cylindrical and Spherical coordinates
			CO2	Explain the Heat Transfer through Fins and the significance of Dimensional Analysis in unsteady state conduction
			CO3	Analyze the empirical corelations for Forced and Free Convection in Laminar and Turbulent Flows
			CO4	Apply the various laws governing and the concept of Radiation Heat Transfer

			CO5	Explain the general aspects of Boiling and Condensation Heat Transfer; and design considerations for Heat Exchangers
			CO6	Explain the basic concepts of Mass Transfer
40	0AEPE409	Material Testing and Characterisation	CO1	Prepare the specimens as per standards for respective test.
			CO2	Select the appropriate test depending on material and its application.
			CO3	Understand, correlate and interpret the results.
			CO4	Select the characterization tool for specific application
			CO5	Understand basics of thermal analysis techniques.
			CO6	Identify and justify the selection of the techniques to evaluate a particular sample
41	0AEPE410	Engineering Design Optimization	CO1	Define objective function, explain the terms related to optimiztion problem, classify them
			CO2	Understand and apply the techniques of classical optimization single and multivariable optimization with equality and inequality constraints
			CO3	Understand and apply the techniques of linear (Simplex) and nonlinear (Elimination and Interpolation) programming to the optimization problems
			CO4	Understand and apply techniques of unconstrained optimization through different methods
			CO5	Apply the concepts of optimal control, optimality criteria, genetic algorithm, neural network and need of adaptive control
42	0AEPE411	Helicopter Theory	CO1	Explain the basic configurations of helicopter, main rotor and tail rotor - working principles, maintenance and inspection
			CO2	Apply the principles of momentum theory and balde element theory for the Aerodynamics calculation of Rotor blade
			CO3	Analyze the power requirements in forward flight and associated stability problems of helicopter.
			CO4	Analyze the factors/parameters affecting the helicopter performance under the various operational conditions.
			CO1	Understand the differences between HTA and LTA systems
			CO2	Comment on current developments and future trends of LTA systems

43	0AEPE412	Lighter-Than-Air Systems	CO3	Describe the properties and structure of atmosphere, and state the aerostatic principles	
			CO4	Comment on the technological challenges in design, development and operation of an LTA system	
			CO5	Estimate the static lift generated by an LTA system, given its type, size and operating scenario	
			CO6	Carry out conceptual layout and sizing of an LTA system	
44	0AEPE413	Hypersonic Aerodynamics	CO1	Define the fundamental of hypersonic flow physics	
			CO2	Explain the theories related to analysis of hypersonic flow	
			CO3	Analyze the hypersonic shock theories.	
			CO4	Develop the viscous effect in hypersonic flow.	
			CO5	Impliment similarity rule on various bodies moving at hypersonic speed.	
45	0AEPE414	Advanced Propulsion Systems	CO1	To understand the concept of various types of advanced chemical propulsion system and its application to real systems	
			CO2	To demonstrate the utilization of combustion systems in scramjet, ramjet propulsion and hypersonic propulsion.	
			CO3	To infer the concept of nuclear rockets and evaluate the performance, operation parameters and handling hazard involved	
			CO4	To differentiate between electro-thermal and pure electric thrusters and interpret the concept for power generation in space.	
			CO5	To appraise the various micro-propulsion systems developed and emerging technologies involved.	
			CO6	Understand the concepts of hybrid propulsion systems	
46	0AEPE415	Advanced Mechanics of Solids	CO1	Understand the basic concepts of stress, strain and deformation	
			CO2	Analyse the elastic and plastic behaviour of materials, stress invariants, principal stresses and their directions.	
			CO3	Analyse strain in variants, principal strains and their directions.	
			CO4	Develop constitutive relationships between stress and strain for linearly elastic solid.	
			CO5	Apply the concepts of energy methods in solving structural problems.	

			CO6	Analyse theories of failure and design considerations for safe operations
47	0AEPE416	Aircraft Engine Design	CO1	Provide preliminary design parameters for compressors and turbines and characterize their performance based on a mean line approach.
			CO2	Evaluate the operation and performance of a jet engine based on compressor and turbine maps for different operating conditions.
			CO3	Provide preliminary design parameters and define key design issues, constraints and architectures for main combustors in jet engines.
			CO4	Carryout the conceptual design of the Jet Engine
48	0AEPE417	Airline and Airport Management	CO1	Understand about the airline industry and its regulatory bodies
			CO2	Understand the characteristics of Airline Industry and its characteristics
			CO3	Understand the organisational structure of the airline industry
			CO4	Understand the security, navigation and traffic control
			CO5	Understand the importance of safety and security
49	0AEPE418	Lean Six Sigma	CO1	Understand the concept of Lean principles and Six sigma
			CO2	Predict the various process mapping for the quality standards to be maintained
			CO3	Solve Minitabs and the project Charter
			CO4	Solve various problems on conceptual knowledge of DMAIC
			CO5	Categorize Various phases under DMAIC
50	0AEPC419	Avionics and Instrumentation	CO 1	Identify the various cockpit controls and Describe the principle and working of different aircraft systems.
			CO2	Distinguish between the features and working of various flight control systems.
			CO3	Using the components of a fuel system illustrates the operation of integrated civil aircraft fuel systems and in- flight refuelling and also troubleshoot the snags.

			CO4	Prepare process chart for installation, inspection & troubleshooting procedures of avionics & electrical components
51	0AEPC420	Space Mechanics	CO1	Understand general concepts of space mechanics and solar system.
			CO2	Interpret n-body problem and solve the two body problems.
			CO3	Understand general aspects of satellite injection in trajectory and launch vehicle performance.
			CO4	Apply the knowledge of satellite orbit perturbations to solve the problems.
			CO5	Demonstrate trajectory selection for interplanetary missions.
			CO6	Identify the need of low thrust trajectories and describe basic concept of low thrust trajectories.
52	0AEPC421	Finite Element Analysis	CO1	Illustrate the fundamental concepts, equations of equilibrium, Stress-strain relations and the principle of potential energy and approximations of differential equations.
			CO2	Compute the key concepts of finite element formulations by considering the 1D problem, just as Shape function, element stiffness and boundary conditions.
			CO3	Apply the finite element formulations for two dimensional plane stress and plane strain problems using constant strain triangle
			CO4	Demonstrate the modelling aspects of axisymmetric solids subjected to axisymmetric loading
			CO5	Use the Galerkin formulation for steady state heat transfer, torsion and potential flow.
53	0AEPE422	Automobile & Industrial Aerodynamics	CO1	Describe the atmospheric wind and its elements.
			CO2	Explain wind energy harvesting using different methods
			CO3	Develop flow control techniques for vehicle aerodynamics
			CO4	Explain effects of wind loading on building and urban planning.
			CO5	Explain wind structure induced vibration
			CO1	Apply the basic concept of thermochemistry to combustion related problems.
			CO2	Demonstrate the utilization of the concept of chemical kinetics in combustion reactions.

54	1AEES204	Applied Thermodynamics	CO3	Distinguish between premixed and diffusion flames including their properties, and their use in combustion devices and rockets.
			CO4	Differentiate between deflagration and detonation process and interpret the concept for computation and analysis of the transition phenomenon.
			CO5	Evaluate the combustion processes taking place in different types of chemical rockets.
			co6	Understand the effects of pollutant emissions and able to quantify it.
55	0AEPC424	Experimental Stress Analysis	CO1	Study the instruments for measurement
			CO2	Determine the stress-strain values in material and structure subjected to static and dynamic forces & loads
			CO3	Acquiring information's the usage of strain gauges and photo elastic techniques of measurement.
			CO4	Formulate and solve general three dimensional problems of stress-strain analysis especially fundamental problems of elasticity.
			CO5	Analyze the strain gauge data under various loading condition by using gauge rosette method
			CO6	Understand elastic behavior of solid bodies using coating techniques
56	0AEPE425	Navigation, Guidance and Control	CO1	Explain and fundamentals of Radars, missile guidance, navigation systems, and describe the behaviour of 1 and 2 order linear time invariant systems
			CO2	Apply the concept of frequency response & Laplace transform to describe the stability in time domain and frequency domain using bode plot and root locus techniques
			CO3	Apply the concept of radar equation and Doppler shift to evaluate the minimum detectable distance
			CO4	Apply the guidance laws to a missile to hit a specified target using classical and modern guidance laws
			CO1	Describe the complexity of airline planning, operations and dispatch.
			CO2	Calculate the shortest path flow for minimum cost flow problem.
			CO3	Understand the maximum path flow for multi commodity flow problem.

57	0AEPE426	Flight Scheduling and Operations	CO4	Analyse the Integer programming models- set covering/ partitioning problems, traveling salesman problem
			CO5	Differentiate and analyse the problems in aircraft routing and management for maintenance of regular operations.
			co6	Analyze the role of solution for constructing flight scheduling and operations.
58	0AEPE427	Aircraft Rules and Regulations - DGCA (CAR)	CO1	Understand various Air worthiness requirements for Civil Aviation
			CO2	Understand various Series of CAR
			CO3	Interpret various Aircraft maintenance programmes under CAR
			CO4	Understand the various process of registration of aircraft
			CO5	Understand the various documents to be carried on an Indian registered aircraft
59	0AEPE428	Turbulence Modelling	CO1	Describe the physical mechanisms of the transition from laminar to turbulent flow for a simple flow case
			CO2	Explain Kolmogorov's theory, including the basic assumptions and the validity of the theory
			CO3	From a phenomenological perspective, assess if a flow is turbulent
			CO4	Describe the character of the turbulence in different flow situations with respect to the properties and development of the turbulence
			CO5	Explain how the differences between these flow situations are reflected in the modelling
60	0AEPE429	Introduction to Propellant Technology	CO1	Demonstrate the processing of different types of solid propellants and effect of processing on the vital properties of solid propellants.
			CO2	To comprehend the fundamentals of solid propellant grain design.
			CO3	Design solid propellant grain for static and flight rocket motors.
			CO4	Evaluate the ignition delay and combustion parameters of a liquid rocket engine for different combustion chamber configurations
			CO5	To demonstrate the characteristics of the cryogenic fluid and the challenges acquired in achieving it.
			CO6	Evaluate the technical problems associated with propellant loading and other design issues associated with a liquid rockets engine.

61	0AEPE430	High Temeprature Materials	CO1	Explain processing, characterization and properties of high temperature materials.
			CO2	Determine failure of material is due to creep or fatigue.
			CO3	Apply knowledge of creep resistance in design of material.
			CO4	Anlyse damage mechanism and failure of components at elevated temperatures
			CO5	Discuss factors influencing the oxidation and hot corrosion.
			co6	Choose the material for high temperature application.
62	0AEPE431	Numerical Heat transfer and Fluid Flow	CO1	Derive the general transport equation and use it for physical process of interest, apply the FDM and FVM methods to transport equation
			CO2	Understand and Apply the concept of FVM to steady/ unsteady 1D and 2D Heat diffusion equation
			CO3	Understand and Apply the concept of FVM to steady/ unsteady 1D and 2D Diffusion and Convection equation
			CO4	Understand and apply the iterative solving method to the system of linear equations
			CO5	Understand and apply the concept of various schemes to solve the diffusion and convection equation
63	0AEPE432	Air Traffic Control and Airport Management	CO1	Understand the requirement of air traffic control systems and types of air traffic control system.
			CO2	Understand flight information systems and rules of air traffic systems.
			CO3	Understand indirection indicator systems for air navigation
			CO4	Identify the Various Navigation Services
			CO5	Understand the various Airport Lighting systems
64	0AEPE433	Probability and Statistics	CO1	Apply the basic rules and theorems of probability theory, to determine probabilities that help to solve engineering problems.
			CO2	Appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc. to model and solve engineering problems.
			CO3	Formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.

64	0AELPL453	Probability and Statistics	CO4	Demonstrate how regression analysis can be used to develop an equation that estimates how two variables are related and how the analysis of variance procedure can be used to determine if means of more than two populations are equal
			CO5	Solve queuing theory problems for Pure Birth process and Death Process M/M/1 Mo
			co 6	Apply the concepts of Markov Chains and Stochastic Matrix to solve engineering problems.
65	0AEPC451	Structural Dynamics Laboratory	CO1	Illustrate and Carry out measurement of various vibration parameters.
			CO2	Determine the behavior of system under different vibratory conditions.
			CO3	Analyze the vibration phenomena as a mathematical model & evaluate its response.
			CO4	Carry out the Performance study of the vibration of plate and beam.
			CO5	Effectively record the results and analyze them to provide a conclusion.
			CO 6	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
66	0AEPC452	Aircraft Systems Laboratory	CO1	Incorporate FAA/DGCA/EASA guidelines used in maintenance & repair, layouting, markings and sketching
			CO2	Perform the Basic maintenance and rigging operation on cessna 152
			CO3	Calibrate various aircraft instruments like altimeter
			CO4	Sketch the various flight control panels in the aircraft confined to the various regulations
			CO5	Read the technical drawing and adher necessary information from the diagram
			CO6	Prepare & present a maintenance log for all the experiments, with suitable procedures, diagrams, layouts, sketches, adhering to the norms and regulations of FAA/DGCA/ EASA
			CO1	Define virtual instrumentation concepts, Compare traditional and virtual instrumentation.

67	0AEPC453	Virtural Instrumentation Laboratory	CO2	Discuss operating systems required for virtual instrumentation, Illustrate implementation methods for instrumentation.
			CO3	Familiarize the basics and interfacing of Virtual Instrumentation using LabVIEW
			CO4	Effectively record the results and analyze them to provide a conclusion.
			CO5	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
68	0AEPC454	Aircraft General Engineering Maintenance Laboratory	CO1	Carryout the Aircraft Maintenance, start up and Tools identification knowledge on Cessna 152.
			CO2	Utilize suitable tools to carryout maintenance and repair on aircraft components.
			CO3	Demonstrate the inspection procedures as per DGCA norms.
			CO4	Effectively Record the observations of Inspection, maintenances through check list and logs.
			CO5	Follow the Professional practices like punctuality and following safety procedures.
69	0AEPR455	Industrial Training	CO1	Effectively use the modern tool/ techniques to investigate the problem statement effectively and Recognize the need for continuously updating their modern tool usage skills
			CO2	Recognize and follow the professional and ethical responsibility as an Individual and also contribute to the team work for the success of the project
			CO3	Effectively record the reports based on the work carried and present them orally, with reasoning and justification
			CO4	Manage a project, leading to the successful completion of the work within the deadlines and budget constraints
			CO1	Identify a problem statement related to their area of interest, carry out an detailed literature review and arrive at an research gap
			CO2	Develop an methodology for designing a solution for the problem identified
			CO3	Develop and Conduct Experiments on setups (or) Carry out computer simulation analysis and Interpret of Data from experiments (or) computer simulations

70	0AEPR456	Project Phase I	CO4	Effectively use the modern tool/ techniques to investigate the problem statement effectively and Recognize the need for continuously updating their modern tool usage skills
			CO5	Recognize and follow the professional and ethical responsibility as an Individual and also contribute to the team work for the success of the project
			CO6	Effectively record the reports based on the work carried and present them orally, with reasoning and justification
			CO7	Manage a project, leading to the successful completion of the work within the deadlines and budget constraints

PSO	Statement
1	**PSO1.** Apply the knowledge of aeronautical engineering in the Design and Development, Operating, Maintaining and overhauling of the products enhancing the mobility in the society.
2	**PSO2.** Develop aeronautical and aviation frameworks, and subsystems to overcome the challenges faced by the aviation industry through innovative solutions leading to employability and entrepreneurial development.

Sr.No.	Course Code	Course Name	Cou	CO Statement
1	1AEBS201	Applied Mathematics - III	CO1	Solve the problems on Fourier Series and Laplace Transform.
			CO2	Make use of Linear Differential Equation to solve the Aeronautical Engineering problems.
			CO3	Make use of Partial Differential Equation to solve the Aeronautical Engineering problems.
			CO4	Solve the problems of vector calculus.
			CO5	Demonstrate Numerical ability to solve the problem.
2	1AEES202	Fluid Mechanics	CO1	Explain the fluid properties, their definitions & SI units.
			CO2	Apply the basic laws of nature to derive the fluid flow governing equations & use them for solving the problems related to fluid mechanics.
			CO3	Apply the dimensional analysis technique to obtain the equations for the problems related to fluid mechanics and use the similarity laws for carrying out the prototype testing.
			CO4	Explain basic terminology & the working principle of various fluid machinery and will be able to draw the velocity triangle of the turbo machinery.
			CO5	Comment on the significance of the Governing equations of the fluid flow in solving the fluid mechanics problems using the computational methods and explain the basic terminology involved in computational fluid dynamics.
			CO6	Calculate the losses that occur when a fluid passes through closed conduits and analyze them to select the dimensions and material for the minimum loss.

			CO7	Determine the lift & drag forces on the bodies like flat plate, cylinder & aerofoil and comment on the comparative study.
3	1AEES203	Mechanics of Materials	CO1	Explain the basic concepts related to stress and strains in engineering components.
			CO2	Construct a Mohr's circle for given plane stress problem to calculate stress components.
			CO3	Apply the fundamental concepts of principle of superposition, equilibrium, force-deformation, and stress-strain relationships to the solid mechanics problems.
			CO4	Calculate the shear force, bending moment, stresses and deflections in a beam under given load conditions.
			CO5	Calculate the shear stresses in shafts subjected to torsion.
			CO6	Perform structural analysis by hand computations and design bars, shafts, beams and columns with the use of theories of failure.
4	1AEES204	Applied Theromodynamics	CO1	Explain the basic physical quantities & their Units, principles of thermodynamics such as systems, properties, and thermodynamics laws.
			CO2	Explain the concept of Entropy & its significance in the irreversible & reversible process.
			CO3	Apply the First Law of Thermodynamics to solve problems related to the Flow & Non Flow Processes.
			CO4	Apply the Second Law of Thermodynamics to solve problems related to thermodynamic cycles.
			CO5	Solve the problems based on the air standard cycles such as Otto cycle, Diesel and Brayton cycle, etc.
			CO6	Know definitions of fuel, oxidizer and combustion; concepts related to element conservation; calculate enthaply of reaction, enthalpy of combustion and heating values; determine adiabatic flame temperature.
			CO1	Explain the historical developments in the Aeronautical Engineering, Current Trends in the Aviation Industry
			CO2	Comment & Explain in detail the basic components, systems & subsystems of the Aircraft and their functions

5	1AEPC205	Introduction to Aerospace Engineering	CO3	Explain the fundamentals of Aerodynamics, Propulsion, Structures & Their classifications
			CO4	Comment & Explain in detail the basics of Air Transportation & Airport Operations
			CO5	Comment & Explain on the material requirements for Aeronautical applications
			CO6	Identify & Comment on the various configurations of the aircraft
6	1AEPC206	Aircraft Production Technology	CO1	Describe the technique of manufacturing different parts of aircraft like Casting, Joining, Machining, Shaping and Forming
			CO2	Interpret the concept of conventional and unconventional manufacturing processes
			CO3	Take a decision on manufacturing technique for manufacturing given component or a product
			CO4	Estimate production cost, selling cost with profit margin for products with respect to the production methods
			CO5	Relate the advance manufacturing method's amplification in the Aircraft production line
7	1AEPC251	Aircraft Production Technology Laboratory	CO1	Decide the manufacturing method and techniques for the given design
			CO2	Illustrate sample company certifications and IPR
			CO3	Perform all the machining works on the given work piece
			CO4	Make use of production tools and equipment to manufacture given simple components
			CO5	Follow professional ethics and virtue throughout the entire course and forth
			CO1	Apply the basic fluid mechanics principles for determining the fluid & flow characteristics using the measuring instruments.

8	1AEES254	Fluid Mechanics Laboratory	CO2	Determine the forces acting on the bodies due to fluid flow over them using the Wind Tunnel
			CO3	Verify the fluid mechanics laws using the experimental methods
			CO4	Carry out the Performance study of the Fluid Machinery
			CO5	Effectively record the results and analyze them to provide a conclusion.
			CO6	Learn the best & effective practices for carrying out the experimentation.
			CO7	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
9	1AEES255	Mechanics of Materials Laboratory	CO1	Explain the behavior of the materials under tension, compression, bending and torsion loading conditions.
			CO2	Calculate the stresses and strains induced in the bodies under the given loading condition.
			CO3	Effectively carry out the experiment and record the results, analyze them to provide a conclusion.
			CO4	Learn the best & effective practices for carrying out the experimentation.
10	1AEES256	Applied Thermodynamics Laboratory	CO1	Conduct the experiment as per standard process to find properties of lubricants such as Aniline point, cloud and pour point, flash and fire point and grease penetration no., dropping point etc.
			CO2	Evaluate the isothermal efficiency and volumetric efficiency of an air compressor.
			CO3	Evaluate the calorific value of any given substance.
			CO4	Perform the experiments in a group as a leader as well as a member
			CO5	Communicate the results and write the report effectively

			CO6	Pursue professional and ethical principles during laboratory work
			CO7	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
11	1AEES207	Numerical Analysis with Programming Language	CO1	Analyze the various types of errors which are a part of scientific computing and perform the curve fitting & the statistical analysis of the experimental data generated.
			CO2	Solve the mathematical problems involving the algebraic, Transcendal equations and Linear Equations
			CO3	Solve the mathematical problems involving the Numerical Integration & Differentiation
			CO4	Obtain the the solutions of Ordinary & Partial Differential Equations with the given boundary
12	1AEPC208	Low Speed Aerodynamics	CO1	Explain the Fluid properties, & their Governing Equations in various forms.
			CO2	Apply the basics of Fluid Mechanics to derive the Lift & Drag equations acting over the bodies.
			CO3	Calculate the Lift Force Coefficient & Lift Distribution over the Finite Wing of an Aircraft
			CO4	Calculate the Induced & Skin Friction Drag over the Finite Wings & explain the Flow control techniques to control the boundary layer
			CO5	Explain & Determine the Thrust & Thrust Coefficient acting on the Propellers applied to Aircraft, Helicopter & Hovercraft
13	1AEPC209	Air Breathing Propulsion	CO1	Differentiate and explain the working principle of air breathing and non-air breathing engines.
			CO2	Distinguish and explain the intakes and exhaust systems and gas turbine combustions used in aircrafts.
			CO3	Apply control volume analysis and the integral momentum equation to estimate the forces produced by Aircraft Propulsion systems.
			CO4	Describe the principal design parameters and constraints that set the performance of gas turbine engines, and to apply ideal-cycle analysis to a gas turbine engine to relate thrust and air fuel ratio.

			CO5	Use velocity triangles to estimate the performance of a compressor or turbine stage.
			CO 6	Comment of the factors that affect combustion process and design factors of combustion chamber
14	1AEPC210	Aerospace Materials and Structures	CO1	Understand basics of the structure- properties relationship
			CO2	Explain different phase diagrams, predict and calculate amount of phases using the phase diagram
			CO3	Apply principles of heat treatments of steels.
			CO4	Explain composition, properties and use of different materials used in aircraft construction.
			CO5	Understand the basic structure and loads acting on aircraft components
			CO 6	Applying the design considerations of aircraft structures
15	1AEPC211	Aircraft Systems and Instruments	CO1	Describe the principle and working of different aircraft systems.
			CO2	Distinguish between the features and working of various flight control systems.
			CO3	Compare the aircraft piston engine and jet engines fuel system components and its operational features.
			CO4	Illustrate the need of cabin pressurization and auxiliary systems.
			CO5	Justify the statement that "all the aircraft instrument are either Gyroscopic or Inertial"
			CO 6	Trouble shoot the snags detected in various aircraft systems and suggest methods to minimize the maintenance of various system components
			CO1	Understanding basic purpose of profession, professional ethics and various moral and social issues.

16	1AEHS252	Professional Ethics	CO2	Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer
			CO3	Acquiring knowledge of various roles of Engineer In applying ethical principles at various professional levels
			CO4	Professional Ethical values and contemporary issues
			CO5	Excelling in competitive and challenging environment to contribute to industrial growth.
			CO6	Identify the essential qualities for progressing in career.
17	1AEMC253	Environmental Studies	CO1	Know importance and scope of environmental studies.
			CO2	Explain the importance of public awareness on environmental problems.
			CO3	Explain about natural resources and biodiversity.
			CO4	Describe scientific, technological and economic solutions to environmental problems.
			CO5	Explain the pollution control and waste management.
18	1AEES257	Numerical Analysis with Programming Language Laboratory	CO1	Apply Numerical Methods/Techniques to find the solutions of simple engineering problems using computer program
			CO2	Implement the numerical algorithm as a MATLAB script to compute the solution for the given problem
			CO3	Debug the MATLAB script for any syntax or logical errors for proper execution
			CO4	Follow professional ethics and complete the laboratory work regularly along with the maintenance of lab journal
		Low Speed	CO1	Draft the given aerofoil over a graph sheet and prepare the model
			CO2	Demonstrate the flow visualization over the Aerofoil & Propeller and Explain the flow patterns.

19	1AEPC258	Low Speed Aerodynamics Laboratory	CO3	Use the wind tunnel effectively for the carrying out the experimentation over the aerofoil models.
			CO4	Effectively record the results and analyse in details to provide a conclusion
			CO5	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
20	1AEPC259	Air Breathing Propulsion Laboratory	CO1	Explain the various systems of aircraft piston engine, jet engines and Identify the systems on the engines
			CO2	Use the concept of forced and free convective heat transfer and perform experiment on the heat transfer apparatus
			CO3	Explain the Heat of combustion of aviation fuel and how to find it using given set up
			CO4	Effectively record the results and analyse in details to provide a conclusion
			CO5	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
21	1AEPC301	Aircraft Structures	CO1	Sketch the bending stress distribution over symmetrical and unsymmetrical cross sections
			CO2	Apply principles of structural analyses to calculate the shear flow of various cross sections to anticipate shear center location
			CO3	Interpret the Torsional constants of thin-walled beams which are subjected to shear and torsional loads.
			CO4	Implement structural idealization to various cross sections to perform stress analysis
			CO5	Relate Structural idealization to the stress analysis of various aircraft components
22	1AEPC302	Flight Dynamics	CO1	Describe the necessity of stability for dynamic systems like Aircraft.
			CO2	Derive the Mathematical equations required to analyse aircraft performance, stability and control
			CO3	Apply the mathematical expressions for calculating the aircraft flight performance under the different operational envelopes

22	1AEPC302	Flight Dynamics	CO4	Estimate the static stability parameters such as neutral point, control power etc. for longitudinal and lateral directional motion of aircraft
			CO5	Analyse the factors/parameters affecting the aircraft flight performance under the various operational conditions
			co6	Estimate the Dynamic stability parameters for longitudinal and lateral directional motion of aircraft using linearized EOM
23	1AEPC303	High Speed Aerodynamics	CO1	Understand the characteristics of compressible flow in various flow regimes – subsonic, transonic, supersonic and hypersonic
			CO2	Use quasi one dimensional theory to analyse compressible flow problems.
			CO3	Estimate the normal and oblique shock properties.
			CO4	Analyse the flow behaviour over a convex corner, estimate the flow properties through a constant area duct.
			CO5	Analyse the flow characteristics over different aerodynamic profiles at various flow regimes.
			CO6	Predict the supersonic flow characteristics over the various wing types and various aircraft configurations.
24	1AEPC304	Aerospace Propulsion	CO1	Understand various concepts of advanced propulsion techniques.
			CO2	Describe solid, liquid and hybrid rocket motors and their composition.
			CO3	Explain the fundamentals of rocket propulsion and working of individual rocket propulsion components.
			CO4	Understand various concepts of electric propulsion system in application to electric thrusters.
			CO5	Evaluate the various parameters of Electrostatic and Ion thrusters.
			CO1	Describe and recognize various types of wind tunnels, measuring equipment's and their applications.

25	1AEPE305	Experimental Aerodynamics	CO2	Explain various techniques of pressure, force and velocity measurement.
			CO3	Analyse qualitative and quantitative flow behaviour over various bodies.
			CO4	Select data acquisition system for the aerodynamic characteristic measurements.
			CO5	Design and develop models to be tested on wind tunnels.
26	1AEPE306	Heat and Mass Transfer	CO1	Apply the concept of one dimensional steady state heat conduction to solve problems in Plane, Cylindrical and Spherical coordinates
			CO2	Explain the Heat Transfer through Fins and the significance of Dimensional Analysis in unsteady state conduction
			CO3	Analyse the empirical correlations for Forced and Free Convection in Laminar and Turbulent Flows
			CO4	Apply the various laws governing and the concept of Radiation Heat Transfer
			CO5	Explain the general aspects of Boiling and Condensation Heat Transfer; and design considerations for Heat Exchangers
			CO6	Explain the basic concepts of Mass Transfer
27	1AEPE307	Material Testing and Characterization	CO1	Prepare the specimens as per standards for respective test.
			CO2	Select the appropriate test depending on material and its application.
			CO3	Understand, correlate and interpret the results.
			CO4	Select the characterization tool for specific application
			CO5	Understand basics of thermal analysis techniques.

			CO6	Identify and justify the selection of the techniques to evaluate a particular sample
28	1AEPE308	Engineering Design Optimization	CO1	Define objective function, explain the terms related to optimization problem, classify them
			CO2	Understand and apply the techniques of classical optimization single and multivariable optimization with equality and inequality constraints
			CO3	Understand and apply the techniques of linear (Simplex) and nonlinear (Elimination and Interpolation) programming to the optimization problems
			CO4	Understand and apply techniques of unconstrained optimization through different methods
			CO5	Apply the concepts of optimal control, optimality criteria, genetic algorithm, neural network and need of adaptive control
29	1AEPE309	Helicopter Theory	CO1	Explain the basic configurations of helicopter, main rotor and tail rotor - working principles, maintenance and inspection
			CO2	Apply the principles of momentum theory and baled element theory for the Aerodynamics calculation of Rotor blade
			CO3	Analyse the power requirements in forward flight and associated stability problems of helicopter.
			CO4	Analyse the factors/parameters affecting the helicopter performance under the various operational conditions.
30	1AEPE310	Lighter-Than-Air Systems	CO1	Understand the differences between HTA and LTA systems
			CO2	Comment on current developments and future trends of LTA systems
			CO3	Describe the properties and structure of atmosphere, and state the aerostatic principles
			CO4	Comment on the technological challenges in design, development and operation of an LTA system
			CO5	Estimate the static lift generated by an LTA system, given its type, size and operating scenario

			CO6	Carry out conceptual layout and sizing of an LTA system
31	1AEOE311	Introduction to Flight	CO1	Explain the historical developments in the Aeronautical Engineering, Current Trends in the Aviation Industry
			CO2	Comment & Explain in detail the basic components, systems & subsystems of the Aircraft and their functions
			CO3	Explain the fundamentals of Aerodynamics, Propulsion, Structures & Their classifications
			CO4	Comment & Explain in detail the basics of Air Transportation & Airport Operations
			CO5	Comment & Explain on the material requirements for Aeronautical applications
			CO6	Identify & Comment on the various configurations of the aircraft
32	1AEOE312	Introduction to Experimental Aerodynamics	CO1	Describe and recognize various types of wind tunnels, measuring equipment's and their applications.
			CO2	Explain various techniques of pressure, force and velocity measurement.
			CO3	Analyse qualitative and quantitative flow behavior over various bodies.
			CO4	Select data acquisition system for the aerodynamic characteristic measurements.
			CO5	Design and develop models to be tested on wind tunnels.
33	1AEOE313	Introduction Gas Dynamics and Jet	CO1	Discuss the effects of variable area duct under the effect of varying back pressure.
			CO2	Estimate the flow parameters over convex and concave corner and comment on the downstream flow
			CO3	Give an insight into advanced jet & rocket propulsion systems and compare one another

		Propulsion	CO4	Perform the engine cycle analysis for all thermodynamic cases
			CO5	Interpret and design various propulsive systems suitable for the application and operation
34	1AEOE314	Introduction to UAV	CO1	Classify the UAV's and will be equipped with knowledge of Design process involved
			CO2	Explain the basic aerodynamics and performance concepts associated with Fixed wing UAV
			CO3	Derive the Equations of motion of an UAV and explain the PID control strategy associated with it
			CO4	Derive and explain the mathematics associated with Launch and recovery systems
			CO5	Explain the PID control strategy involved in altitude hold of a quadcopter
35	1AEPE351	Self Learning Course	CO1	Explain the use of tools/skills and relevant theory learned in the industry
			CO2	Apply the knowledge learned to the an Aeronautical and allied problems
			CO3	Use the Modern tools learned effectively to solve the problems and interpret the results
			CO4	Document the results and present them before the department committee on time
36	1AEHS352	Communication Skills and Competencies	CO1	Understand the most important communication skills required for becoming competent professionals
			CO2	Understand the 4 modules of competencies required for excelling in IELTS examinations
			CO3	Understand the various accents in English communication
			CO4	Apply the Professional and General writing styles

			CO5	Apply the Professional and General speaking styles
			CO6	Apply the concepts of Presenting a topic with the use of effective body language and Audio/Visual Aids
37	1AEPR355	Mini - Project	CO1	Understand existing literatures, analyse and identify the research gaps and formulate project objective(s)
			CO2	Evaluate existing methodologies and adopt a suitable research methodology
			CO3	Develop the required technical expertise and infrastructure to perform the project
38	1AEPC356	Aircraft Structures Laboratory	CO1	Determine the Stresses and Deformations of the specimen by using different loading condition.
			CO2	Identify use of suitable non-destructive method for particular application.
			CO3	Fabricate and analysis of composite structures
			CO4	Perform the experiment on given topic and explain with the help of knowledge acquired in theory classes.
			CO5	Use non-destructive techniques in maintenance practices in aerospace industry.
			CO6	Follow the professional practices like maintaining a laboratory journal and completion of work on time.
39	1AEPC357	Flight Dynamics Laboratory	CO1	Apply their knowledge and programming skills to compute the Aircraft Performance Equations.
			CO2	Write a MATLAB Codes for the Generating Aircraft Performance Curves and Execute & Debug the MATLAB/Python Code for the Syntax & Logical Errors
			CO3	Estimate the Stick fixed and free Neutral point for a given the aircraft data
			CO4	Estimate the aerodynamic parameters using ANN

			CO5	Demonstrate how to interface and acquire the information from the sensors
			CO6	Follow professional and ethical principles, standards while writing the MATLAB/Python Codes
			CO7	Recognize the need for learning the Programming Language for solving complex Problems related to Engineering.
40	1AEPC305	Vibrations and Structural Dynamics	CO1	Describe the basic concepts of vibration
			CO2	Explain different vibration measuring instruments
			CO3	Describe the interaction among the aerodynamic, elastic and inertia forces
			CO4	Determine natural frequency of mechanical vibrating system/element
			CO5	Compute the parameters of vibration isolation system
			CO6	Identify the vibratory response of mechanical system/element.
41	1AEPC306	Computational Fluid Dynamics	CO1	Describe components of the CFD algorithms, the role of CFD algorithms in the product design cycle & the governing equations of the fluid flow applicable for the general & special cases of the fluid flows.
			CO2	Discuss the need for grids, types of grid generation techniques & the advancements in the grid generation process.
			CO3	Categorize the Partial Differential Governing Equations applicable for specific fluid flow cases by applying the principles of mathematics.
			CO4	Describe the various Finite Difference & Finite Volume schemes used in the Computational Algorithms & Apply them for solving simple fluid flow cases.
			CO5	Describe the role of Turbulence Models in the CFD Solution Procedure and Apply and use the appropriate Turbulence Models for solving the cases.
			CO6	Analyse the Stability characteristics of the various Finite Difference schemes.

42	1AEPC307	Space Dynamics	CO1	Explain the Basic concepts related to space dynamics such as Celestial sphere, Newton's laws of motion,
			CO2	Apply the concept of two body and restricted three body problem to celestial objects of interest
			CO3	Explain the concept of Unrestricted three body and Many body problem
			CO4	Apply the concept of various orbital manoeuvres for interplanetary trajectories
			CO5	Apply the concept of Lagrange multiplier to determine the optimal staging for rockets
43	1AEPE316	Hypersonic Aerodynamics	CO1	Define the fundamental of hypersonic flow physics
			CO2	Explain the theories related to analysis of hypersonic flow
			CO3	Analyse the hypersonic shock theories.
			CO4	Develop the viscous effect in hypersonic flow.
			CO5	Implement similarity rule on various bodies moving at hypersonic speed.
44	1AEPE317	Advanced Propulsion Systems	CO1	To understand the concept of various types of advanced chemical propulsion system and its application to real systems
			CO2	To demonstrate the utilization of combustion systems in scramjet, ramjet propulsion and hypersonic propulsion.
			CO3	To infer the concept of nuclear rockets and evaluate the performance, operation parameters and handling hazard involved
			CO4	To differentiate between electro-thermal and pure electric thrusters and interpret the concept for power generation in space.
			CO5	To appraise the various micro-propulsion systems developed and emerging technologies involved.

			CO6	Understand the concepts of hybrid propulsion systems
45	1AEPE318	Advanced Mechanics of Solids	CO1	Understand the basic concepts of stress, strain and deformation
			CO2	Analyse the elastic and plastic behavior of materials, stress invariants, principal stresses and their directions.
			CO3	Analyze strain in variants, principal strains and their directions.
			CO4	Develop constitutive relationships between stress and strain for linearly elastic solid.
			CO5	Apply the concepts of energy methods in solving structural problems.
			CO6	Analyze theories of failure and design considerations for safe operations
46	1AEPE319	Introduction to Air Transportation and Flight Scheduling	CO1	Describe the complexity of airline planning, operations and dispatch.
			CO2	Calculate the shortest path flow for minimum cost flow problem.
			CO3	Understand the maximum path flow for multi commodity flow problem.
			CO4	Analyse the Integer programming models- set covering/ partitioning problems, traveling salesman problem
			CO5	Differentiate and analyze the problems in aircraft routing and management for maintenance of regular operations.
			co6	Analyze the role of solution for constructing flight scheduling and operations.
47	1AEPE320	Introduction to	CO1	Describe about the various design process and methodology, and will be able to explain about various types of configuration alternatives and their significance
			CO2	Describe about various cost factors involved in the operation of an aircraft and about airline economics
			CO3	Apply the knowledge of design and estimate take-off weight and the dimensional parameters of wing, fuselage, tail, control surfaces and Engine based on the requirement

47	1AEPE320	Aircraft Design	CO4	Analyze the performance characteristics- take-off, landing level turn, climb for the given aircrafts
			CO5	Estimate the Drag characteristics, air loads, V-n diagram gust load diagrams for the Aircrafts
			co6	Perform constrain and performance analysis for the given design problem
48	1AEOE321	Lighter-Than-Air Systems	CO1	Understand the differences between HTA and LTA systems
			CO2	Comment on current developments and future trends of LTA systems
			CO3	Describe the properties and structure of atmosphere, and state the aerostatic principles
			CO4	Comment on the technological challenges in design, development and operation of an LTA system
			CO5	Estimate the static lift generated by an LTA system, given its type, size and operating scenario
			CO6	Carry out conceptual layout and sizing of an LTA system
49	1AEOE322	Airline and Airport Management	CO1	Understand about the airline industry and its regulatory bodies
			CO2	Understand the characteristics of Airline Industry and its characteristics
			CO3	Understand the organisational structure of the airline industry
			CO4	Understand the security, navigation and traffic control
			CO5	Understand the importance of safety and security
		Flight	CO1	Describe the complexity of airline planning, operations and dispatch.
			CO2	Calculate the shortest path flow for minimum cost flow problem.

50	1AEOE323	Flight Scheduling and Operations	CO3	Understand the maximum path flow for multi commodity flow problem.
			CO4	Analyse the Integer programming models- set covering/ partitioning problems, traveling salesman problem
			CO5	Differentiate and analyze the problems in aircraft routing and management for maintenance of regular operations.
51	1AEHS353	Constitution of India	CO1	Understand the basic features and modalities about Indian constitution.
			CO2	Understand the functioning of Indian parliamentary system at the center and state level.
			CO3	Understand the different aspects of Indian Legal System and its related bodies.
			CO4	Apply different laws and regulations related to engineering practices.
			CO5	Differentiate the role of Engineers in different organizations and governance
52	1AEPC358	Vibration and Structural Dynamics Laboratory	CO1	Illustrate and Carry out measurement of various vibration parameters.
			CO2	Determine the behavior of system under different vibratory conditions.
			CO3	Analyze the vibration phenomena as a mathematical model & evaluate its response.
			CO4	Carry out the Performance study of the vibration of plate and beam
			CO5	Effectively record the results and analyze them to provide a conclusion.
			co6	Follow the professional practices like mainlining a laboratory journal and completion of work on time.
		Computational	CO1	Carryout the analysis of complex engineering problems related to Aerodynamics to provide solutions
			CO2	Use the Modern Software Tool for solving & simulation the simple fluid flow cases

53	1AEPC359	Computational Fluid Dynamics Laboratory	CO3	Effectively record the analysis reports of the Analysis Report carried out using the software tool and present them orally.
			CO4	Recognize the need for life-long learning of the modern tools & techniques used for providing solutions to the complex engineering problems
			CO5	Follow professional and ethical principles during laboratory work
54	1AEPE311	Quality Engineering & Management	CO1	Understand the basic concepts and Principles of Quality Management
			CO2	Understand the various tools and techniques used in Quality Management
			CO3	Understand the benefits and need for implementation of Quality Standards and Documentation
			CO4	Apply the concept of Service Quality and determine the costs incurred in quality
			CO5	Apply the concept of Experimental Design using various methods
			co6	Evaluate the Process capability through Satistical Quality Control using various sampling plans
B.TECH FINAL YEAR COURSES				
55	1AEPC401	Finite Element Methods	CO1	**Describe** the concept of FEM, types of FEM analyses and its applications.
			CO2	**Decide** the appropriate meshing parameters and **perform** the meshing for a FEM analysis of a problem.
			CO3	**Apply** appropriate constraints and boundary conditions for a FEM analysis of a problem.
			CO4	**Solve** the linear and non-linear Static finite element Analysis problems using appropriate solution technique.
			CO5	**Validate** and **Check** Accuracy of the results obtained from FEA solutions and **interpret** the results.
			CO1	Explain the fundamentals of (feedback) control systems

56	1AEPC402	Aircraft Control systems	CO2	Apply Basic Engineering Mathematics and laws of physics to formulate Mathematical models of any dynamic systems in forms suitable for use in the analysis and design of control systems .
			CO3	Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs .
			CO4	Analyze the stability of the system using root locus diagram or Routh's table .
			CO5	Solve system equations in state-variable form (state variable models).

58	1AEPE403	Turbulence Modeling	CO1	Illustrate cockpit and display technologies of civil and fighter airplanes
			CO2	Interpret the concept of Flight Control Systems from an earlier era to advanced Technologies.
			CO3	Discriminate the technologies of communication and navigation systems with different failure conditions and operational difficulties.
			CO4	Summarize the operation of integrated civil aircraft fuel systems and in-flight refueling and also troubleshoot the snags using the components of a fuel and Engine control system.
			CO5	Appraise the advancements in the auxiliary systems and their benefits through emergency flying conditions
			CO6	Plan the process chart for installation, inspection & troubleshooting procedures of avionics & electrical components.
59	1AEPE405	Theory of elasticity	CO1	To use mathematical knowledge to solve problem related to structural elasticity.
			CO2	Identify stress-strain relation in 3D, principal stress and principal strain.
			CO3	Analyze a structure using Elasticity concepts.
			CO4	Use analytical techniques to predict deformation, internal force and failure of simple solids and structural components.
			CO5	Solve aerospace-relevant problems in plane strain and plane stress in Cartesian and polar coordinates.
			co6	Apply energy methods to solve elasticity problems.
60	1AEPE406	Aircraft Rules and Regulations - DGCA (CAR)	CO1	**Explain the responsibilities of aircraft operator.**
			CO2	Describe the aircraft maintenance programme and classify investigation.
			CO3	Illustrate the airworthiness of aircraft and determine organization approval.
			CO4	**Classify requirements of AME license.**

			CO5	Describe procedures for issue of Certificates of Airworthiness and distinguish aircraft registration and markings.
61	1AEHS407	Economics for Engineers	CO1	**Describe the role of economics involved in the decision making process.**
			CO2	**Calculate the rate of return, depreciation charges and taxes.**
			CO3	**Enumerate different cost entities in estimation, and explain the importance of finance functions.**
			CO4	**Apply different economic comparison methods.**
			CO5	**Apply different accounting principles.**
62	1AEPE409	Automobile & Industrial Aerodynamics	CO1	Describe the atmospheric wind and its elements.
			CO2	Explain wind energy harvesting using different methods
			CO3	Develop flow control techniques for vehicle aerodynamics
			CO4	Explain effects of wind loading on building and urban planning.

			CO5	Explain wind structure induced vibration
63	1AEPE410	Numerical Heat Transfer and Fluid Flow	CO1	**Derive the general transport equation and use it for physical process of interest, apply the FDM and FVM methods to transport equation.**
			CO2	Understand and Apply the concept of FVM to steady/ unsteady 1D and 2D Heat diffusion equation.
			CO3	Understand and Apply the concept of FVM to steady/ unsteady 1D and 2D Diffusion and Convection equation.
			CO4	Understand and Apply the iterative solving method to the system of linear equations.
			CO5	Understand and Apply the concept of various schemes to solve the diffusion and convection equation.
64	1AEPE411	Experimental stress analysis	CO1	Explain the Transmission Photoelasticity and its related parameters.
			CO2	Use various extensometers and displacement Sensors for the measurement of displacement.
			CO3	Determine the stress-strain values in material and structure subjected different loading
			CO4	Analyze the behaviour of solids under load using Photo-elastic Coatings and Brittle Coatings
			CO5	Use strain gauges to calculate the strain and stress induced in the material.

65	1AEPE413	Aircraft Engine Design	CO1	Provide preliminary design parameters for compressors and turbines and characterize their performance based on a mean line approach.
			CO2	Evaluate the operation and performance of a jet engine based on compressor and turbine maps for different operating conditions.
			CO3	Provide preliminary design parameters and define key design issues, constraints and architectures for main combustors in jet engines.
			CO4	Carryout the conceptual design of the Jet Engine
66	1AEPE417	Probability and Statistics	CO1	Apply the basic rules and theorems of probability theory, to determine probabilities that help to solve engineering problems.
			CO2	Appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal, etc. to model and solve engineering problems.
			CO3	Formulate and test hypothesis about mean, variance and proportions, and to draw conclusions based on the results of statistical tests.
			CO4	Demonstrate how regression analysis can be used to develop an equation that estimates how two variables are related and how the analysis of variance procedure can be used to determine if means of more than two populations are equal.
			CO5	Solve queuing theory problems for Pure Birth process and Death process.
			CO6	Apply the concepts of Markov Chains and Stochastic Matrix to solve engineering problems.

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67	1AEOE422	Aircraft General Engineering Maintenance	CO1	Understand Aircraft Maintenance Practices and Tool usages.
			CO2	Carryout Inspections and maintenance checks on aircraft piston engines.
			CO3	Classify repair procedure that occur in plastic and composite component of an Aircraft.
			CO4	Select the maintenance procedure of various systems of aircraft according to various manuals.
			CO5	Determine the safety practices while handling Aircraft hazardous materials.
68	1AEPC454	Finite Element Analysis Laboratory	CO1	Represent the engineering problem as model.
			CO2	Perform meshing of model using appropriate meshing technique.
			CO3	Apply appropriate material properties, boundary conditions, loads and constraints to the finite element model.
			CO4	Use the computational tool to perform the finite element analysis.
			CO5	Check and interpret the results obtained in FEA and prepare the report.

Approved By- Dean Academics

Programme Name:- B.Tech Food Technology

Revision : R0 Zeroth Revision

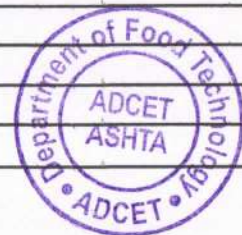| PSO	Statement
1	Analyse the food material/product for its nutritional values
2	Design/Develop a new food product as per customer/industry requirements

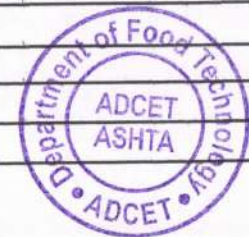| Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
1	0FDBS101	Organic Chemistry-I	0FDBS101_1	Discuss the nomenclature and stereochemistry of organic compounds.(K^2)
			0FDBS101_2	Describe the fundamentals in mechanisms of simple organic reactions. (K^2)
			0FDBS101_3	Summarize the chemistry of alkanes, alkenes and alkynes.(K^2)
			0FDBS101_4	Identify chemical reactivity of organic compounds like alcohols, phenols, aldehydes and ketones. (K^2)
			0FDBS101_5	Describe the concepts related to chemistry of alcohols, phenols, aldehydes & ketones(K2)
2	0FDBS102	Inorganic Chemistry	0FDBS102_1	Recognize periodic properties such as ionization potential, electronegativity, oxidation states. (K2)
			0FDBS102_2	Describe isomerism and chelation in complex substances.(K^2)
			0FDBS102_3	Summarize the role of some bioinorganic and organometallic materials. (K^2)
			0FDBS102_4	Explain concepts of acids, bases and inorganic polymers. (K^2)
			0FDBS102_5	Discuss the concept of catalysis in inorganic Chemistry(K2)
3	0FDBS103	Applied Mathematics- I	0FDBS103_1	Solve the system of linear equations by using matrix method and numerical techniques. (K^3)
			0FDBS103_2	CalculateEigen values and Eigen vectors and power of matrix by using Cayley-Hamilton theorem.(K^3)
			0FDBS103_3	Describe the statistical data numerically by using lines of regression and curve fittings. (K^2)
			0FDBS103_4	Apply Taylor series to find the expansion of functions. (K^3)
			0FDBS103_5	Compute the nth power and roots of the complex number by using De-Moivre's Theorem. (K^3)
4	0FDES104	Basic Electrical & Electronics Engineering	0FDES104_1	Explain various terms related to electric & electronic circuits(K^1)
			0FDES104_2	Describethe construction, working of Electric machines,Electronic components,Transducers & their Applications.
			0FDES104_3	Illustrate the wiring system for different work space(K^2)
			0FDES104_4	Apply conceptual understanding to solve numerical related to Electrical circuits, Electronic circuits (K^2)
			0FDES104_5	Implement Combinational and Sequential circuits using standard gates by applying reduction techniques.(K^3)
5	0FDES105	Basic Mechanical Engineering	0FDES110_1	Distinguish different operations/machines involved in manufacturing processes.(K^1)
			0FDES110_2	Describe power generation processes from different energy sources. (K^2)
			0FDES110_3	Explain the basic concept of Gas laws and IC engines. (K^2)
			0FDES110_4	Distinguish between variousmechanical systems. (K^2)
			0FDES110_5	Explain principles of power transmission devices and its types. (K^2)
			0FDES110_6	Calculate the operating and geometric parameters inthermodynamics and power transmission systems(K^3)
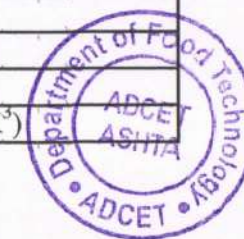
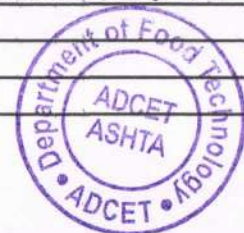| Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
6	0FDBS151	Organic Chemistry Laboratory-I	0FDBS151_1	List steps for identifying simple organic compounds. (K^1)
			0FDBS151_2	Summarize some methods of organic quantitative analysis and preparation of organic compounds. (K^2)
			0FDBS151_3	Carry out experimental tasks by handling different glassware's and reagents.(S^1)
			0FDBS151_4	Perform various experiments by following written instructions.(S^2)
			0FDBS151_5	Express involvement by understanding concepts in organic chemistry. (A^2)
7	0FDBS152	Inorganic Chemistry Laboratory	0FDBS152_1	Determine strength, quantity, percentage purity of given solutions.(K^1)
			0FDBS152_2	Identify constituents in inorganic substances. (K^2)
			0FDBS152_3	Carry out experimental tasks by handling different glassware's. (S^1)
			0FDBS152_4	Perform various experiments by following written instructions. (S^2)
			0FDBS152_5	Express involvement by understanding concepts in organic chemistry. (A^2)
8	0FDES153	Computer Fundamentals and Programming Laboratory	0FDES153_1	Explain fundamental concepts of information technology (K^2)
			0FDES153_2	Demonstrate structured approach to solve a problem. (K^2)
			0FDES153_3	Explain C programming fundamentals (K^3)
			0FDES153_4	Illustrate cocepts like array, functions, structures, C Programming language (K^3)
			0FDES153_5	Apply C Programming constructs to solve a given problem. (K^3)
			0FDES153_6	Practice C program for various problem statements(S^3)
9	0FDES154	Basic Electrical & Electronics Laboratory	0FDES154_1	Identify Electrical and Electronic components & equipment (K^1)
			0FDES154_2	Interpret the measurement of different electrical parameters of Electric circuits and Electronic circuits with appropriate measuring instruments (K^2)
			0FDES154_3	Perform different tests to study the characteristics of different Electrical &Electronic components (S^1)
			0FDES154_4	Correlate the observations and results of experiment with different laws and theorem (S^2)
			0FDES154_5	Practice safety precautions required for electrical engineering practices (A^2)
10	0FDBS106	Organic Chemistry-II	0FDBS106_1	Discuss concepts of aromaticity and chemistry of aromatic compounds.(K^2)
			0FDBS106_2	Describe the chemistry of nitro and amino arenes & dyes.(K^2)
			0FDBS106_3	Identify the chemistry of carboxylic acids, ethers and related organic compounds.(K^2)
			0FDBS106_4	Explain characteristics and simple reactions of heterocyclic compounds.(K^2)
			0FDBS106_5	Discuss the organic chemistry of some natural products (K2)
11	0FDBS107	Analytical Chemistry	0FDBS107_1	List different analytical techniques.(K^2)
			0FDBS107_2	Describe the basic principles of different analytical techniques.(K^2)
			0FDBS107_3	Compute the mean from a set of measurements. (K^2)
			0FDBS107_4	Identify possible analytical techniques for identification and quantification of chemicals.(K^2)
			0FDBS107_5	Summarise the applications of various analytical techniques in food analysis (K2)

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
12	0FDBS108	Applied Physics	0FDBS108_1	Know the preface of thermodynamics. (K^1)
			0FDBS108_2	Explain the basic concepts in optics (Diffraction and Polarization) (K^2)
			0FDBS108_3	Discuss interaction of radiation with matter and applications of LASER. (K^2)
			0FDBS108_4	Describe various properties of engineering materials in view of crystallography study. (K^2)
			0FDBS108_5	Explain the concept of nanotechnology and its Engineering applications. (K^2)
13	0FDBS109	Applied Mathematics- II	0FDBS109_1	Use partial derivatives to solve the problems based on functions of two or more variables (K3)
			0FDBS109_2	Solve problems on ordinary differential equations by using analytical method and numerical technique (K3)
			0FDBS109_3	Solve the mathematical problems involving the Numerical Differentiation and Integration.(K^3)
			0FDBS109_4	Apply the concept of Special Functions to solve improper integrals. (K^3)
			0FDBS109_5	Make use of multiple integral to find area and mass of plane lamina. (K^3)
14	0FDES110	Engineering Graphics	0FDES110_1	Summarize basic concepts in drawing and its application. (K^2)
			0FDES110_2	Sketch projection of simple geometries. (K^3)
			0FDES110_3	Sketch projection of solids. (K^3)
			0FDES110_4	Prepare sectional views of solids & develop the lateral surfaces of solids. (K^3)
			0FDES110_5	Sketch the Orthographic projections.(K^3)
			0FDES110_6	Prepare the Isometric view of simple objects. (K^3)
15	0FDHS111	Professional Communication	0FDHS111_1	Strengthen his communicative competence and able to achieve considerable success in English language competency test such as IELTS.
			0FDHS111_2	Solve the exercise related to reading comprehension and listening comprehension
			0FDHS111_3	Prepare and modify his portfolio considering own strength, weakness and career opportunities
			0FDHS111_4	Construct grammatically sound and meaningful sentences necessary for effective communications
			0FDHS111_5	Compose relevent professional letters and able to maintain offical correspondance.
			0FDHS111_6	Strengthen his communicative competence and able to achieve considerable success in English language competency test such as IELTS.
16	0FDBS155	Organic Chemistry Laboratory-II	0FDBS155_1	List steps for identifying simple organic compounds. (K^1)
			0FDBS155_2	Summarize some methods of organic quantitative analysis and preparation of organic compounds. (K^2)
			0FDBS155_3	Carry out experimental tasks by handling different glassware's and reagents. (S^1)
			0FDBS155_4	Perform various experiments by following written instructions. (S^2)
			0FDBS155_5	Express involvement by understanding concepts in organic chemistry. (A^2)
17	0FDBS156	Analytical Chemistry Laboratory	0FDBS156_1	Demonstrate various analytical methods of chemical analysis.(K^2)
			0FDBS156_2	Analyze the given samples using various instruments.(K^2)
			0FDBS156_3	Carry out experimental tasks by handling different glassware's. (S^1)
			0FDBS156_4	Perform various experiments by following written instructions. (S^2)
			0FDBS156_5	Express involvement by understanding concepts in applied chemistry. (A^2)

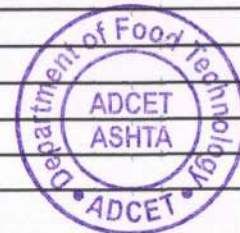| Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
18	0FDBS157	Applied Physics Laboratory	0FDBS157_1	Interpret the characteristics of LASER such as mono-chromaticity and divergence. (K^2)
			0FDBS157_2	Calculate band gap energy, specific rotation, wavelength of light and verify Inverse Square law. (K^2)
			0FDBS157_3	Demonstrate fourteen Bravais lattices; explain symmetries of cube and different properties of cubic lattices.(K^2)
			0FDBS157_4	Communicate effectively and work in a team for laboratory activities. (S^1)
			0FDBS157_5	Follow professional and ethical principals during laboratory. (A^2)
19	0FDES158	Engineering Graphics Laboratory	0FDES158_1	Draw the projections of the different lines, Planes and Solids in different positions; develop the lateral surface of object. (K^3)
			0FDES158_2	Draw orthographic, sectional and isometric views. (K^3)
			0FDES158_3	Use/Handle different engineering drawing instruments accurately & carefully. (K^3)
			0FDES158_4	Produce drawings with accuracy and proficiency. (K^3)
			0FDES158_5	Display a high degree of certainty in drawings and projections of complex components. (K^3)
20	0FTES201	Process Calculations	0FTES201_1	Apply basic laws and convert units into required systems of units
			0FTES201_2	Carry out material balance calculations for reacting and non-reacting systems
			0FTES201_3	Apply concept of material balance for a given food process operation
			0FTES201_4	Carry out energy balance calculations for given system
			0FTES201_5	Analyze the system and do stoichiometric calculations
			0FTES201_6	Analyze the combustion of fuel and do combustion calculations
21	0FTES202	Engineering Thermodynamics	0FTES202_1	Apply concepts of thermodynamics in food processing operations
			0FTES202_2	Analyze thermodynamic properties of the system
			0FTES202_3	Describe the significance of thermodynamic properties of pure fluids and fluids in mixture
			0FTES202_4	Demonstrate the applications of the first and second laws of thermodynamics for a given systems
			0FTES202_5	Quantify the thermodynamic behavior of substances
			0FTES202_6	Interpret thermodynamic data in food processing applications
22	0FTES203	Unit Operations	0FTES203_1	Acquire the knowledge of materials handling during commercial processing.
			0FTES203_2	Apply various laws related to size reduction of food materials.
			0FTES203_3	Differentiate types of conveyors and its working
			0FTES203_4	Analyze the characteristic of foods in different process
			0FTES203_5	Justify the use of filtration
			0FTES203_6	Describe the fluidization operation
23	0FTPC204	Food Microbiology	0FTPC204_1	Identify the microbes associated with food and food groups
			0FTPC204_2	Describe the role of micro-organisms in food preservation & spoilage
			0FTPC204_3	Demonstrate the methods of detections of pathogens in food
			0FTPC204_4	Apply the theories& principles to reduce the spoilage in all types of foods
			0FTPC204_5	Analyze the preventative measurements during handling, processing & consuming of food

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
24	0FTPC205	Food Engineering -I	0FTPC205_1	Apply concepts of heat transfer to food process operations
			0FTPC205_2	Analyze the heat transfer due to conduction
			0FTPC205_3	Apply concept of convection to food process operations
			0FTPC205_4	Evaluate the heat transfer through radiation
			0FTPC205_5	Analyze the heat exchange operations and equipments
			0FTPC205_6	Analyze the industrial applications of evaporators
25	0FTMC206	Environmental Studies	0FTMC206_1	Explain importance of environmental studies with necessary of acts
			0FTMC206_2	Explain importance of public awareness on environmental problems
			0FTMC206_3	Write a technical report in team regarding course and impacts of environment related issues
			0FTMC206_4	Discuss current concern of environment issues
			0FTMC206_5	Describe the need of environment protection and ethics
26	0FTES251	Unit Operations Laboratory	0FTES251_1	Apply filteration operation in various juice processing.
			0FTES251_2	Analyse principle and operation of variuos machinaries and equipments.
			0FTES251_3	Develop skills realted to fludization in various processes
			0FTES251_4	Understand principle of different of operations.(Sedimentation and Filteration)
			0FTES251_5	Demonestrate principle understanding of osmosis
			0FTES251_6	Apply dryers in different food processing
27	0FTES252	Food Microbiology Laboratory	0FTES252_1	Carry out isolation, characterization of various microbes associated with foods and food groups
			0FTES252_2	Investigate microbiological techniques of different food groups
			0FTES252_3	Examine the pathogens in foods.
			0FTES252_4	Analyze the microbiological effect on different types of food commodities
			0FTES252_5	Describe the characteristics of food borne, waterborne and spoilage microorganisms,
			0FTES252_6	Explain the methods for their isolation, detection, and identification
28	0FTES253	Food Engineering -I Laboratory	0FTES253_1	Apply concepts of Conduction to given heat transfer system
			0FTES253_2	Calculate heat transfer coefficient in case of convection
			0FTES253_3	Calibrate heat measuring instrument
			0FTES253_4	Evaluate heat transfer due to radiation
			0FTES253_5	Handle heat transfer equipments
			0FTES253_6	Analyze heat exchangers
29	0FTES207	Fluid Mechanics	0FTES207-1	Apply fundamentals compresiable fluid flows to relevent system.
			0FTES207-2	Analyse the process and science of fluids
			0FTES207-3	Demonestrate the basic properteies of fluid and their behaviour under application of various force system
			0FTES207-4	Interprete fluid properties in process food industry
			0FTES207-5	Rectify problem of the fluid flow system in beverage industry
			0FTES207-6	Implement comncept of fluid flow to food process industry

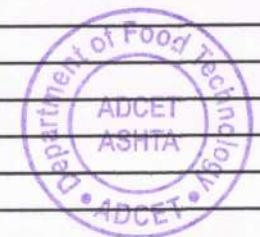| Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
30	0FTPC208	Food Engineering-II	0FTPC208_1	Apply concept of mass transfer to food processing operations
			0FTPC208_2	Evaluate mass transfer coefficients for given mass transfer operation
			0FTPC208_3	Select suitable mass transfer operation for given system
			0FTPC208_4	Analyze given mass transfer operation
			0FTPC208_5	Apply method to calculate number of stages in columns
			0FTPC208_6	Design mass transfer equipments.
31	0FTPC209	Food Chemistry	0FTPC209_1	Analyze the importance and physicochemical properties of water, protein and lipid in foods
			0FTPC209_2	Familiarize with chemistry of carbohydrates and minerals
			0FTPC209_3	Quantification of food additives for different food process
			0FTPC209_4	Describe the different enzymes with functions
			0FTPC209_5	Evaluate the antinational factors presents in foods
			0FTPC209_6	Analyze the food contaminates during processing
32	0FTPC210	Chemistry of Food Constituents	0FTPC210_1	Analyze the chemistry of carbohydrates and proteins constituents
			0FTPC210_2	Describe the chemistry of vitamins, lipid, and another constituent
			0FTPC210_3	Examine water activity and its factors
			0FTPC210_4	Analyze the texture of food products by texturometer
			0FTPC210_5	Acquire the knowledge of flavors and its commercial uses
			0FTPC210_6	Evaluate of pigments and its acceptance
33	0FTPC211	Principles of Food Preservation	0FTPC211_1	Apply basic principle of food preservation.
			0FTPC211_2	Evaluate the different food preservation methods.
			0FTPC211_3	Justify the primary food preservation techniques.
			0FTPC211_4	Evaluta the preservation of meat
			0FTPC211_5	Analyze the different cooling methods in food preservation.
			0FTPC211_6	Apply the various fish preservation technology.
34	0FTHS212	Psychology	0FTHS212_1	Elaborate the basics of psychology and its importance at workplace
			0FTHS212_2	Analyze the emotional states and its effects on body and behavior
			0FTHS212_3	Differentiate leadership styles and its importance in an industry
			0FTHS212_4	Apply the concept of emotional intelligence at work
			0FTHS212_5	Analyze the communication style based on transactional analysis
35	0FTES254	Fluid Mechanics Laboratory	0FTES254_1	Understand basic units of measurement, convert units and utilize basic measurement techniques of fluid mechanics.
			0FTES254_2	Demonstrate practical understanding of various equation of Bernoulli
			0FTES254_3	Apply the suitable hydraulic or pneumatic components for a specific fluid power application
			0FTES254_4	Study the performance characteristics of pumps
			0FTES254_5	Develop skills related to fluid flow handling e.g. volumetric flow rate measurement, fluid pressure measurement etc.
			0FTES254_6	Analyze principles and operations of various flow measurement devices

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
36	0FTPC255	Food Engineering-II Laboratory	0FTPC255_1	Carry out the calculations in mass transfer.
			0FTPC255_2	Analyze the diffusion process
			0FTPC255_3	Determine the absorption and adsorption in gaseus
			0FTPC255_4	Design mass transfer equipments.
			0FTPC255_5	Evalute the different extraction methods.
			0FTPC255_6	Apply the knowledge to solve the mass transferd at the time of processing.
37	0FTPC256	Food chemistry Laboratory	0FTPC256_1	Identify moisture and protein contents
			0FTPC256_2	Describe sorption isotherm
			0FTPC256_3	Classify the total and reducing sugars
			0FTPC256_4	Analyze the food additives
			0FTPC256_5	Carry out the edible oil quality
			0FTPC256_6	Explain the anti-nutritional factors present in foods
38	0FTPC257	Chemistry of Food Constituents Laboratory	0FTPC257_1	Examine the protein digestibility
			0FTPC257_2	Carry out the determination of micro - nutrients
			0FTPC257_3	Identify of tannins and phenol content from foods
			0FTPC257_4	Examine the ascorbic acid
			0FTPC257_5	Analyze the food colors
			0FTPC257_6	Analyze the texture of foods
39	0FTPR258	Mini Project	0FTPR258_1	Apply knowledge of unit operation and process.
			0FTPR258_2	Carry out material and energy balance calculations of selected problem
			0FTPR258_3	Design problem statement
			0FTPR258_4	Use modern tools to solve problem
			0FTPR258_5	Prepare a project report
			0FTPR258_6	Present the solution of problem effectively
40	0FTPR259	In-Plant Training	0FTPR259_1	Understand industry culture
			0FTPR259_2	Work in team
			0FTPR259_3	Understand industrial Management
			0FTPR259_4	Apply concepts studied in actual industrial problem
			0FTPR259_5	Prepare training report
			0FTPR259_6	Apply various industrial aspects in real life
41	0FTOE311	Packaging Technology	0FTOE311_1	Understand the functions of packaging materials and its importance in food Industry.
			0FTOE311_2	Evaluate the properties, types and applications of plastics in packaging.
			0FTOE311_3	Recommend suitable paper packaging and its types.
			0FTOE311_4	Evaluate different types of metal cans and glass bottles as packaging.
			0FTOE311_5	Design the active food packaging and its role in food industry.
			0FTOE311_6	Explain the laws, regulations and environmental standards to food packaging.

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
42	0FTPC301	Nutrition	0FTPC301_1	Apply the knowledge of dietary recommendations and nutrient facts in daily routing
			0FTPC301_2	Evaluate the food energy balance and imbalance in terms of a biological system
			0FTPC301_3	Preparations of diet chart for the prevention and control of diseases
			0FTPC301_4	Estimation of food energy balance by using different methods
			0FTPC301_5	Validated for nutrient intake recommendations across the lifespan
			0FTPC301_6	Conclude the effect of nutrients on human body
43	0FTPC302	Processing of Fruits and Vegetables	0FTPC302_1	Recommend suitable preservation method for various food products
			0FTPC302_2	Distinguish different processing methods
			0FTPC302_3	Design the process for value added products from fruits and vegetables
			0FTPC302_4	Recommend suitable method for processing of fruits and vegetables
			0FTPC302_5	Design storage methods of foods and vegetables
			0FTPC302_6	Identify processing equipment for given fruits &vegetables
44	0FTPC303	Processing of Milk and Milk Products	0FTPC303_1	Evaluate the basic composition and properties of milk.
			0FTPC303_2	Improve the primary processing of milk.
			0FTPC303_3	Identify the milk processing equipment.
			0FTPC303_4	Design the different types of dairy products.
			0FTPC303_5	Analyze the fermented dairy products.
			0FTPC303_6	Recommend to adapt new technology for cleaning of dairy equipment
45	0FTPC304	Food additives & ingredients	0FTPC304_1	Identify the preservatives for food products
			0FTPC304_2	Application of colors and flavors during processing
			0FTPC304_3	Categorize sugar replacers for functional food products
			0FTPC304_4	Recommend the emulsifiers and stabilizers for specific food groups
			0FTPC304_5	Evaluate organoleptic quality of the food products
			0FTPC304_6	Recognized safer additives for human consumptions
46	0FTPE305	Wine Technology (Professional Elective-I)	0FTPE305_1	Describe the terminologies involved in wine technology
			0FTPE305_2	Describe the various raw materials for manufacture of wine
			0FTPE305_3	Prepare flow chart for wine manufacturing process
			0FTPE305_4	Evaluate the characteristics of wine
			0FTPE305_5	Evaluate economic aspects involved in wine production
			0FTPE305_6	Analyze the wine market scenario
47	0FTPE306	Sugar Technology (Professional Elective-I)	0FTPC310_1	Identify various equipment for sugar production
			0FTPC310_2	Design raw and refined sugar manufacturing plant
			0FTPC310_3	Analyze the market of sugar in India and in the World
			0FTPC310_4	Suggest improvements in production of white sugar
			0FTPC310_5	Suggest improvements instorage condition of sugar
			0FTPC310_6	Identify problems in sugar production

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
48	0FTPC351	Nutrition laboratory	0FTES351_1	Carry out the analysis of proximate composition of all food products.
			0FTES351_2	Develop the healthy food products
			0FTES351_3	Examine the natural & added sugars from foods
			0FTES351_4	Calculate the energy value by using calorimeter
			0FTES351_5	Extract the pigments from vegetables
			0FTES351_6	Design the healthy diet for various age groups
49	0FTPC352	Processing of Fruits and Vegetables laboratory	0FTPC352_1	Understand various processing of fruits and vegetables
			0FTPC352_2	Use of different machineries and equipment for various unit operations
			0FTPC352_3	Develop value added product
			0FTPC352_4	Improve shelf life of products made from fruits and vegetables
			0FTPC352_5	Improve nutritional quality of traditional products
			0FTPC352_6	Recommend solution to agriculture related problem
50	0FTPC353	Processing of Milk and Milk Products laboratory	0FTPC353_CO	Evaluate the basic composition and properties of milk.
			0FTPC353_CO2	Design the primary processing of milk.
			0FTPC353_CO3	Apply the milk processing equipment.
			0FTPC353_CO4	Demonstrate the different types of dairy products.
			0FTPC353_CO5	Prepare the fermented dairy products.
			0FTPC353_CO6	Improve the shelf life of dairy products.
51	0FTPC354	Food additives & ingredients laboratory	0FTPC354_1	Optimize the food additives for commercial use
			0FTPC354_2	Examine the emulsifiers and stabilizers for food products
			0FTPC354_3	Specify the leavening agents for bakery products.
			0FTPC354_4	Implement the analytical techniques
			0FTPC354_5	Extend the shelf life of fruit juices
			0FTPC354_6	Qualitative detection of food products
52	0FTOE321	Process Modeling and Simulation (Open Elective-II)	0FTOE321_1	Understand types of models and its applications
			0FTOE321_2	Exercise model building procedure for steady and unsteady processes
			0FTOE321_3	Use fundamental laws for development of models
			0FTOE321_4	Formulate mathematical model for various operations
			0FTOE321_5	Formulate mathematical model for given process
			0FTOE321_6	Carry out simulation by using simulation software packages
53	0FTPC308	Processing of Cereals	0FTPC308_1	Classify the post harvest handling methods of cereals and legumes
			0FTPC308_2	Relate the processing technology to extend the shelf life of food grains
			0FTPC308_3	Demonstrate the methods which affect on cooking quality of food
			0FTPC308_4	Identify the anti nutritional compounds from food grains.
			0FTPC308_5	Explore the traditional and novel products derived from seeds
			0FTPC308_6	Waste / by products utilization in valuable products

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
54	0FTPC309	Processing of Meat ,Fish &Poultry Products	0FTPC309_1	Evaluate the basic composition and chemistry of meat.
			0FTPC309_2	Illustrate the primary processing and pre-slaughtering of animals.
			0FTPC309_3	Differentiate to Optimize Technology for processing of meat.
			0FTPC309_4	Estimate the meat tenderization.
			0FTPC309_5	Design the processing of poultry products.
			0FTPC309_6	Improve the preservation techniques of fish and marine products.
55	0FTPC310	Bakery and Confectionary	0FTPC310_1	Identify equipment and machineries in food industry
			0FTPC310_2	Understand the regulations in processing
			0FTPC310_3	Design production procedure of bakery and confectionary products
			0FTPC310_4	Design suitable method to improve shelf life of products
			0FTPC310_5	Understand functions of various ingredients
			0FTPC310_6	Design process for new products
56	0FTPE311	Fragrance Technology	0FTPE311_1	Acquire knowledge regarding basic concepts of flavor technology
			0FTPE311_2	Describe fragrance quality evaluation and fragrance applications
			0FTPE311_3	Explain the recent developments in processing, retention, and recovery of fragrance
			0FTPE311_4	Identify the aromatic compounds for various products
			0FTPE311_5	Recommend suitable the different extraction techniques
			0FTPE311_6	Recognize the need of fragrance technology
57	0FTPE312	Neutrasuiticals	0FTPE312_1	Identify the nutritional deficiencies in human body
			0FTPE312_2	Differentiate types of nutraceuticals.
			0FTPE312_3	Identify the omega-3 fatty acids Lipoprotein.
			0FTPE312_4	Identify use of the phytochemicals as antioxidants.
			0FTPE312_5	Differentiate the probiotics and prebiotics.
			0FTPE312_6	Recommend food for in metabolic disorders.
58	0FTPC355	Processing of Cereals, Pulses & Oilseeds laboratory	0FTPC355_1	Distinguish the physicochemical properties of raw material.
			0FTPC355_2	Analyze the wheat quality for preparation of cake, biscuit etc
			0FTPC355_3	Characterize the quality of legumes and pulses
			0FTPC355_4	Analyze the physicochemical properties of the oil
			0FTPC355_5	Recognize the anti nutritional factors present in cereals, legumes and pulses
			0FTPC355_6	Correlate the raw material and finish product quality
59	0FTPC356	Processing of Meat, Fish & Poultry laboratory	0FTPC356_CO	Evaluate the basic composition and chemistry of meat.
			0FTPC356_CO2	Design the primary processing and pre-slaughtering of animals.
			0FTPC356_CO3	Apply to Optimize Technology for processing of meat.
			0FTPC356_CO4	Evaluate the meat tenderization.
			0FTPC356_CO5	Demonstrate the quality of poultry products.
			0FTPC356_CO6	Improve the preservation techniques of fish and marine products.

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
60	0FTPC357	Bakery and Confectionary laboratory	0FTPC357_1	Use equipment in bakery and confectionery industry
			0FTPC357_2	Understand processing parameters
			0FTPC357_3	Develop production flow sheet of different products
			0FTPC357_4	Demonstrate analytical parameters of products
			0FTPC357_5	Understand function of various ingredients
			0FTPC357_6	Improve packaging of the products
61	0FTPR361	Minor Project	0FTPR258_1	Apply knowledge of food engineering
			0FTPR258_2	Carry out material and energy balance calculations of selected problem
			0FTPR258_3	Design problem statement
			0FTPR258_4	Use modern tools to solve problem
			0FTPR258_5	Prepare a project report
			0FTPR258_6	Present the solution of problem effectively
62	0FTPR362	In-plant Training	0FTPR259_1	Understand industry culture and processes
			0FTPR259_2	Work in team
			0FTPR259_3	Understand industrial Management
			0FTPR259_4	Apply concepts studied in actual industrial problem
			0FTPR259_5	Prepare training report
			0FTPR259_6	Apply various industrial aspects in real life
63	0FTOE411	Process Optimization and Automation	0FTOE411_1	Apply optimization methods for given process parameters
			0FTOE411_2	Analyze the Optimize first order models
			0FTOE411_3	Apply concept of experimental design to given first order model
			0FTOE411_4	Analyze the optimization of second order models
			0FTOE411_5	Apply concept of experimental design to given second order model
			0FTOE411_6	Evaluate the statistical inference in process optimization
64	0FTOE412	Cold Storage & Supply Chain Management	0FTOE412_CO	Evaluation of the basic principles of refrigeration
			0FTOE412_CO	Analyze the primary processing of a cold storage.
			0FTOE412_CO	Differentiate between different chilling techniques.
			0FTOE412_CO	Apply different freezing methods.
			0FTOE412_CO	Apply cold preservation techniques.
			0FTOE412_CO	Examine Cooling chain management.
65	0FTPC401	Food Biotechnology	0FTPC401_1	Assess biotechnological tools and develop new value-based products
			0FTPC401_2	Evaluate the use of genetic engineering to increase the yield of products
			0FTPC401_3	Measure the efficiency of the product and modify the process
			0FTPC401_4	Apply fermentation technology to prepare various healthy products
			0FTPC401_5	Identify the improvement techniques in production of various nutrients and medicines.
			0FTPC401_6	Devise the use of different methods to overcome the current shortages in food supply
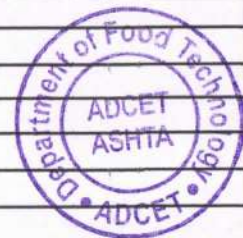
Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
66	0FTPC402	Food Hygiene and Sanitation	0FTPC402_1	Illustrate the link between personal hygiene and food safety
			0FTPC402_2	Configure the internal and external unit in food establishment
			0FTPC402_3	Identify measures/ procedures that will reduce accidents in food preparation
			0FTPC402_4	Identify the kinds of organisms found on human body that can cause contamination
			0FTPC402_5	Establish the relationship between microorganisms and sanitation
			0FTPC402_6	Identifies factors influencing on cleaning
67	0FTPC403	Process Instrumentation and Control	0FTPC403_1	Apply principles of process control to analyze the performance of industrial processes.
			0FTPC403_2	Evaluate concepts of measurement and sensor selection to specify, install, configure and calibrate
			0FTPC403_3	Apply the measurement techniques for Pressure and Temperature
			0FTPC403_4	Apply the measurement techniques for Flow and Level
			0FTPC403_5	Explain recording, indicating and signaling instruments
			0FTPC403_6	Analyze repeatability, precision and accuracy of instruments
68	0FTPE404	Biochemical Engineering (Professional Elective III)	0FTPE404_1	Distinguish between the different kinetics
			0FTPE404_2	Calculate the kinetic parameters of enzymatic reactions
			0FTPE404_3	Calculate and analyze the kinetic parameters for microbial growth
			0FTPE404_4	Develop mathematical models for bioreactors
			0FTPE404_5	Analyze bioreactor design and operation
			0FTPE404_6	Evaluate downstream processing methods for product recovery
69	0FTPE405	Wealth from waste (Professional Elective III)	0FTPE405_1	Identify and segregation of generated waste
			0FTPE405_2	Analyze the characteristics of waste
			0FTPE405_3	Optimize the process for food waste management at small scale
			0FTPE405_4	Minimize waste generation from different food processing units and study impact of waste generated in food industries on health and the environment
			0FTPE405_5	Formulation of value-added products from waste
			0FTPE405_6	Utilization organic waste as a fertilizer
70	0FTPC451	Food Biotechnology Laboratory	0FTPC451_1	Isolate and characterize microorganisms
			0FTPC451_2	Isolation and separation of DNA and proteins.
			0FTPC451_3	Handle tools and equipment used for various biotechnology experiments
			0FTPC451_4	Develop fermented food products in laboratory
			0FTPC451_5	Evaluate with the issues generated during actual fermentation processes.
			0FTPC451_6	Isolate and store important strains used in production of fermented foods.

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
71	0FTPC452	Process Instrumentation and Control Laboratory	0FTPC452_1	Illustrate the different methods for the measurement of length and angle
			0FTPC452_2	Elucidate the construction and working of various industrial devices used to measure pressure, and flow
			0FTPC452_3	viscosity and humidity
			0FTPC452_4	Analyze, formulate and select suitable sensor for the given industrial applications
			0FTPC452_5	Analyze the mathematical basis for the design of control systems
			0FTPC452_6	Specify the required instrumentation and final elements to ensure that well-tuned control is achieved
72	0FTPE453	Biochemical Engineering Laboratory (Professional Elective III)	0FTPE453_1	Identify the main groups of microorganisms
			0FTPE453_2	Compare the different structures and growth modes of diverse microorganisms
			0FTPE453_3	Determine (microbial) genetics determines microbial metabolic and functional activity.
			0FTPE453_4	Describe key biochemical and cellular components and biochemical pathways
			0FTPE453_5	Calculate yield and production rates in a biological production process and also interpret data.
			0FTPC354_6	Undertake a range of practical approaches associated with microbiology and biochemistry e.g.microbial isolation and culture, microscopy biochemical and genetic analyses and be able to record, describe, present and explain data
73	0FTPE454	Wealth from Waste Laboratory (Professional Elective III)	0FTPE454_1	Analyze and compare Waste water and treated water
			0FTPE454_2	Minimize and control waste generation and environment pollution
			0FTPE454_3	Extraction of value-added products from waste
			0FTPE454_4	Modify process of manufacturing to lower the waste
74	0FTPR456	Project (Phase-I)	0FTPR456_1	Apply knowledge of food engineering
			0FTPR456_2	Design problem statement
			0FTPR456_3	Carry out material and energy balance calculations of selected problem
			0FTPR456_4	Use modern tools to solve problem
			0FTPR456_5	Prepare a project report
			0FTPR456_6	Present the solution of problem effectively
75	0FTPC 407	Food Quality and Assurance	0FTPC407_1	Analyze food quality by knowing general terms regarding food quality.
			0FTPC407_2	Identify hazards in food manufacturing system and minimize them.
			0FTPC407_3	Assess food quality by using sensory evaluation
			0FTPC407_4	Identify startups in nearest area and suggest them mandatory documents and pre-requisite programs with respect to quality.
			0FTPC407_5	Create documents, files about audits and related program for small scale business
			0FTPC407_6	Arrange various certification programs to the food business operators

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
76	0FTPC408	Process Equipment Design	0FTPC408_1	Implement the material properties for design of process equipments
			0FTPC408_2	Explain and interpret essential design documents such as PFD, P&ID, vessel specification
			0FTPC408_3	Calculate size of various process equipment components using design rules as well as IT tools.
			0FTPC408_4	Apply design principles for vessels, heat exchangers and allied auxiliary components.
			0FTPC408_5	Determine loadings, failure modes for process equipment design
			0FTPC408_6	Analyze equipment fabrication and testing methods
77	0FTPC409	Project Management and Economics	0FTPC409_1	Apply concepts of project management
			0FTPC409_2	Apply concepts of project planning and scheduling
			0FTPC409_3	Analyze the various project resources
			0FTPC409_4	Use project management software's for monitoring and controlling project activities
			0FTPC409_5	Apply concepts of economics for given project
			0FTPC409_6	Analyze the economics of the project in terms of breakeven point, economic feasibility, etc.
78	0FTPE410	Design & Development of Special Foods (Professional Elective IV)	0FTPE410-_CO	Identify the basic need of special foods
			0FTPE410-_CO	Improve the primary processing special foods.
			0FTPE410_CO3	Identify the sources for special foods.
			0FTPE410_CO4	Design the different types of Special products.
			0FTPE410_CO5	Analyze the therapeutic foods.
			0FTPE410_CO6	Develop special consumer food.
79	0FTPE411	Food Allergies (Professional Elective IV)	0FTPE459_1	Recognizing the food allergy in food
			0FTPE459_2	Recommend the different solutions for food allergy
			0FTPE459_3	Develop food product to reduce risk of food allergy
			0FTPE459_4	Apply the different process to eliminate allergens
			0FTPE459_5	Analyze the different allergens in present in food
			0FTPE459_6	Create new food products
80	0FTPC457	Process Equipment Design Laboratory	0FTPC457_1	Implement standard symbols of process flow diagrams.
			0FTPC457_2	Assess basics of process equipment design and important parameters of equipment design
			0FTPC457_3	Impart the knowledge of mechanical aspects of pressure vessel design
			0FTPC457_4	Translate mechanical design specifications in to fabrication drawings for plant erection.
			0FTPC457_5	Draw detailed dimensional drawings include sectional front view, Full Top/side view depending on equipment.
81	0FTPE458	Design & Development of Special Foods laboratory (Professional Elective IV)	0FTPE458_CO1	Evaluate the basic organic farming conditions
			0FTPE458_CO2	Design the primary processing Special food.
			0FTPE458_CO3	Apply the processing equipment to special food.
			0FTPE458_CO4	Demonstrate the different types of Special foods products.
			0FTPE458_CO5	Prepare and examine the Therapeutic foods.
			0FTPE458_CO6	Improve the shelf life of Specific consumer-oriented foods.

Sr. No.	Course Code	Course Name	Course Outcome	CO Statement
82	0FTPE459	Food Allergies Laboratory (Professional Elective IV)	0FTPE459_CO1	Analyze the allergens in food
			0FTPE459_CO2	Develop Functional food for food allergy
			0FTPE459_CO3	Detect the different food allergens
			0FTPE459_CO3	Create allergen free food products
83	0FTPR461	Project (Phase-II)/Internship	0FTPR461_1	Apply knowledge of food engineering
			0FTPR461_2	Design problem statement
			0FTPR461_3	Carry out material and energy balance calculations of selected problem
			0FTPR461_4	Use modern tools to solve problem
			0FTPR461_5	Prepare a project report
			0FTPR461_6	Present the solution of problem effectively
84	0FTMC462	Constitution of India	0FTMC462_1	Understand the salient features of Constitution of India
			0FTMC462_2	Understand fundamental rights
			0FTMC462_3	Understand fundamental duties as Indian Citizen

Head of the Department

Department of Automobile Engineering

CO statements of courses

Programme- Automobile Engineering - Zero Revision (192 credits)

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
1	Applied Mathematics-III	0AUBS201	CO1	Solve the problems on Fourier Series and Laplace Transform.
			CO2	Make use of Linear Differential Equation to solve the Automobile Engineering problems.
			CO3	Make use of Partial Differential Equation to solve the Automobile Engineering problems.
			CO4	Solve the problems of vector calculus.
			CO5	Apply numerical methods to find out roots of equations and least squares method for curve fitting.
			CO6	Develop numerical ability to solve the problem.
			CO7	Demonstrate professional and ethical behavior to carry forward in their life.
2	Applied Thermodynamics	0AUPC202	CO1	Explain fundamental concepts and laws of thermodynamics in thermodynamic processes.
			CO2	Explain concept of entropy and calculate entropy change for various thermodynamic processes.
			CO3	Explain concept of availability, properties of pure substances and estimate the performance of steam power plant.
			CO4	Estimate theoretically the performance of steam turbine.
			CO5	Explain various gas power cycles and gas turbine.
3	Fluid Mechanics and Machinery	0AUPC203	CO1	Explain different types of fluids with its properties and units
			CO2	Illustrate fundamental principles of fluid statics, kinematics and dynamics
			CO3	Derive fundamental equations of laminar flow, pipe flow and apply for different fluid flow systems
			CO4	Finding solutions for problems of fluid flow analysis using appropriate principles and equations

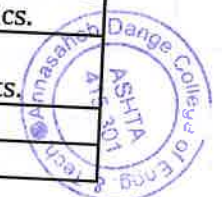| SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Explain constructional details, classification of hydraulic machines with applications.
4	Automotive Materials & Heat Treatments	0AUPC204	CO1	Distinguish the different ferrous and non-ferrous material, properties and its automotive applications.
			CO2	Explain the classification, properties and applications of different non- metallic materials.
			CO3	Select the material for automotive components.
			CO4	Interpret the phase diagrams of materials & constitution of metals & alloys.
			CO5	Select suitable heat-treatment process to achieve desired properties of metals and alloys.
5	Elements of Automotive Engineering	0AUPC205	CO1	Explain classification of automobile vehicles and types of automobile vehicles.
			CO2	Describe transmission system and suspension systems of automobiles and their components.
			CO3	Explain steering geometry and requirements and describe Braking system of automobiles.
			CO4	Describe necessity of suspension system along with functions of wheels and tyres.
			CO5	Describe lighting system as well as resent trends in automobile engineering.
6	Applied Thermodynamics Laboratory	0AUPC251	CO1	Conduct experiments to determine penetration number and drop point of sample greases.
			CO2	Conduct experiments to determine aniline point, flash and fire, redwood viscometer, carbon residue, cloud point and pour point of lubricating oil.
			CO3	Conduct experiments on air compressor and air blower.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and exhibit technical curiosity in the lab work.
7	Fluid Mechanics Laboratory	0AUPC252	CO1	Describe different types of manometers to measure pressure and flow visualization methods.
			CO2	Compute Reynolds number for given fluid floe and differentiate type of flow.
			CO3	Apply Bernoulli's equation to calculate discharge through various flow measuring devices.
			CO4	Calibrate flow measuring devices used for measurement of flow rate.
			CO5	Find out coefficient of friction and head loss for pipes with different materials.
			CO1	Distinguish ferrous and nonferrous materials through macroscopic examination.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
8	Metallurgy Laboratory	0AUPC253	CO2	Describe destructive and non-destructive testing methods.
			CO3	Express microstructures of steel, cast iron and non-ferrous alloys.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
9	Automotive component drawing laboratory	0AUPC254	CO1	Use BIS conventions in assembly drawing.
			CO2	Prepare freehand drawing.
			CO3	Prepare given details and assembly by using 2D drafting software.
			CO4	Apply limits, fits tolerances used in machine drawing.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
10	Workshop Practice-II Laboratory	0AUPC255	CO1	Explain working principle, application of lathe machine.
			CO2	Construct assembly of two parts by using operations like- plain turning, taper turning, external threading, internal threading, knurling and prepare process sheet for given job.
			CO3	Describe unconventional machine processes, sheet metal working and joining processes.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and exhibit technical curiosity in the lab work
11	Electrical Technology Laboratory	0AUES256	CO1	Analyze the operation of electric machines under different conditions.
			CO2	Draw and analyze characteristics of Power converter.
			CO3	Build and test different electrical circuits at the time of conduction of experiment.
			CO4	Work in groups for perforating experiment.
			CO5	Demonstrates acceptable presentation skills through experiment report.
12	Communication Skill	0AUHS257	CO1	Create awareness on importance of communication skills.
			CO2	Explain the concept of communicative and natural English.
			CO3	Develop interpersonal skills on current problems and events.
			CO4	Apply ethics to realize the responsibilities in the society.
			CO5	Engage in analytical and critical dialogue orally.
	Automotive		CO1	Elaborate different types of chassis frames.
			CO2	Justify the selection of steering geometry and types of axle for a given automotive application.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
13	Automotive Chassis	0AUPC206	CO3	Examine elements/types of suspension, brakes, wheels and tyre systems for given application of automobile.
			CO4	Solve problems on steering and braking system.
			CO5	Explain chassis systems used in modern automobiles.
14	Theory of Machines	0AUPC207	CO1	Develop velocity and acceleration diagrams for various mechanisms.
			CO2	Illustrate force analysis of engine mechanism.
			CO3	Explain the characteristics of meshing gears and select the gear train according to application.
			CO4	Develop profile of cam to obtain specified follower motion for an application.
			CO5	Solve the example on governor height for corresponding change in speed and sleeve displacement.
15	Manufacturing Engineering	0AUPC208	CO1	Explain casting process in detail along with various types of casting.
			CO2	Describe forming, plastic shaping and joining processes with neat sketch.
			CO3	Solve problems on metal cutting.
			CO4	Describe conventional and unconventional machining processes with neat sketch.
			CO5	Develop part programs for various machining processes
16	Strength of Materials	0AUPC209	CO1	Compute the stresses and strains in axially-loaded members, factor of safety, complementary shear stress and different elastic constants.
			CO2	graphical method.
			CO3	Draw shear force and bending moment diagram for different loading conditions.
			CO4	Calculate stresses in beams for various sections and the deflections produced in beams, columns.
			CO5	Solve problems of hollow and solid circular shafts subjected to torsion.
17	Transport Management	0AUPC210	CO1	Make use of the motor vehicle act & central motor vehicle rules.
			CO2	Apply motor vehicle insurance & taxation basics.
			CO3	Analyze the passenger & goods transport operations and characterize fare structure.
			CO4	Make use of advanced techniques in traffic management.
			CO5	Carry out Survey of accidental claims, vehicle volume count, pedestrian density, vehicle speed, axle load.
18	Environmental Studies	0AUMC211	CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
			CO3	Write a technical report in team regarding course and impacts of environment related issues.
			CO4	Discuss current concern of environment issues.
			CO5	Describe the need of environment protection and ethics.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
19	Automotive Engineering Laboratory	0AUPC258	CO1	Identify and locate basic components that make up automotive chassis/transmission systems.
			CO2	Draw labeled sketches/schematics of automotive transmission/chassis systems.
			CO3	Demonstrate the functioning of various automotive chassis and transmission systems.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work
			CO5	the lab work
20	Theory of Machines Laboratory	0AUPC259	CO1	Explain working of different four bar chain, single slider crank mechanism, and double slider crank mechanism
			CO2	Develop velocity and acceleration diagrams for various mechanisms.
			CO3	Develop profile of cam to obtain specified follower motion for an application.
			CO4	Analyze the governor to determine its height for corresponding change in speed and sleeve displacement.
			CO5	Communicate effectively in laboratory work and show technical curiosity in the lab work.
			CO6	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
21	Strength of Materials Tutorial	0AUPC260	CO1	Compute the stresses and strains in axially-loaded members, factor of safety, complementary shear stress and different elastic constants.
			CO2	Determine principal stresses, maximum shearing stress by analytical as well as graphical method.
			CO3	Draw shear force and bending moment diagram for different loading conditions.
			CO4	Calculate stresses in beams for various sections and the deflections produced in beams, columns.
			CO5	Solve problems of hollow and solid circular shafts subjected to torsion.
22	Instrumentation & Measurement Laboratory	0AUPC261	CO1	Determination of angle, flatness, gear thickness and thread terms using instruments.
			CO2	Demonstrate the use of different types of comparators.
			CO3	Determination of temperature, pressure, flow and force using instruments.
			CO4	Compare different instruments on the basis of accuracy and requirement.
			CO5	Calibrate different instruments by using formal standards.
23	Hydraulics and Pneumatics Laboratory	0AUPC262	CO1	Use the ISO symbols for various components used in hydraulics and pneumatics.
			CO2	Explain construction and working of hydraulic and pneumatic system elements.
			CO3	Prepare hydraulic and pneumatic circuit for different applications.
			CO4	Evaluate discharge of fluid by using centrifugal and reciprocating pumps .

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Apply safety regulations and troubleshooting of hydraulic and pneumatic systems.
24	Programming In C++	0AUBS263	CO1	Explain basic Programming in C++ Language and understand concept of Function, Array and Pointer.
			CO2	Prepare program in pointer, array and Structure.
			CO3	Prepare program in class and object.
			CO4	Explain Array of Class, Inheritance and Overloading.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
25	Professional Skills Development-I	0AUHS264	CO1	Describe significance of professional skills.
			CO2	Summarize the functions of automobile engineer in different departments of company.
			CO3	Explain role of automobile engineer in service sector of automobile.
			CO4	Conduct mock meeting in organization.
			CO5	Use prerequisite skills in oral and written communication.
26	Dynamics of Machine	0AUPC301	CO1	Apply basic concepts of mechanics to solve numerical on friction.
			CO2	Make use of gyroscopic principal to calculate gyroscopic couple for various applications.
			CO3	Solve numerical on balancing of rotory and reciprocating masses to reduce vibration
			CO4	Analyse effect of flywheel on speed and energy fluctuation in engine.
			CO5	Solve numerical on brakes and dynamometers
			CO6	Solve problems on fundamental theory of vibration.
27	Heat Transfer	0AUPC302	CO1	Explain the basic concepts of heat transfer in conduction, convection and radiation.
			CO2	Solve the heat transfer problems in conduction, convection and radiation
			CO3	Analyze the effect of various parameters on convective heat transfer coefficient using dimensionless numbers
			CO4	Compare the performance of heat exchangers
			CO5	Explain Automotive cooling system
28	Design of Machine Elements	0AUPC303	CO1	Explain basic design methods, procedures, considerations and theories of failures.
			CO2	Design the numerical on joints according to mechanical application.
			CO3	Design transmission shafts, keys and couplings.
			CO4	Design the gears for power transmission application.
			CO5	Make use of design data book for design of various mechanical elements
	Automotive		CO1	Discriminate different types of clutches and gearboxes.
			CO2	Describe the functioning of driveline of an automobile

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
29	Automotive Transmission	0AUPC304	CO3	Illustrate different automatic transmission systems.
			CO4	Describe various advance drive systems.
			CO5	Select/Recommend transmission system as per vehicular application.
30	Vehicle body engineering	0AUPC305	CO1	Calculate various forces and moments acting on vehicle due to air force
			CO2	Explain importance of ergonomics in automotive body design
			CO3	Illustrate different design considerations while designing different car, bus and commercial bodies as per requirement.
			CO4	Explain factors considered while designing driver cabin
			CO5	Examine different stresses and loads on vehicle body.
31	Dynamics of Machine Laboratory	0AUPC351	CO1	Perform experiment to verify gyroscope principal, and determine MI using bi/tri-filler/compound pendulum method
			CO2	Perform static and dynamic balancing of four masses and find out natural frequency and mode number for whirling shaft.
			CO3	Perform experiment to determine logarithmic decrement and force vibration characteristics.
			CO4	Make use of vibration analyzer for vibration measurement
			CO5	Follow professional and ethical behaviour to carry forward in their life and cooperate with the members of batch during lab work
32	Heat Transfer Laboratory	0AUPC352	CO1	Perform the experiments to calculate parameters in conduction, convection and radiation
			CO2	Analyze the effect of varying the air flow on convective heat transfer coefficient in natural and forced convection equipment's.
			CO3	Compare the performance of parallel flow and counter flow heat exchanger.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behavior to carry forward in their life and cooperate with the members of batch during lab work
33	Cad Modeling Laboratory	0AUPC353	CO1	Explain advanced tools used in 3D modeling
			CO2	Draw 3D components and Prepare its assembly and drafting by using CAD software
			CO3	Draw 3D components in sheet metal and surfacing
			CO4	Exhibit professional and ethical attitude trough behavior in lab sessions and co-operate with members of batch during lab work
			CO5	Communicate effectively about 3D modeling software work and Exhibit Technical Curiosity in the lab work.
	Vehicle body		CO1	Estimate drag, lift force of a scaled model using wind tunnel.
			CO2	Compare body layouts and components of vehicles

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
34	and maintenance laboratory	0AUPC354	CO3	Apply knowledge for the maintenance of vehicle system.
			CO4	Sketch the car body construction with different panels and assemblies
			CO5	Express awareness of the concepts and their applications with satisfactory demonstration as a response.
35	Seminar	0AUPC355	CO1	Propose the specific phenomena related to automotive or mechanical engineering
			CO2	Analyze different technical and realistic issuse related to selected phenomena of automotive or mechanical engineering
			CO3	Organize and interpret collected technical data and information in recommended standards.
			CO4	Summarize technical issuse in a well organized report.
			CO5	Prepare and present a seminar on the basis of information collected.
,36	Professional skill devolopment II	0AUHS356	CO1	Demonstrate techniques to prepare formal engineering report and technical proposal.
			CO2	Recognize interpersonal skills corporate ethics and etiquette.
			CO3	Prepare proffesional letters and resumes.
			CO4	Plan a formal meering along with necessary documentation.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and cooperate with members of batch during lab work
37	Entrepreneurship and Business startup	0AUAC357	CO1	Explain the fundamentals involved in entrepreneurship development.
			CO2	Evaluate opportunities for a new venture
			CO3	Demonstrate the ability to prepare a business plan for aventure
			CO4	Exhibit professional and ethical attitude through behavior and co-operate with members.
			CO5	Communicate effectively and Exhibit Technical Curiosity.
38	Internal combution engines and emissions	0AUPC314	CO1	Explain the operation of SI and CI engine Fuel supply systems and combustion
			CO2	Describe in detail combustion process for SI and CI engines with factors affecting design of combustion chambers.
			CO3	Describe methods of turbo charging and super charging in addition to scavenging of engines
			CO4	Examine and Interprete performance of I. C. engines by solving the numerical
			CO5	Select/Recommend proper control technique for emission formation from SI and CI engine
39	Alternative fuels and Hybrid	0AUPC315	CO1	Illustrate the properties and performance charactoristics of various alternative fuels.
			CO2	Explain deliberate utilization of hydrogen and fuel cell as an alternative for automobile

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
	Vehicles		CO3	Select hybrid architecture and power plant for particular application
			CO4	Recommend/Select appropriate energy storage system for HEV application
			CO5	Illustrate various non-electric hybrid propulsion systems.
40	Industrial management and operational reaserch	0AUPC316	CO1	Explain the functions of management in organizations.
			CO2	Categorize different responsibilities, principals and policies of financial management and material management.
			CO3	Make use of purchasing cycle, purchase policies and procedures to evaluate the purchase performance.
			CO4	Apply OR models to demonstrate their applications
			CO5	Solve industrial problems and discrepancies related with Operational Management.
41	Advanced Automotive Technology	0AUPC317	CO1	Explain the trends in automotive power plants
			CO2	Select proper suspension and braking system for modern vehicles
			CO3	Apply emission and noise control devices to vehicle
			CO4	Choose the batteries for electric vehicles and explain electronic vehicle opration.
			CO5	Illustrate National Highway Network with Automated Roads and Vehicles.
42	Automotive Refridgeration and Air Conditioning	0AUPE318	CO1	Describe the principals of automotive refridgeration and air conditioning
			CO2	Select appropriate refrigerants, insulating materials for air distribution system according to application
			CO3	Illustrate different transport refrigeration systems, methods and refrigeration equipment used in commercial applications.
			CO4	Explain different processes, properties of air infouencing on human metabolism.
			CO5	Solve problems on automotive refrigeration and air conditioning using psychometric chart, steam table
43	Vehicle asthetics and ergonomics	0AUPE319	CO1	Elaborate different types of vehicle bodies.
			CO2	Describe various sketching and styling of vehicles
			CO3	Compare different types of form studies
			CO4	Demonstrate importance of ergonomics in vehicle
			CO5	Explain different aspects of vehicle packaging.
44	Tyre Technology	0AUPE320	CO1	Explain tyre terminology and use skill in wheel balancing, alignment and wheel care.
			CO2	Explain various effects o ftyre material and road surface on grip.
			CO3	Describe various grip forces and factors affecting on itand Solve problem on grip forces.
			CO4	Explain effects of water and wet surface on tyre grip
			CO5	Analyze the tyre performance of an vehicle
			CO1	Explain the necessity of vehicle safety measures to avoid accidents.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
45	Automotiv Seafty	0AUPE321	CO2	Elaborate the injury levels and use of dummies in testing
			CO3	Illustrate the design considerations in vehicle body to reduce impact of accident.
			CO4	Describe the procedure for dynamic vehicle simulation tests.
			CO5	Explain occupant protection systems and injuries associated with vehicle incidents.
46	Engine Testing laboratory	0AUPC358	CO1	Calculate friction power using Morse test.
			CO2	Evaluate performance of engine at variable speed and constant speed
			CO3	Calculate and analyze the heat balane sheet, A/F ratio.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about labortory work and Exhibit Technical Curiosity in the lab work.
47	Emision laboratory	0AUPC359	CO1	Comprehend various emission norms.
			CO2	Examine engine emission by gas and smoke analyzer.
			CO3	Analyze exhaust gas to evaluate its effect on engine emission
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work
48	Vehicle Diagnosis and maintenance Lab	0AUPC360	CO1	Study the clutch overhaul, final drive, differential overhaul, real axle hub greasing.
			CO2	Perform engine and cooling system overhaul, lubrication system overhaul, hydralic brake system overhaul.
			CO3	Perform overhaul of front axle of light/heavy duty vehicle
			CO4	communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
49	Computational Fluid Dynamics Laboratory - I	0AUPC361	CO1	Explain the basics of fluid dynamics
			CO2	Explain the governing equations of fluid fow
			CO3	Evaluate different methods of grid generation.
			CO4	Construct a code to generate the grid
			CO5	Simulate the given problem with help of software
50	Mini Project	0AUPC362	CO1	Identify methods and materials to carry out experiments/develop code.
			CO2	Recognize the procedures with a concern for society, environment and ethics.
			CO3	Analyze and discuss the results to draw valid conclusions.
			CO4	Prepare a report as per recommended format and defend the work.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Explore the possibility of publishing papers inpeer reviewed journels/conference
51	Field Training	OAUPC455	CO1	Dismantle and assemble various automotive systems.
			CO2	Overhaul different automotive systems and make proper adjustments as per specified standards to assure proper running/working.
			CO3	Conduct different tests and engine tune-up to evaluate the performance of vehicle.
			CO4	Diagnose automotive systems for fault detection with modern tools and equipment's
			CO5	Prepare a seminar/report as per the recommended format.
52	Engine Design	OAUPC401	CO1	Solve problems on Design of components subjected to fluctuating loads
			CO2	Solve problems on Engine Functional Design.
			CO3	Solve problems on Design of Automotive components.
			CO4	Select cooling and lubrication systems for I.C.engines
			CO5	Select bearing for different applications
			CO06	Explain design of different Automotive Engine components subjected to fluctuating loads.
53	Finite element Method	OAUPC402	CO1	Inspect discretization and discrete elements used in finite element method.
			CO2	Identify the use of interpolation function.
			CO3	Solve problems on structural and heat transfer using finite element method.
			CO4	Compare different types of analysis.
			CO5	Distinguish Iso-parametric elements.
54	Vehicle Dynamics	OAUPC403	CO1	Describe the need and importance of vehicle dynamics and factors affecting vehicle acceleration performance.
			CO2	Discuss the effect of different parameters on Performance Characteristics of Road Vehicles.
			CO3	Identify the effect of excitation sources on vehicle ride characteristics of vehicle.
			CO4	Solve the braking and handling characteristics problems of vehicle under different operating conditions.
			CO5	Explain the recent trends in vehicle dynamics.
55	Vehicle Aerodynamics	OAUPC404	CO1	Explain the fundamental concepts of aerodynamics.
			CO2	Solve the numerical on different forces of vehicle
			CO3	Classify the strategies for aerodynamic design and shape optimization of cars.
			CO4	Compare testing methods of vehicle aerodynamics.
			CO5	Explain the vehicle handling and stability parameters based on aerodynamics.
56	Tribology	OAUPC405	CO1	Explain the tribological characteristic for engine components.
			CO2	Illustrate principle of hydrodynamic lubrication for design of bearing.
			CO3	Identify the hydrostatic bearing for minimum energy loss.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
56	Tribology	0AUPC403	CO4	Apply reynolds equation fo designing gas and elasto-hydrodynamic lubrication system.
			CO5	Select appropriate coating for wear and corrosion resistance.
57	Computational Fluid Dynamics	0AUPE406	CO1	Apply substantial Derivative, Divergence theorem and Continuity equation.
			CO2	Make use of governing equations for fluid flow
			CO3	Apply finite difference methods to fluid flow problems and finite volume methods to diffusion problems.
			CO4	Compare different types of mesh and grids and apply it on fluid flow problem.
			CO5	Apply turbulance models to engineering fluid flow problems.
58	Combution Engineering	0AUPE407	CO1	Describe the composition of various types of fuels and their properties.
			CO2	Identify the pollution of fossil fuels and its control.
			CO3	Apply the knowledge of combution thermodynamics.
			CO4	Solve the numerical on stoichiometry
			CO5	Explain mechanism of combution and related advanced technologies.
59	Hybrid vehicles	0AUOE408	CO1	Compare different types of hybrid vehicles and its propulsion systems.
			CO2	Select hybrid architecture and power plant for particular application.
			CO3	Select appropriate energy storage system for HEV application.
			CO4	Compare fuel cells used in Hybrid Electric Vehicles
			CO5	Illustrate various non-electric hybrid propulsion systems.
60	Intellectual property rights	0AUAC409	CO1	Explain the preliminary laws and conventions related to each IP.
			CO2	Differentiate between the types of Ips and categorize the invention accordingly.
			CO3	Describe the national and international patents with sufficient understanding
			CO4	Conduct prior art search for patents, copyrights, trademarks and Geographical Indications.
			CO5	Suggest forms and documents for specific Intellectual Properties with the help of appropriate website.
61	Engine Design Laboratory	0AUPC451	CO1	Identify stress concentration and perform design of components subjected to fluctuating loads.
			CO2	Design and draw different engine components.
			CO3	Select and design rolling contact and sliding bearings.
			CO4	Analyze design of any one engine component using Finite element analysis software
			CO5	Follow professional and ethical behavior to carry forward in their life and co-operate with the members of batch during lab work.
	Simulation and		CO1	Analyze different problems in ANSYS Software.
			CO2	Estimate the stresses developed in static and thermal analysis

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
62	Simulation and analysis software laboratoty - I	0AUPC452	CO3	Evaluate frequency in midl nlysis and deflection in buckling analysis.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behavior to carry forward in their life and co-operate with the members of batch during lab work.
63	Computational Fluid Dynamics Laboratory - II	0AUPC453	CO1	Explain Finite Difference Method
			CO2	Explain Finite Volume Method
			CO3	Analyze Properties over different components.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behavior to carry forward in their life and co-operate with the members of batch during lab work.
64	Project Phase - I	0AUPC454	CO1	Identify and formulate research problem or question of substantial intricacy.
			CO2	Review relevant theories and literature to identify research slits to employ ideas for inventive and original solutions and define objectives and scope of the work
			CO3	Develop research methodology and implement project plan systematically.
			CO4	Make use of appropriate resources associated with a particular problem.
			CO5	Design and develop a prototype/model/setup/technique/methodology to encounter desired objectives.
65	Automotive system design	0AUPC410	CO1	Solve problems on clutches for automotive applications
			CO2	Solve problems on gearbox for automotive applications.
			CO3	Perform design of the axles, propeller shaft and final drive.
			CO4	Perform design of brakes and suspension system.
			CO5	Apply statistical consideration and design optimization techniques for Automotive system Design
66	Vehicle performance and Testing	0AUPC411	CO1	Determine performance parameters of automobile systems for given operating conditions.
			CO2	Describe various factors affecting in selection of test tracks for variety of vehicles.
			CO3	Describe different safety systems used in vehicle
			CO4	Compare different crash testing methods for vehicle
			CO5	Explain testing procedure, causes and remedies for noise and vibration.
67	Automotive Noise and Vibration	0AUPC412	CO1	Make use of different methods for controlling the noise and vibration
			CO2	Formulate mathematical model for multi degree of freedom vibration system.
			CO3	Analyze the system for noise and vibration.
			CO4	Select transducers for measurement of vibration in automotive/mechanical system.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Apply methods for noise and vibration control in automobile sources.
68	Robotics and automation	0AUPE413	CO1	Explain the basic concepts of working of robot.
			CO2	Illustrate different types of mechanism used for transmission in robots.
			CO3	Analyze the function of sensors in robots.
			CO4	Explain the basic concepts of automation
			CO5	Describe the application of automation in Material handling and production line
69	Advance automotive Materials	0AUPE414	CO1	Explain the classification, properties and applications of different non-metallic materials.
			CO2	Identify different types of manufacturing methods for plastic and composite component.
			CO3	Identify different types of automotive fluids and their importance.
			CO4	Categorize smart materials and their structures.
			CO5	Summarize different quality control standerds and specifications in automotive sector.
70	Special purpose vehicle	0AUPE415	CO1	Classify the different type of special purpose vehicles with its applications.
			CO2	Choose various types of features for given special purpose vehicle
			CO3	Explain the constructional and working features of various special purpose vehicles.
			CO4	Apply the fundamental concepts of automotive engineering related to design of special purpose vehicles.
			CO5	Explain safety features required for special purpose vehicles.
71	Fuel cell Technology	0AUPE416	CO1	Explain and classify fuel cell technology.
			CO2	Explain construction and working of main cell components and processes.
			CO3	Solve numerical on performance characteristics of fuel cell.
			CO4	Explain design considerations in fuel cell system.
			CO5	Describe use of fuel cell in automobile
72	Automotive Electronics	0AUPC417	CO1	Select battery for different automotive application.
			CO2	Identify starting, ignition, charging and lighting system for given application of vehicle
			CO3	Recommend proper instrument and accessories for vehicles.
			CO4	Explain fundamentals of electronics used in automobiles.
			CO5	Select automotive sensors, actuators and restraint systems.
73	Automotive System Design	0AUPC456	CO1	Design of the clutch for automotive applications and prepare detail and assembly drawing of it.
			CO2	Design the gearbox for automotive applications and prepare detail and assembly drawing of it.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
73	System Design Laboratory	0AUPC456	CO3	Perform design of axles, propeller shaft and final drive .
			CO4	Perform design of brakes and suspension system.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.
74	Vehicle performance and testing laboratory	0AUPC457	CO1	Solve the numerical related to performance parameters for given operating conditions.
			CO2	Perform on-road vehicle testing on different performance parameters.
			CO3	Perform laboratory testing for two wheeler on different performance parameters.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.
75	Automotive Electronics Laboratory	0AUPC458	CO1	Explain the operations of various automotive electrical and electronic systems
			CO2	Test for automotive batteries, alternator, and starting motor.
			CO3	Diagnose automotive electrical and electronic faults using ECU diagnostic systems.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.
76	Simulation and analysis software laboratory - II	0AUPC459	CO1	Examine displacement, velocity and acceleration of the object after certain time Using ADAMS software.
			CO2	Evaluate performance of spring damper system at static equilibrium.
			CO3	Estimate the performance of various subsystems of automobile.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.
77	Project phase II	0AUPC460	CO1	Recognize routine problems to disentangle their solutions and justify as an individual or team under supervision.
			CO2	Synthesize collected data to draw valid and reliable conclusion which meet feasible expectations of the relevant field/area.
			CO3	Prepare a formal engineering project report as per recommend format to defend the work.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.

SR. NO.	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
Department of Automobile Engineering
CO statements of courses

Programme- Automobile Engineering- First Revision (170 credits)

	Course Name	Course Code	Course Outcome	CO Statement
1	Fluid Mechanics and Machinery	1AUPC201	CO1	Explain different types of fluids with its properties and units
			CO2	Explain fundamental principles of fluid statics, kinematics and dynamics
			CO3	Derive fundamental equations of laminar flow, pipe flow and apply for different fluid flow systems
			CO4	Finding solutions for problems of fluid flow analysis using appropriate principles and equations
			CO5	Explain constructional details, classification of hydraulic machines with applications.
2	Automotive Chassis	1AUPC202	CO1	Elaborate different types of chassis frames.
			CO2	Select steering geometry and types of axle for a given automotive application.
			CO3	Select elements/types of suspension, brakes, wheels and tyre systems for given automotive application
			CO4	Solve problems on steering and braking system.
			CO5	Explain chassis systems used in modern automobiles.
3	Applied Thermodynamics	1AUPC203	CO1	Explain fundamental concepts and laws of thermodynamics in thermodynamic processes.
			CO2	Solve numerical onfundamentals of thermodynamics and entropy change for various processes.
			CO3	Solve numerical on Availability, properties of pure substances and estimate the performance of steam power plant.
			CO4	Explain various gas power cycles and gas turbine.
			CO5	Estimate theoretically the performance of compressor.
	Automotive		CO1	Compare different types of clutches and gearboxes.
			CO2	Describe the functioning of driveline

	Course Name	Course Code	Course Outcome	CO Statement
4	Automotive Transmission	1AUPC204	CO3	Explain fluid couplings and torque converters of an automobile.
			CO4	Explain automatic transmission systems.
			CO5	Select hydrostatic and electric drives systems to automobiles application.
5	Professional Practice, Law & Ethics	1AUHS205	CO1	Explain human values for professional excellence and stress management
			CO2	Comply with engineering ethicsin professional practices
			CO3	Practice experimentationin engineering domain
			CO4	Explain safety and risk assessment
			CO5	Exhibit professional and ethical attitude through behavior in class and co-operate with members of batch during lab work.
6	Fluid Mechanics Laboratory	1AUPC251	CO1	Compute Reynolds number for given fluid flow and visualize flow lines.
			CO2	Determine hydraulic coefficients and discharge for flow through different measuring devices.
			CO3	Interpret losses in pipe flow for different cross sections and different arrangements.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and exhibit technical curiosity in the lab work
7	Metallurgy Laboratory	1AUPC252	CO1	Distinguish ferrous and nonferrous materials through macroscopic examination.
			CO2	Describe destructive and non-destructive testing methods.
			CO3	Examine microstructures of steel, cast iron and non-ferrous alloys.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
8	Automotive Component Drawing Laboratory	1AUPC253	CO1	Explain BIS conventions used in Machine drawing.
			CO2	Drawfreehand Sketches of different components.
			CO3	Draw detail and assembly drawings by using 2D drafting software.
			CO4	Apply limits, fits and tolerances for drawing.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO1	Explain working principle, application of lathe machine.

	Course Name	Course Code	Course Outcome	CO Statement
9	Manufacturing Practices-III	1AUEC254	CO2	Make use of variouslathe machine operations to prepare given assemblyand prepare process sheet for given job.
			CO3	Explain unconventional machine processes, sheet metal working and joining processes.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work
10	Programming In C++	1AUPC255	CO1	Explain basic Programming in C++ Language.
			CO2	Prepare program in pointer, array and Structure.
			CO3	Prepare program in class and object.
			CO4	Prepare Array of Class, Inheritance and Overloading.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
11	Applied Mathematics- III	1AUBS206	CO1	Solve the Automobile Engineering problems using Linear Differential Equation,
			CO2	Solve the problems of vector calculus,
			CO3	Develop the Fourier Series for the any function,
			CO4	EvaluateLaplace Transform and inverse Laplace Transform of any function,
			CO5	Solve Algebraic and transcendental Equations using numerical method,
			CO6	Solve the problems on Partial Differential Equation,
12	Theory of Machines	1AUPC207	CO1	Determine velocity and acceleration for various mechanisms.
			CO2	Solve numerical on force analysis of engine mechanism.
			CO3	Solve numerical on gear train for different application.
			CO4	Develop profile of cam to obtain specified follower motion for an application.
			CO5	Solve numerical on governor.
13	Manufacturing Engineering	1AUES208	CO1	Explain casting process in detail along with various types of casting.
			CO2	Solve numerical on casting
			CO3	Describe forming, plastic shaping and joining processes.
			CO4	Solve numerical on metal cutting.
			CO5	Describe conventional &non- conventional machining processes
			CO1	Explain fundamentals of solid mechanics

	Course Name	Course Code	Course Outcome	CO Statement
14	Strength of Materials	1AUPC209	CO2	Compute the stresses and strains in axially-loaded members, factor of safety, complementary shear stress and different elastic constants.
			CO3	Determine principal stresses, maximum shearing stress by analytical as well as graphical method.
			CO4	Draw shear force and bending moment diagram for different loading conditions.
			CO5	Calculate stresses in beams for various sections and the deflections produced in beams, columns.
			CO6	Solve problems of hollow and solid circular shafts subjected to torsion.
15	Vehicle Body Engineering	1AUPC210	CO1	Calculate various forces and moments acting on vehicle due to air force
			CO2	Explain importance of ergonomics in automotive body design
			CO3	Illustrate different design considerations while designing different car, bus and commercial bodies as per requirement
			CO4	Explain factors considered while designing driver cabin
			CO5	Examine different stresses and loads on vehicle body
16	Environmental Studies	0AUMC211	CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
			CO3	Write a technical report in team regarding course and impacts of environment related issues.
			CO4	Discuss current concern of environment issues.
			CO5	Describe the need of environment protection and ethics.
17	Instrumentation & Measurement Laboratory	1AUPC256	CO1	Determine angle, flatness, gear thickness and thread terms using instruments.
			CO2	Demonstrate the use of different types of comparators.
			CO3	Determine temperature, pressure, flow and force using instruments.
			CO4	Compare different instruments on the basis of accuracy and requirement.
			CO5	Calibrate different instruments by using formal standards.
18	CAD – Modeling and Drafting Laboratory	1AUPC257	CO1	Explain different tools used in 3D modeling software.
			CO2	Draw 3D components, assembly and drafting by using CAD software
			CO3	Draw 3D component in sheet metal and surfacing,
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.

	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
19	Hydraulics and Pneumatics Laboratory	1AUPC258	CO1	Use the ISO symbols for various components used in hydraulics and pneumatics.
			CO2	Explain construction and working of hydraulic and pneumatic system elements.
			CO3	Prepare hydraulic and pneumatic circuit for different applications.
			CO4	Conduct performance test on centrifugal and reciprocating pumps .
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-operate with members of batch during lab work.
20	Vehicle Body and Chassis Laboratory	1AUPC259	CO1	Estimate drag, lift force of a scaled model using wind tunnel.
			CO2	Identify and locate basic components that make up automotive chassis/transmission systems
			CO3	Apply knowledge for the vehicle chassis system.
			CO4	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work
			CO5	Express awareness of the concepts and their applications with satisfactory demonstration as a response.
21	Internship-I	1AUPC260	CO1	Explain Techniques observed during internship
			CO2	Comply with advanced tools & techniques used in industries
			CO3	Prepare a precise project report on internship
			CO4	Communicate effectively at work and Exhibit Technical Curiosity in the industry
			CO5	Express awareness of the concepts and their applications with satisfactory demonstration as a response.
22	Product design and development	1AUOE301	CO1	Explain need and importance of new product design.
			CO2	Describe various factors affecting on new product development
			CO3	Analyze different ideas of new product design and development.
			CO4	Make use of functional analysis techniques for new product design.
			CO5	Utilize new product design guidelines and testing procedure.
			CO1	Describe the principles of automotive refrigeration and air conditioning.
			CO2	Select appropriate refrigerants, insulating materials for air distribution system according to application.

	Course Name	Course Code	Course Outcome	CO Statement
23	Automotive Refridgeration and air conditioning	1AUOE302	CO3	Categorize different transport refrigeration systems, methods and refrigeration equipment used in commercial applications.
			CO4	Identify different processes, properties of air influencing on human metabolism.
			CO5	Solve problems on automotive refrigeration and air conditioning using psychometric chart, steam table.
24	Dynamics of Machine	1AUPC303	CO1	Apply basic concepts of mechanics to solve numerical on friction.
			CO2	Make use of gyroscopic principle to calculate gyroscopic couple for various applications.
			CO3	Estimate the mass required for balancing of machine to reduce vibration.
			CO4	Analyze effect of governor in regulating the speed of an engine.
			CO5	Solve numerical on brakes and dynamometers.
			CO6	Explain the concepts of vibration.
25	Heat Transfer	1AUPC304	CO1	Explain the basic concepts of heat transfer in conduction, convection and radiation.
			CO2	Solve the heat transfer problems in conduction, convection and radiation.
			CO3	Analyze the effect of various parameters on convective heat transfer coefficient using dimensionless numbers
			CO4	Compare the performance of heat exchangers
			CO5	Explain automotive cooling system.
26	Design of Machine Elements	1AUPC305	CO1	Explain fundamental theories and principles of design of machine elements.
			CO2	Design joints for different mechanical applications.
			CO3	Recommend shafts, keys and couplings for power transmission systems.
			CO4	Design gears for power transmission application.
			CO5	Select various mechanical components using design data with their advantages and limitations.
27	Automotive System Design	1AUPE306	CO1	Design clutches for different automotive applications.
			CO2	Solve numerical on gearbox for automotive applications.
			CO3	Solve numerical on design of the axles, propeller shaft and final drive.
			CO4	Design of brakes and suspension system for vehicles.
			CO5	Examine design optimization techniques for Automotive system Design.
	Machine Tool		CO1	Explain classification of different machine tools and related processes.
			CO2	Analyze the effect of cuttion tool parameters on machine tool structures.

	Course Name	Course Code	Course Outcome	CO Statement
28	Machine Tool Engineering	1AUPE307	CO3	Examine the effect of vibration on machine tool.
			CO4	Analyze the performance of Spindles, Bearing and Power Screws.
			CO5	Select method for machine tool maintenance and conditioning monitoring.
29	Two and Three Wheeler Technology	1AUPE308	CO1	Explain layouts of two wheeler and three wheeler vehicles.
			CO2	Select power plants for two and three wheeler vehicles.
			CO3	Select appropriate chassis, sub systems for two and three wheelers application.
			CO4	Justify selection of Suspension system, Steering system, Brakes and Wheels for two and three wheeler application.
			CO5	Compare different types of maintenance for two and three wheeler vehicles.
30	Entepreneurship and Business Startup	1AUMC309	CO1	Explain the fundamentals involved in entrepreneurship development.
			CO2	Evaluate opportunities for a new venture.
			CO3	Develop the ability to prepare a business plan for a venture.
			CO4	Exhibit professional and ethical attitude through behavior and co-oprate with members.
			CO5	Communicate effectively and Exhibit Technical Curiosity.
31	Dynamics of Machine Laboratory	1AUPC351	CO1	Perform experiment to varify gyroscope principle, and determine MI using bi/tri-filler/compound pendulum method
			CO2	Perform static and dynamic balancing of four masses and find out natural frequency and mode number for whirling of shaft.
			CO3	perform experiment to determine logarithmic decrement and force vibration characteristics.
			CO4	Make use of vibration analyzer for vibration measurement.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-oprate with the members of batch during lab work.
32	Heat Transfer Laboratory	1AUPC352	CO1	Perform the experiments to calculate parameters in conduction, convection and radiation.
			CO2	Analyze the effect of varying the air flow on cobvective heat transfer coefficient in natural and forced convection equipment's.
			CO3	Compare the performance of parallel flow and counter flow heat exchanger.
			CO4	Communicate effectively about laboratory work both orally and in writing journels.

	Course Name	Course Code	Course Outcome	CO Statement
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-oprate with the members of batch during lab work.
33	Mini Project	1AUPR353	CO1	Discover methods and materials to carry out experiments/develop code.
			CO2	Recognize the procedures with a concern for society, encironment and ethics.
			CO3	Analyze and discuss the results to draw valid conclusions.
			CO4	Prepare a report as per recommended format and defend the work.
			CO5	Construct the paper and of publish in peer reviewed journals/conferences.
34	Computational Fluid Dyanamics Laboratory - I	1AUPC354	CO1	Categorize the applications of computational fluid dynamics in fluid flow.
			CO2	Select the appropriate governing equations for fluid flow problems.
			CO3	Analyze different methods of grid generation.
			CO4	Construct a code to generate the grid.
			CO5	Simulate the given problem with help of software.
35	Simulation and software analysis Laboratory - I	1AUPC355	CO1	Analyze different problems in ANSYS Software.
			CO2	Estimate the stresses developed in static and thermal analysis.
			CO3	Evaluate frequency in modal analysis and deflection in buckling analysis.
			CO4	Communicate effectively about laboratory work both orally and in writing journels.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-oprate with the members of batch during lab work.
36	Special Purpose Vehicles	1AUPE317	CO1	Classify diffeent types of special purpose vehicles.
			CO2	Select features and instrumentation for special purpose vehicles.
			CO3	Categorize tractors and mobile cranes for special purpose vehicles application.
			CO4	Categorize different types of special purpose vehicles for various applications.
			CO5	Apply various Ergonomics considerations for special purpose vehicles.
37	Constitution of India	1AUMC318	CO1	Explain formation and development of constitution of India.
			CO2	Describe fundamental rights and directive principle in the development of state policies.
			CO3	Compare government of union and government of state.
			CO4	Explain judicial system
			CO5	Choose regulation and information acts as per government policies.
			CO1	Examine friction power using Morse test.

	Course Name	Course Code	Course Outcome	CO Statement
38	Engine Testing Laboratory	1AUPC356	CO2	Evaluate performance of engine at variable speed and constant speed.
			CO3	Analyze the heat balance sheet and A/F ratio.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-opreate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
39	Vehicle Diagnosis and Maintenance Laboratory	1AUPC357	CO1	Categorize the Clutch, final drive, differential overhaul and Rear axle hub greasing.
			CO2	Perform Engine and cooling system overhaul, Lubrication system overhaul and Hydraulic brake system overhaul.
			CO3	Perform overhaul of front axle of light/heavy duty vehicle.
			CO4	Exhibit professional and ethical attitude through behavior in lab sessions and co-opreate with members of batch during lab work.
			CO5	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
40	Computational Fluid Dynamics Laboratory - II	1AUPC358	CO1	Make use of Finite Difference and Finite Volume method for fluid flow problem.
			CO2	Perform hands on related to fluid related problem.
			CO3	Analyze properties of fluid over different components.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.
41	Internship - II	1AUPR359	CO1	Evaluate Techniques observed during internship.
			CO2	Comply with advanced tools and techniques used in industries.
			CO3	Prepare a precise project report on internship.
			CO4	Communicate effectively at work and Exhibit Technical Curiosity in the industry.
			CO5	Express awareness of the concepts and their applications with satisfactory demonstration as a response.
42	Vibration based	1AUOE310	CO1	Explain the fundamentals of vibration
			CO2	Classify methods of vibration control.
			CO3	Categorize the methods of failure analysis used for different applications.

	Course Name	Course Code	Course Outcome	CO Statement
42	Fault Diagnosis	1AUOE310	CO4	Examine fault diagnosis and instruments required to identify the faults in machinery.
			CO5	Choose methods of signsl analysis used for condition monitoring.
43	Engineering Tribology	1AUOE311	CO1	Explain the tribological characteristic for engine components.
			CO2	Illustrate principal of hydrodynamic lubrication for design of bearing.
			CO3	Inspect the hydrostatic bearing for minimum energy loss.
			CO4	Apply reynolds equation for designing gas and elasto-hydrodynamic lubrication system.
			CO5	Select appropriate coating for wear and corrosion resistance.
44	Internal Combution Engines and Emissions	1AUPC312	CO1	Explain fundamentals of I.C. engines,Fuel supply systems.
			CO2	Describe in detail combution process for SI and CI engines with factors affecting design of combution chambers.
			CO3	Compare methods of turbo charging and super charging in addition to scavenging of engines.
			CO4	Examine and Interpret performance of I. C. engines by solving the numerical .
			CO5	Select proper emission control technique fo SI and CI engines.
45	Vehicle Dynamics	1AUPC313	CO1	Analyze the factors affecting on performance of vehicle acceleration.
			CO2	Examine the effect of different parameters on performance charactoristics of Road Vehicles.
			CO3	Solve the braking and handling characteristics problems of vehicle under different operating conditions.
			CO4	Identify the effect of excitation sources on vehicle ride characteristics of vehicle
			CO5	Explain the recent trends in vehicle dynamics.
46	Industrial Management and Operations research	1AUHS314	CO1	Explain the functions of management in organizations
			CO2	Categorize different responsibilities, principles and policies of financial management and material management.
			CO3	Make use of purchasing cycle, purchase policies and procedures to evaluate the purchase performance.
			CO4	Apply operation research models to demonstrate their applications.
			CO5	Solve industrial problems and discrepancies related with operational management.
			CO1	Explain design optimization techniques in engineering design process.

	Course Name	Course Code	Course Outcome	CO Statement
47	Design Optimization	1AUPE315	CO2	Develop practical engineering design problems as well-posed optimization problems.
			CO3	Analyze the advantages and disadvantages of applying different optimization techniques for a specific problem.
			CO4	Model multi-objective problems.
			CO5	Determine multi disciplinary optimization problems.
48	Metal Heat Treatments and Testing	1AUPE316	CO1	Explain the principle of heat treatment of different types steels.
			CO2	Analyze the phase diagrams of materials and constitution of metals and alloys.
			CO3	Select suitable heat-treatment process to achieve desired properties of metals and alloys.
			CO4	Select suitable surface hardening treatment of metals and special heat treatment process.
			CO5	Compare different destructive and non-destructive testing methods.
49	Vehicle Maintenance and Safety	1AUOE401	CO1	Make use of Relevant tools and equipments required for maintenance of vehicle.
			CO2	Categorize and rectify faults occurring un automobile engine.
			CO3	Inspect the different faults occurring in automobile system.
			CO4	Select vehicle design and safety point of view.
			CO5	Analyze safety measures, standards and rules un automobiles.
			CO6	Compare advanced automotive safety systems used in automobiles.
50	Vehicle Aerodynamics	1AUOE402	CO1	Analyze the concepts of aerodynamics.
			CO2	Solve the numerical on different forces of vehicle
			CO3	Classify the strategies for aerodynamic design and shape optimization of cars.
			CO4	Compare testing methods of vehicle aerodynamics
			CO5	Categorize vehicle handling and stability parameters based on aerodynamics.
51	Vehicle Performance	1AUPC403	CO1	Analyze performance parameters of automobile systems for given operating conditions and select test tracks for variety of vehicles.
			CO2	Evaluate failure modes, causes and remedies of vehicle component with procedure.
			CO3	Compare different crash testing methods for vehicle testing.
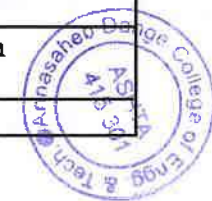
	Course Name	Course Code	Course Outcome	CO Statement
			CO4	Recommend safety system sand auxiliaries for vehicle based on motor vehicle safety standards and ergonomic considerations.
			CO5	Compile the data for analysis of noise and vibration for different vehicles for different operating conditions.
52	Automotive Noise and Vibration	1AUPE404	CO1	Compare different types of vibration.
			CO2	Analyze the sources of vibrations in automotive systems.
			CO3	Make use of various techniques for measurement of vibrations.
			CO4	Categorize the level of noise.
			CO5	Analyze the sources of noise in automotive systems.
			CO6	Make use of various techniques for measurement of noise.
53	CNC and Programming	1AUPE405	CO1	Compare NC and CNC Machines.
			CO2	Analyze different tooling methods for CNC Machines.
			CO3	Develop NC part programming for CNC Machining.
			CO4	Make use of NC programming for CAD/CAM systems.
			CO5	Select different microcontrollers for various applications.
54	Alternative fuels and Hybrid Vehicles	1AUPE406	CO1	Examine the properties and performance characteristics of various alternative fuels.
			CO2	Analyze hydrogen and fuel cell as an alternative fuel for automobile.
			CO3	Select hybrid architecture and power plant for particular application.
			CO4	select appropriate energy storage system for HEV application.
			CO5	compare various non-electric hybrid propulsion systems.
55	Finite element Method	1AUPC407	CO1	Inspect discretization and discrete elements used in finite element method.
			CO2	Identify the use of interpolation function.
			CO3	Solve problems on structural and heat transfer using finite element method.
			CO4	Compare different types of analysis.
			CO5	Distinguish Iso-parametric elements.
56	Engine Design	1AUPC408	CO1	Recommend approach for analyzing Nonlinear structural analysis.
			CO2	Design of components subjected to fluctuating loads.
			CO3	Solve problems on Engine Functional Design.
			CO4	Design of automotive components.
			CO5	Select coolingand lubricationsystems for I. C. engines.
			CO6	Select bearing for different applications.
			CO1	Design of different automotive engine components subjected to fluctuating loads.

	Course Name	Course Code	Course Outcome	CO Statement
57	Project management and Finance	1AUHS409	CO2	Illustrate the project management principles and philosophy.
			CO3	Analyze the project environment through feasibility study.
			CO4	Evaluate the investment opportunities and to formulate the projects.
			CO5	Categorize the development of project network-Time Estimation.
			CO6	Compare the importance of capital budgeting techniques - NPV, IPR
58	Vehicle Performance Laboratory	1AUPC451	CO1	Analyze performance parameters of automobile systems for given operating conditions.
			CO2	Perform vehicle testing for different parameters afffercting the vehicle performance.
			CO3	Compare the vehicle performance based on the data obtained through testing.
			CO4	Communicate effectively about laboratory work both orally and in writing journals.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.
59	Automotive Electronics Laboratory	1AUPC452	CO1	Prapare automotive electrical and electronic systems layout and make use of battery charging, battery testing and alternators.
			CO2	Demonstrate starting system, ignition system, dashboard panel instruments and controls of headlight beam alignment.
			CO3	Perform testing of auto electrical components on Multifunctional tester, electric bike and ECU diagnostic system.
			CO4	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-oprate with members of batch during lab work.
60	Simulation and analysis software Laboratory - II	1AUPC453	CO1	Analyze different problems in ANSYS software
			CO2	Estimate the stresses developed in static and thermal analysis.
			CO3	Evaluate frequency in modal analysis and deflection in buckling analysis.
			CO4	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
			CO5	Exhibit professional and ethical attitude through behavior in lab sessions and co-oprate with members of batch during lab work.
			CO1	Identify and formulate research problem or question of substantial intricacy.

	Course Name	Course Code	Course Outcome	CO Statement
61	Project Phase - I	1AUPR454	CO2	Reciew relevant theories and literature to identify research slits to employ ideas for inventive and original solutions and define objectives and scope of the work.
			CO3	Develop research methodology and implement project plan sysematically.
			CO4	Make use of appropriate resources associated with a particular problem.
			CO5	Design and develop a prototype/model/setup/technique/methodology to encounter desired objectives.
62	Motor Vehicle act and rules	1AUPC409	CO1	Make use of motor vehicle act and central motor vehicle rules.
			CO2	Select the motor vehicle insurance and taxation type.
			CO3	Analyze the procedure of licensing of driver and registration of vehicle .
			CO4	Discriminate offenses and penalties specified in MVA
			CO5	Categorize advanced techniques in traffic management.
63	Automotive Fault Diagnosis	1AUPC410	CO1	Categorize automotive fault diagnosis methods.
			CO2	Correlate maintenance and repair procedures for auxiliary systems of vehicle
			CO3	Choose maintenance and overhauling procedures for engine and driveline systems.
			CO4	Analyze procedures for chassis components maintenance and overhauling.
			CO5	Summarize advances in automotive electrical and electronic maintenance technology.
64	Project Phase - II / Internship - III	1AUPR455	CO1	Recognize routine problems to disentangle their solutions and justify as an indivisual or team under supervision.
			CO2	Synthesize collected data to draw valid and reliable conclusion which meet feasible expectations of the relevant fjield/area.
			CO3	Prepare a formal engineering project report as per recommend format to defend the work.
			CO4	Communicate effectively about laboratory work and Exhibit Technical Curiosity in the lab work.
			CO5	Follow professional and ethical behaviour to carry forward in their life and co-operate with the members of batch during lab work.

Programme Name : Computer Science and Engineering Revision- Zero

PSO	Statement
1	An ability to adapt to latest trends in software engineering practices and strategies in real-time software development lifecycle using open-source programming environment or commercial environment.
2	An ability to get acquainted with contemporary trends in industrial / research areas and thereby provide solutions to real life problems, by specifically using knowledge and skills in the areas of Data Analytics, Machine Learning, Internet of Things, Cloud Computing and Security.

Revision 0 Courses

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
	B.Tech Semester-III			
1	0CSBS201	Discrete Mathematics	CO1	Explain the fundamental concepts of Discrete Mathematical Structures.
			CO2	Apply equivalence formulas/laws to solve problems.
			CO3	Make use of logical notation to define and reason about fundamental mathematical concepts such as sets, relations & functions.
			CO4	Describe the concepts of algebraic systems, lattices & Boolean algebra.
			CO5	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.
			CO6	Apply the appropriate formulas to calculate permutations and combinations.
2	0CSPC202	Data Structures	CO1	Describe basic fundamentals in data structures.
			CO2	Explain the fundamental concepts of structuring, managing and organizing the data using linear and non-linear data structures with ADTs.
			CO3	Apply appropriate linear and nonlinear data structure to solve the problems. (K3)
			CO4	Compare and analyze different data structure algorithms and searching, sorting methods.
3	0CSPC203	Data Communication	CO1	Explain the fundamental of data communication.
			CO2	Summarize the layered architecture of network models with topologies and different communication protocols
			CO3	Explain analog and digital data transmission methods, line coading schemes and different transmission media
			CO4	Descritre protocols and techniques of error detection and correction in data link layer.
			CO5	Explain working of multiplexing and switching methods
			CO6	Apply different formulas to solve communication problemi
4	0CSPC204	Processor Architectures	CO1	Explain architectures of Microprocessors with its pin configuration.
			CO2	Illustrate different interrupt mechanisms and stack operations in microprocessors.
			CO3	Explain concepts of interfacing peripheral devices with microprocessors.
			CO4	Compare different microprocesscrs.
			CO5	Write an assembly language program using 8085 microprocessor instruction set
			CO6	Design an n-bit microprocessor with its physical, logical and segment address structure.
5	0CSBS205	Statistics And Fuzzy System	CO1	Describe the statistical data numericalty by using lines of regresslon ano curve fittings.
			CO2	Explain fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc.
			CO3	Apply Knowledge of probability and statistics, Binomial, Poisson, and Alornal including applications in real life problem
			CO4	Solve example on the principle in performing fiizzy number arithmetic operations zuch as Addition, Multiplication & fuzzy equation etc
			CO5	Solve examples based on assignment problems and game theory
			CO1	Demonstrate basic fundamentals in data structures.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
6	OCSPC251	Data Structures Laboratory	CO2	Apply appropriate data structures like stack, queue, trees and graphs for solving problems.
			CO3	Analyze searching and sorting techniques for data identification and retrieval
			CO4	Exhibit skills by demonstrating mini project to solve problems (A5)
			CO5	Formulate and design solution and debug prngrams using staclq queue, tree and graphs data structures.
			CO6	Proficiently use data structures to solve problems
7	OCSPC252	Processor Architectures Laboratory	CO1	Identify the basic elements and functions of Microprocessors. (K1)
			CO2	Describe the architecture of Microprocessors and its peripheral devices.
			CO3	Design flowchart and Data flow diagrams for 8085assembly language program for microprocessor system.
			CO4	Proficient in the assembly language programming for 8085 microprocessor.
			CO5	Compare 8085 and 8086 microcomputer software and Hardware aspects, including the Microprocessor structure, and its operation and controls.
8	OCSPC253	Programming Laboratory -I	CO1	Explain the fundamentals of object oriented programming.
			CO2	Apply the concept of class, object, array, pointers in C++.
			CO3	Apply the concept of inheritance and polymorphism in C++.
			CO4	Appty various library utilities and advanced features- template, STL, R.TTI
			CO5	Communicate effectively, both orally and in writingjournals,
			CO6	Follow given instructions during practical performance.
9	OCSAC211	Communication Skills	CO1	Develop Vocabulary to communicate effectively
			CO2	Upgrade soft skills necessary to become efficient professional
			CO3	improve writing skills to compose emails and resume professionally
			CO4	Strengthen communicative performance in professional events
			CO5	Follow given instructions during practical performance
	B.Tech Semester-IV			
10	OCSBS206	Theory Of Computer Science	CO1	Explain basic terminologies relaied to theory of computation.
			CO2	Construct regular expressions and build machines to recognize those regular expressions and vice versaice versa.
			CO3	Demonstrate finite stste system, build them as per the requirement and transform them into different types of finite stste systems
			CO4	Construct context-free grammars for language, demonstste derivaion and parse trees for specified inputs
			CO5	Demonstrate pushdown automata, its connection with context-free grammars and formulate conversion betvreen them
			CO6	Demonstrate various Turning machines for different kinds of formal languages and illustrate their variants
11	OCSPC207	Computer Networks	CO1	Explain the fundamental of cornputer network
			CO2	Describeretworl protocols.
			CO3	Explain network layer design issues with routing atgoiitnm
			CO4	Explain different protocols of transport layer (TCP, UDP)
			CO5	Describe various utilities of application layer
			CO6	Make use of logical addressing
12	OCSPC208	Operating Syatem -I	CO1	Explain basic concepts of operating system, system structure, services and operations in OS.
			CO2	Illustrate process, Thread scheduling algorithm and interprocess communication.
			CO3	Explain basic concepts of file handling and I/O subsystem.
			CO4	Apply appropriate solution to solve critical section problem .
			CO5	Solve deadlock problems
			CO6	Apply memory management strategies for various page replacement policies
			CO1	Illustrate basic concepts and principles of software engineering.
			CO2	Explain analysis, planning & requirement specifications of software project development.

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
13	0CSPC209	Software Engineering	CO3	Construct structure & function-oriented design for software project development.
			CO4	Determine the cost of software w.r.t. development efforts, quality and cost.
			CO5	Describe standards related to software reliability and quality management.
14	0CSPC210	Computer Architecture	CO1	Explain computer evolution and basics of computer organization
			CO2	Solve different arithmetic operations
			CO3	Illustrate control design and memory organization
			CO4	Explain concepts of parallel processing and vector processiong
			CO5	Explain different computer architectures
15	0CSPC254	Operating SyStem -I Laboratory	CO1	Demonstrate the installation and various features of operating systems.
			CO2	Identify CPU scheduling algorithms and resolve problems related to deadlock, critical section.
			CO3	Test for appropriate commands on Unix, Linux platform and identify their use to perform various operations.
			CO4	Debate on various commands and standard libraries in the operating system. (A3)
			CO5	Proficiently Develop and debug, C programs created on Linux and Unix platforms
16	0CSPC255	Computer Networks Laboratory	CO1	identify various internetworkins devices
			CO2	Apply principles and mechanisms for data exchange among computers
			CO3	Make use of different network layer protocols to formulate and solve problems.
			CO4	Porpose LAN Design and make use of various network trouble commands
			CO5	Utilize various networking protocols for data transfer
17	0CSES256	Programming Laboratory -II	CO1	Develop suitable logic to solve problems using Java
			CO2	Apply various object oriented features of Java
			CO3	Develop programs using Applet and swing with database connectivity
			CO4	Make use of Multi-threading I/O operations and Networking to solve problems
			CO5	Formulate and design solution and debug programs Java Programming Language
			CO6	Proficiently Use java programming to solve problems
18	0CSPR257	Mini-Project	CO1	Develop suitable logic to solve a real world problem and its requirements
			CO2	Developa design solution for a set of requirements
			CO3	Make use ofTesting to validate the conformance of the developed prototype against the original requirements of the problem
			CO4	Work as a responsible member and possibly a leader of a team in developing software solutions
			CO5	Proficiently learn new tools, algorithms, and/or techniques that contribute to the software solution of the proiect
19	0CSMC212	Environmental Studies	CO1	Explain importance of environmental studies lvith necessary of acts.
			CO2	Explain importance of public awareness on environrnental problems
			CO3	Write a technical report in team regarding course and impacts of environment related issues.
			CO4	Discuss current concenl of environment issues.
			CO5	Describe the need of environment protection and ethics.
	B.Tech Semester-V			
20	0CSPC301	Internet Of Things	CO1	Describe fundamental mechanisms of Internet of Things.
			CO2	Describe components and working of RFID technology
			CO3	Design applications of Internet of Things.
			CO4	Explain protocols related to wireless technologies
			CO5	Explain components needed to prototyping an Internet of Things application
21	0CSPC302	Computer Algorithms	CO1	Explain different desigr-r rnethbds of al$orithm.
			CO2	Explain solvability, unsolvability of a problern and computational models of parallel algorithm.
			CO3	Apply different design rnethods of algorithm

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO4	Apply different search techniques for efficient graph traversal
			CO5	Analyze complexity of different algorithm designs
22	OCSPC303	System Software	CO1	Explain the fundamentals of language processing.
			CO2	Design an assembler and macro preprocessor.
			CO3	Identify a language processor for specific needs.
			CO4	Explain various stages of compiler construction.
			CO5	Design a parser using different techniques.
23	OCSPC304	Information and Network Security	CO1	Infer need of security for information and classical encryption techniques
			CO2	Make use of Symmetric and asymmetric encription algorithum.
			CO3	Analyze algorithm for data encryption standards key generation and transmission etc.
			CO4	Indentify techinques for email, IP and Web security
			CO5	Illustrate threats to system or application security and their counter measures
24	OCSPC305	Database Engineering	CO1	Explain concepts of database system, conceptual database design, relational algebra, SQL, normalization
			CO2	Design ER diagram for the enterprise as well as prepare the relational database schema for the enterprise using integrity constraints, validate the design applying normalization techniques and theoretical knowledge
			CO3	Write queries in pure languages, SQL to extract required information from the database.
			CO4	Comprehend file organization, concepts of indexing for efficient system performance, transaction management, concurrency control and recovery of databases
25	OCSPC351	Computer Algorithms Laboratory	CO1	Apply different design methods of algorithm.
			CO2	Analyze complexity of different algorithm designs.
			CO3	Communicate effectively and work in a team for laboratory activities.
			CO4	Practice rules to provide the solution for designing algorithms.
			CO5	Follow professional and ethical principles during laboratory.
26	OCSPC352	Database Engineering Laboratory	CO1	Interpret the problem statement of an enterprise, identify the need, analyse the problem and design ER model for the enterprise as well as prepare the relational database schema for the enterprise identifying integrity constraints for efficient design.
			CO2	Demonstrate installation and configuration of Oracle /MySQL / SQL Server / PostgreSQL etc.
			CO3	Apply the Structured Query language for database definition and manipulation and also use PL/SQL constructs.
			CO4	Experiment with hashing techniques, transaction processing, concurrency control etc.
			CO5	Follow professional and ethical principles during laboratory work in a team for laboratory activities.
27	OCSPE353	Professional Elective-IAdvanced progranrmirE	CO1	Experiment with python and Ruby on Rails programming basics
			CO2	Build applications for data manipulation using Python programming language
			CO3	Build an appliations using control structures in Python programming language
			CO4	Make use of OOP concepts using Python and Ruby on Rails programming language
			CO5	Examine the. observations and determine the result of experiment
28	OCSPE354	Professional Elective-I Software Testing and Quality Assurance	CO1	Explain the basic concepts of bsting pro"esJ& measurement
			CO2	Summarize the fundamentals software verification & creating test cases from SRS
			CO3	Apply different rnethods of regression tesiing
			CO4	Build different testing web applications & generate test data using tools.
			CO5	Examine the observations and determine the result of experiment
29	OCSPE355	Professional Elective-INetwork Admini"istration	CO1	Explain various concepts related to network administration and maintaining its security
			CO2	Apply active Directory Services, Configure & troubleshoot services in a windods server
			CO3	Make use of Linux Operating System to install, configure, and troubleshoot its service
			CO4	Demonstrate programs in an effective way related to network operating system

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
			CO5	Communicate effectively in both oral and written form during laboratory session
30	OCSPR356	Theme Based Mini Project	CO1	Identify specific problem ststement from a selected domain and prepare SRS documents
			CO2	Design and construct a Software system, component or process to meet desired needs
			CO3	Develop the software product using programming language
			CO4	Improve writing skils to compose project report professionally
			CO5	Follow given instructions during practical performance
31	OCSAC314	Entrepreneurship Development and Planning	CO1	Explain the nature and function of entrepreneurship
			CO2	Explain what characterizes an attractive business opportunities and common pitfalls during the entrepreneurial process
			CO3	Identify Finance and marketing solutions for Business
			CO4	Explain Concept and Characteristics of Small Scale Industry
			CO5	Develop Business plan
	B.Tech Semester-VI			
32	OCSPC306	Advanced Database System	CO1	Describe modeling and development methods/techniques in Object-Relational Databases.
			CO2	Explain knowledge on the need, issues, design and application of both parallel and Distributed databases.
			CO3	Describe different issues in application development and advanced transaction processing.
			CO4	Apply different database security, PL/SQL, NoSQL and OLAP queries on various databases.
			CO5	Compare and illustrate methods/technologies in developing data warehouses
33	OCSPC307	Machine Learning	CO1	Explain fundamental issues, challenges and algorithms of machine learning
			CO2	Demonstrate and use various algorithms and models with mathematical justifications
			CO3	comprehend strengths and weaknesses of various machine learning approaches and use appropriate machine learning algorithms for rear-world applications
34	OCSPE308	Professional Elective -II Digital Image Processing	CO1	Explain fundamental concepts of digital image processing, mathematical transforms,image enhancement, restoration, segmentation, morpholory, compression.
			CO2	Write algorithms and apply the concepts mathematically to interpret the results with justifications
			CO3	Compare different algorithms of image processing and apply them to solve real life problems
35	OCSPE309	Professional Elective -II Ad hoc Networks	CO1	Explain basic cellular and ad hoc wireless network and its applications
			CO2	Explain major issues, goals and challenges for designing ad hoc wireless network
			CO3	Summarize security in ad hoc wireless network
			CO4	Describe QoS and energy management schemes in ad hoc wireless networks
			CO5	Distinguish different types of ad hoc wireless network protocols
36	OCSPE310	Professional Elective -II Advanced Data Structures	CO1	Describe various advanced data structure techniques such as advanced linked list , advanced trees, graphs
			CO2	Describe various hashing techniques and collision resolution techniques
			CO3	Demonstrate the knowledge of advanced data structures in solving problems
			CO4	Analyze the algorithms and compare the working of various data structures
			CO5	Evaluate the performance of various data structures with help of different case studies
37	OCSPE311	Professional Elective -III Computer Graphics & Multimedia Techniques	CO1	Understand the graphics primitives and 2D and 3D trasnformation.
			CO2	Apply different graphics algorithms.
			CO3	Discuss various generations of curves.
			CO4	Compare various Computer Animation Technique.
			CO5	Demonstrate programs for various graphics algorithm.
			CO6	Accurately use Opengl software for graphics program.
		Professional Elective -III	CO1	Explain different storage system and its compnnents
			CO2	Use different techniques to evaluate performance of storage system

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
38	OCSPE312	Professional Elective -III Storage Network	CO3	Describe different storage network technologies and virtualization
			CO4	Ilistrate business continutybackup and recovery process of storage network
			CO5	Explain replication and storage security mechanisms
39	OCSPE313	Professional Elective -III Cyber Security	CO1	Explain the concepts of cyber security.
			CO2	Apply methods for cyber security methods with intrusion detection and prevention.
			CO3	dentify different cybercrimes and respective penalties in IT Act.
			CO4	Apply the scientific method to cyber forensics and ethical Hacking.
			CO5	Communicate effectively in both oral and written form during tutorial.
40	OCSPC357	Unix & Shell Programming Laboratory	CO1	Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System.
			CO2	Demonstrate UNIX commands for file handling and process control.
			CO3	Write Regular expressions for pattern matching and apply them to Various filters for a specific task.
			CO4	Analyze a given problem and apply requisite facets of SHELL Programming in order to devise a SHELL script to solve the problem.
			CO5	Perform different UNIX commands and SHELL Programming to solve problem.
			CO6	Follow professional and ethical principles during laboratory work in a team for laboratioy activities.
41	OCSPC358	Object Oriented Modeling And Design	CO1	Describe the fundamental concept of object oriented modelling and design
			CO2	Explain the novel way of thinking abstractly about a problem using real world concepts rather than computer concepts
			CO3	Describe object oriented modeling techniques methodology that combines three views of modeling systems
			CO4	identify with diagram conceptual , behavioral and architectural modeling of UML
			CO5	Compare structural and behavirol diagram using UML
			CO6	Prepare and present a power point presentation on assigned topic
			CO7	Follow professional and ethical principles during laboratory work in a team for laboratioy activities.
42	OCSPC359	Advanced Database System Laboratory	CO1	construct complx g features data types by utilizing features of object based database.
			CO2	Expepiment with distributed concurrency control protocol protocols and joins concept in distributed DBMS.
			CO3	Analyzing different types of aigorithm using data mining.
			CO4	Perform diffeient PL/SQL, NoSeLand OLAp queries on various databases
			CO5	Follow professional and ethical principles during laboratory work in a team in a term for laboratory activities.
43	OCSPC360	Web Programming	CO1	Describe fundamental of Web Programming
			CO2	Develop web page using different web programming techniques.
			CO3	Build responsive Web Page.
			CO4	Build simple websites by using CMS.
			CO5	Build web application using Javascript and Jquery.
			CO6	Examine the observations and determine the result of experiment.
44	OCSAC315	Soft Skills	CO1	Comply oneself with various personality traits
			CO2	Express oneself professionally for different types of interview
			CO3	Participate in various activities rerated to teamwork and problern .
			CO4	Exhibit positive attitude,work ethics and adaptability at work place.
			CO5	Organize in various tasks related to cross occupational comptency and life skills
	B.Tech Semester-VII			
45	OCSPC401	Distributed and Cloud Computing	CO1	Explain the principles underlying the functioning of dist buted system
			CO2	Apply the algorithms usgd in distributed system & visua ze their working
			CO3	Explain Cloud Infrastructure and their Components
			CO4	Make use of different virtualization tLctrniques
			CO5	Explain various cloud computing services and data security aspects in cloud

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
46	OCSOE402	Big Data Analytics	CO1	Solve examples using probability theory
			CO2	Explain components of business intelligence environment and discuss structure of decision making process .
			CO3	Examine big data and Hadoop ecosystem tools
			CO4	Summarize framework with respect to Hadoop
			CO5	Make use of R language for Data Analytics
47	OCSOE403	Database Essentials and Business Intelligence	CO1	Explain concepts of database system, conceptual database design, relational algebra, SQL, normalization
			CO2	Design ER diagram for the enterprise as well as prepare the relational database schema for the enterprise using integrity constraints, validate the design applying normalization techniques and theoretical knowledge
			CO3	Write queries in pure languages, SQL to extract required information from the database.
			CO4	Explain and interpret the basic concepts in Business Intelligence
			CO5	Explain concepts of data integration with various approaches demonstrating various case studies
48	OCSOE404	Machine Learning	CO1	Explain fundamental challenges and algorithms of machine learning
			CO2	Demonstrate and use various algorithms and models with mathematical justifications
			CO3	Demonstrate the working of various machine learning algorithms with mathematicial justfication for sample real world data
			CO4	Demonstrate and use various machine learning algorithms and models
			CO5	Comprehend strengths and weaknesses of various machine learning approaches and use appropriate machine learning algorithms for real-world applications.
49	OCSHS405	Project Management	CO1	Disseminate project management framework and involed in each phase
			CO2	Classify the importance of project plan
			CO3	Apply the relationship between scope, cost, time inpr
			CO4	Summarize the software quality metrics
			CO5	Recognize the importance of good communication and relationship between stakeholders for resolving issues.
			CO6	Examine the observations and identify risk factors during project development
50	OCSPC451	DCC Laboratory	CO1	Develop the communication among process at different hosts and apply the algorithms used in distributed system algorthms used in distributed system.
			CO2	Build highly scalable cloud-based applications by crea_ting and ionfryuring
			CO3	Apply various virtuali zation techniquesmachines on the cloud and building private cloudconfiguring virtual machines on the cloud and building private cloud
			CO4	Debate on various cloud platforms and their servis
			CO5	Communicate effectively in lab with orally and writing Journals
51	OCSPC452	BDA Laboratory	CO1	Explain need of Data Analytics.
			CO2	Analyze data processing using Hadoop Ecosystem tools
			CO3	Make Use of R programming for data processing
			CO4	Demonstrate programs using analytics tools
			CO5	Follow given instructions during practical performance.
52	OCSPE453	PE IV Deep Learning	CO1	Describe the fundamentals of neural networks
			CO2	Design feed forward networks with backpropagation
			CO3	Develop different deep learning models for given tasks
			CO4	Formulate & analyze the correct parameters and hyper-parameters of developed model for getting improved performance
			CO5	Build real-world applications using deep learning mechanisms and demonstrate effectively with verbal and written skills demonstrate
			CO1	Comprehend parallel algorithm design and taxonomy of parallel architecture
			CO2	Apply OpenMP directives and libraries to implement parallel program
			CO3	Develop different CUDA programs

Sr.No.	Course Code	Course Name	CourseOutcome	CO Statement
53	OCSPE454	PE IV Parallel Programming	CO4	Compare the sequential and parallel approach of varios problems with the help of Open MP MPI, CUDA platfrom implenmentations
			CO5	Justify use of different tools like DNN Digits etc based on given application problems
			CO6	Demonstrate parallel programming directives to solve problems
			CO7	Folloly professional and ethical practices during laboratory work for given leboratorl activiti es.
54	OCSPE455	PE IV Adv Web Programming	CO1	Describe fundamentals of web programming.
			CO2	Develop web page using different web programming techniques.
			CO3	Build responsive Web Page.
			CO4	Build simple websites by using AngularJS. Node Js, Express JS
			CO5	Explain the obervations and determine the result of experment
55	OCSPR456	Preproject	CO1	Identify and formulate the real-word problem for their major project in the field of their own interest
			CO2	Survey technical litereture blogs, documents about latest technological trends etc. to come-up with a4 innovative idea for technical proiect
			CO3	Analyze the hardware and/orsoftware rerequirements of the proposed work
			CO4	Identify and use relevant tools (from industry) and technologies for documentation, designing, coding, testing and debugging the software hardware pertaining to their mqior project (K3
			CO5	Defend or argue or appraise the results obtained during project work
			CO6	Design the prototype of the selected idea
			CO7	Exercise all the rnanagerial lpro.iect planning scheduling) and behavioral skills in a team to accornplish the goals of their projects
			CO8	Develop summarizing, ,writing, documentation ancl presentation skills to showcase their ideas in the conferences / journals leading to effective communication
56	OCSHS457	DesignThinking	CO1	Develop a strong understanding of the Design and propose a concrete feasible, viable and relevant innovation proiect/chailenee
			CO2	Recognize the latest and future issues / challenges in innovation and apply the feasible viable and relevent innovation project/challenge
			CO3	Create physical prototypes / a visual representation of an idea test it and present the soulation
			CO4	Develoo and test innovative ideas tfirough a rapid iteration cycle
			CO5	Develoo Professional skills, leadership and termwork skills shouldering resposibilities motivatiing co-workers team members building strong networks resolving conflicts
			CO6	Exhibit ethical practices in professional work ethics

H. O. D.
Computer Science & Engineering
Annasaheb Dange College of
Engineering & Technology, Ashta. 416 301

ASHTA
416 301

Programme Name : **Computer Science and Engineering Revision- First**

PSO	Statement
1	An ability to adapt to latest trends in software engineering practices and strategies in real-time software development lifecycle using open-source programming environment or commercial environment.
2	An ability to get acquainted with contemporary trends in industrial / research areas and thereby provide solutions to real life problems, by specifically using knowledge and skills in the areas of Data Analytics, Machine Learning, Internet of Things, Cloud Computing and Security.

Revision 1 Courses

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
	B.Tech Semester-III			
1	1CSBS201	Discrete Mathematics	CO1	Define and reason about fundamental mathematical concepts and terminology.
			CO2	Explain the notion of mathematical thinking, concepts and proofs.
			CO3	Apply appropriate formulas to calculate permutations and combinations.
			CO4	Apply mathematical concepts, equivalence formulas and laws to solve the problems.
			CO5	Proficiently use knowledge in Discrete Mathematics to solve and demonstrate the problem.
2	1CSPC202	Data Structures	CO1	Describe basic fundamentals in data structures.
			CO2	Explain the fundamental concepts of structuring, managing and organizing the data using linear and non-linear data structures with ADTs.
			CO3	Apply appropriate linear and nonlinear data structure to solve the problems.
			CO4	Explain the fundamental concepts of structuring, managing and organizing the data using non-linear data structr,u'es lvith ADTs
			CO5	Apply appropriate non-linear data structure to solve the problems
			CO6	Compare and analyze different data structure algorithrns and searching, softing
3	1CSPC203	Computer Networks	CO1	Explain the fundamental concepts of computer network.
			CO2	Apply various error detection/correction and IP addressing mechanisms
			CO3	Describe different protocols from TCP/IP suite
			CO4	Identify the design issues, class of IP addresses, and routing algorithms of network
			CO5	Relate the functionalities of different layers, different t1,pes of netrvork devicei ancj protocols in TCP/IP suite
4	1CSPC204	Processor Architecture	CO1	Explain architectures of Microprocessors with its pin configuration.
			CO2	Illustrate different interrupt mechanisms and stack operations in microprocessors.
			CO3	Explain concepts of interfacing peripheral devices with microprocessors.
			CO4	Differentiate functions of various microprocessors
			CO5	Write an assembly language program using 8085 microprocessor instruction set
			CO6	Design microprocessor with its physical, logical and segment address structure.
5	1CSPC205	Software Engineering	CO1	Illustrate basic concepts and principles of software engineering.
			CO2	Explain analysis, planning & requirement specifications of software project devopment.
			CO3	Construct structure & function-oriented design for software project development

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO4	neterm re t he cost of sotirvare rv.r.t. development efforts, qLrality and cost.
			CO5	Describe standards related to software reliability and quality management
6	1CSPC251	Data Structures Lab	CO1	Demon aat basic fundamentals in data structures.
			CO2	Apply appropriate data structures like stack, queue, trees and graphs for solving problems.
			CO3	Analyze searching and sorting techniques for data identification and retrieval
			CO4	Utilize sk ls for demonstrating mini project to solve problems
			CO5	Proficiendy use data structures to design solutions and solve problems.
7	1CSPC252	Computer Networks Lab	CO1	Simulate, configure and analyze the network using network analyzer tools.
			CO2	Demoretrate the installation and various features of computer network simulation tools.
			CO3	Make use of transport layer protocol and execute the communication nodes using TCP/UDP socket between computer
			CO4	Follow the given instructions during practical performance
			CO5	Communicate effectively in lab with orally and writing journals
8	1CSES253	Processor Architecture Laboratory	CO1	Identify the basic elements and functions of Microprocessors.
			CO2	Describe the architecture of Microprocessors and its peripheral devices.
			CO3	Design flowchart and Data flow diagrams for 8085assembly language program for microprocessor system.
			CO4	Proficient in the assembly language programming for 8085 microprocessor
			CO5	Compare 8085 and 8086 microcomputer software and Hardware aspects, including the Microprocessor structure, and its operation and controls.
9	1CSES254	Programming Laboratory- I	CO1	Explain the fundamentals of object oriented programming.
			CO2	Apply the concept of class, object, array, pointers inheritance and polymorphism in C++.
			CO3	Apply various library utilities and advanced features- template, STL, RTTI
			CO4	Develop programming skills to solve real world problems using object oriented concept in turbo C++
			CO5	Communicate effectively, both orally and in writing journals,
			CO6	Follow given instructions during practical performance.
	B.Tech Semester-IV			
10	1CSBS206	Statistics and Fuzzy Systems	CO1	Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions
			CO2	Solve example on the principal in performing fuzzy sets and fuzzy number arithmetic operation such as Addition, Multiplication Division & Fuzzy equation
			CO3	Solve different types of assignment problems by using different techniques
			CO4	Solve examples on Game Theory
			CO5	Solve examples on PERT and CPM
11	1CSPC207	Theory of Computation	CO1	Explain basic terminologies related to theory of computation.
			CO2	Construct regular expressions and build machines to recognize those regular expressions and vice versa.
			CO3	Demonstrate finite state systems, build them as per the requirement and transform them into different types of finite state systems
			CO4	Construct context-free grammars for languages, demonstrate derivations and parse trees for specified inputs.
			CO5	Demonstrate pushdown automata, its connection with context-free grammars and formulate conversion between them.
			CO6	Demonstrate various Turing machines for different kinds of formal languages and illustrate their variants.
12	1CSPC208	Operating Systems	CO1	Explain basic concepts of operating system, system structure. services, and operation in OS
			CO2	Illustrate process, Thread scheduling algorithm and interprocess communication.
			CO3	Apply appropriate solution to solve critical section problem .
			CO4	Solve thoroughly how to handle a deadlock.
			CO5	Identify memory management strategies and apply various page replacement policies.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO6	Explain basic concepts of file handling and I/O subsystem.
			CO1	Explain concepts of catabase system, conceptual database design, relational algebra, SQL, normalization
13	1CSPC209	Database Engineering	CO2	Design ER diagram for the enterprise as well as prepare the relational database schema for the enterprise using integrity constraints, validate the design applying normalization techniques and theoretical knowledge
			CO3	Write queries in pure languages, SQL to extract required information from the database
			CO4	Comprehend file organization, concepts of indexing for efficient system performance, transaction management, concurency control and recovery of databases
			CO5	Demonstrate concepts of indexing, concuffency protocols and recovery algorithms with real-world illustrations
			CO1	Explain evoluation cf computer and basics of computer organization
			CO2	Solve arithmetic, memory and parallel processing operation
14	1CSPC210	Computer Architecture	CO3	Illustrate Control design and memory organization
			CO4	Explain concepts of parallel processing and vector processing architecture
			CO5	Comprehend various distributed architecture
			CO1	Demonstrate the installation and various features of operating systems.
			CO2	Identify CPL scheduing algorithms and resolve problems related to deadlock, critical section.
15	1CSPC255	Operating Systems Laboratory	CO3	Test for appropriate commands on Unix, Linux platform and identify their use to perform various operations.
			CO4	Follow the given instructions during practical performance
			CO5	Proficiently Develop and debug, C programs created on Linux and Unix platforms
			CO1	Interpret the problem statement of an enterprise, identify the need, analyse the problem and design ER model for the enterprise as well as prepare the relational database schema for the enterprise identifying integrity constraints for efficient design.
16	1CSPC256	Database Engineering Laboratory	CO2	Make use of appropriate SQL construct to write the query with justification
			CO3	Apply the Structured Query language for database definition and manipulation and also use PL/SQL constructs.
			CO4	Experiment with hashing techniques, transaction processing, concurrency control etc.
			CO5	Follow professional and ethical principles during laboratory work in a team for laboratory activities.
			CO1	Apply various object orieuted lbatures like inheritance, data abstraction, encapsulation and polymorphisur to solve specitied problems
			CO2	Make use of Multi-threading, I/O operations, Exception and Networking to solve specified problems
17	1CSPC257	Programming Laboratory- II	CO3	Develop programs using Applet and Swing with database connectivity
			CO4	Identify and correct syntax, logic errors, and runtime errors in the programs
			CO5	Follow professional and ethical principles during practical performance
			CO1	Explain importance of environmental studies with necessary of acts.
			CO2	Explain importance of public awareness on environmental problems
18	1CSMC211	Environmental Studies	CO3	Write a technical report in team regarding course and impacts of environment related issues.
			CO4	Discuss current concern of environment issues.
			CO5	Describe the need of environment protection and ethics.
	B.Tech Semester-V			
			CO1	Explain concepts of database system, conceptual database design, relational database model and SQL
			CO2	Design ER diagram for the enterprise as well as prepare the relational database schema for the enterprise using inte_gritv constraints
19	1CSOE301	OE I DB Essentials	CO3	Write queries in SQL (DDL and DML) to design database and extract required information from the database.
			CO4	Explain and interpret the basic concepts in Business Intelligence
			CO5	Explain concepts of data integration with various approaches demonstrating various case studies
			CO1	Illustrate basic concepts and principles of software engineering.
20	1CSOE302	OE I Software Engineering and Project Management	CO2	Explain analysis, planning & requirement specifications of software project development.
			CO3	Disseminate project management framework and involved in each phase

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
		Project Management	CO4	Classify the importance of project plan.
			CO5	Apply the relationship between scope, cost, time in project
21	1CSOE303	OE I Data Stru and Algo	CO1	Describe fundamentals in data structures.
			CO2	Explain the fundamental concepts of structuring, managing and organizing the data using linear data structures with ADTs.
			CO3	Apply appropriate linear data structure to solve the problems.
			CO4	Explain the fundamental concepts of structuring, managing and organizing the data using non-linear data structures with ADTs.
			CO5	Apply appropriate non-linear data structure to solve the problems.
			CO6	Compare and analyze different data structure algorithms and searching, sorting methods.
22	1CSPC304	SP and compilers	CO1	Explain the fundamentals of language processing.
			CO2	Design an assembler and macro preprocessor.
			CO3	Identify a language processor for specific needs.
			CO4	Explain various stages of compiler construction.
			CO5	Design a parser using different techniques.
23	1CSPC305	Design and Analysis of Algo	CO1	Explain different design methods of algorithm.
			CO2	Explain solvability, unsolvability of a problem and computational models of parallel algorithm.
			CO3	Apply different design methods of algorithm.
			CO4	Apply different search techniques for efficient graph traversal.
			CO5	Analyze complexity of different algorithm designs.
24	1CSPC306	IOT	CO1	Describe fundamental mechanisms of Internet of Things.
			CO2	Function of RFID technology with respect to components & its working.
			CO3	Design applications of Internet of Things.
			CO4	Summarize the different wireless technologies for the IoT
			CO5	Analyze the components needed to prototyping of various application.
25	1CSPE307	PE I Storage N	CO1	Explain different storage system and its components.
			CO2	Apply different techniques to evaluate the performance of storage system.
			CO3	Distinguish different storage network virtualization technologies.
			CO4	Identify business continuity, backup & recovery process of storage network.
			CO5	Describe replication and storage security mechanisms.
26	1CSPE308	PE I Adhoc Nw	CO1	Explain basic cellular and ad hoc wireless network and its applications
			CO2	Analyze issues goals and challenge for designing AdHoc wireless network
			CO3	Summarize security in ad hoc wireless network
			CO4	Describe QoS and energy management schemes in ad hoc wireless networks
			CO5	Distinguish different types of ad hoc wireless network protocols
27	1CSPE309	PE I cyber sec	CO1	Explain concepts of cyber security and classify different cyber-attacks.
			CO2	Describe different cyber security safeguards including intrusion detection and prevention and firewalls.
			CO3	Illustrate different web services, applications and related cyber-attacks and crimes.
			CO4	Analyze different types of possible attacks in a real world cyber world scenario.
			CO5	Apply the scientific method to cyber forensics and ethical Hacking.
			CO6	Review and justify the penalty from IT Act-2000 for a cybercrime in a given situation.
			CO7	Communicate effectively cybercrime terminologies and security mechanisms in both oral and written form during tutorial sessions.
28	1CSPC351	DAA Lab	CO1	Apply different design methods of algorithm.
			CO2	Analyze complexity of different algorithm designs.
			CO3	Communicate effectively and work in a team for laboratory activities.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO4	Practice rules to provide the solution for designing algorithms.
			CO5	Follow professional and ethical principles during laboratory.
29	1CSPC352	Web Prog	CO1	Develop web page using different web programming techniques.
			CO2	Build web application using Javascript and Jquery.
			CO3	Build responsive Web Page.
			CO4	Build simple websites by using CMS.
			CO5	Examine the observations and determine the result of experiment.
30	1CSPE353	PE II Adv Progr	CO1	Apply programming basics of Python and Ruby on Rails.
			CO2	Build applications for data manipulation using Python programming language.
			CO3	Build an applications using control structures in Python Programming language.
			CO4	Make use of OOP concepts using Python and Ruby on Rails programming language.
			CO5	Examine the observations and determine the result of experiment.
31	1CSPE354	PE II CGMT	CO1	Explain graphics primitives and core concepts of computer graphics.
			CO2	Apply computer graphics concepts and algorithms for problem solving
			CO3	Apply various curve theorems and animation techniques for real time problems
			CO4	Demonstrate programs for various graphics algorithms.
			CO5	Proficiently use knowledge in computer graphics to build various computer animations.
32	1CSPE355	PE II Unix and shell p	CO1	Explain Unix Architecture, File system and use of Basic Commands.
			CO2	Demonstrate UNIX commands for file handling and process control.
			CO3	Illustrate Shell Programming and to write Shell Scripts.
			CO4	Analyze a given problem and apply requisite facets of SHELL Programming in order to devise a SHELL script to solve the problem.
			CO5	Perform different UNIX commands and SHELL Programming to solve problem.
			CO6	Follow professional and ethical principles during laboratory work in a team for laboratory activities.
33	1CSPR356	Miniproject	CO1	Identify specific problem statement from a selected domain.
			CO2	Analyze the hardware and/or software requirements of the proposed work
			CO3	Identify and use relevant tools and technologies for documentation, designing, coding, testing and debugging the software / hardware pertaining to their major project
			CO4	Defend or argue or appraise the results obtained during project work
			CO5	Design and construct a software system, component, or process to meet desired needs.
			Co6	Improve writing skills to compose project report professionally.
			CO7	Follow given instructions during practical performance.
34	1CSPR357	Internship/Intra-Inter institute activities	CO1	Make use of technology for solving real world problem
			CO2	Take part in developing solutions by examining the situations
			CO3	Justify the solutions for given problem
			CO4	Plan and create the detailed module for proposed solution
35	1CSMC310	Technical Writing	CO1	Apply knowledge of what goes into the key sections of a report to produce your own report
			CO2	Apply the skills for abstract writing and summarizing technical documents
			CO3	Communicate clearly and effectively in written, verbal, visual, and interpersonal contexts.
			CO4	Impart the ethics in scientific and technical communication
			CO5	Use various tools for preparing reports, drawing flowcharts, diagrams etc.
			CO6	Evaluate what a good report looks like
	B.Tech Semester-VI			
			CO1	Describe fundamental mechanisms of Internet of Things.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
36	1CSOE311	OE-II-IOT	CO2	Describe components and working of RFID technology.
			CO3	Design applications of Internet of Things.
			CO4	Make use of principles for IoT communication to solve real life problems.
			CO5	Analyze the components needed to prototyping of various application.
37	1CSOE312	OE-II Cyber laws and EH	CO1	Describe issues pertaining to cyberspace and cybercrime.
			CO2	Evaluate and Interpret the IT Act and others laws associated with the cyberspace.
			CO3	Show the ethical Hacking tools and its type .
			CO4	Demonstrate various social techniques.
38	1CSHS313	EDP	CO1	Explain the nature and function of enterprenurship
			CO2	Explain what charactrizes an attractive business opportunities and common pitfalls during the enterpreneurial process
			CO3	Identify finance and marketing solutions for Business
			CO4	Explain concept and characteristics od Small Scale Industry
			CO5	Develop Business Plan
39	1CSPC314	Adv Database Systems	CO1	Describe modeling and development methods/techniqes in Object-Relational Database
			CO2	Explan knowledgd on the need issues, design and application of both parallel and Distributed database
			CO3	Describe different issues in application development and advanced transction processing
			CO4	Apply different database security, PL/SQL, NoSQL and OLAP queries on various databases.
			CO5	Compare and illustrate methods/technologys in developing data warehouse
40	1CSPC315	Machine Learning	CO1	Explain the fundamentals, challenges of machine learning
			CO2	Describe various machine learning algorithms
			CO3	Demonstrate the working of various machine learning algorithms with mathematical justifications for sample real-world data
			CO4	Demonstrate and implement various machine learning algorithms and models
			CO5	Comprehend strengths and weaknesses of various machine learning approaches and use appropriate machine learning algorithms for real-world applications.
41	1CSPE316	PE III- STQA	CO1	Explain the basic concepts of testing process & measurement.
			CO2	Summarize the fundamentals software verification & creating test cases from SRS.
			CO3	Apply different methods of regression testing.
			CO4	Classify different testing web applications.
			CO5	Analyze various test data generation tools.
42	1CSPE317	PE III- Adv Data Structures	CO1	Describe various advanced data structure techniques such as advanced linked list, advanced trees, graphs.
			CO2	Describe various hashing techniques and collision resolution techniques.
			CO3	Demonstrate the knowledge of advanced data structures in solving problems.
			CO4	Analyze the algorithms and compare the working of various data structures
			CO5	Evaluate the performance of various data structures with help of different case studies
43	1CSPE318	PE III- Real Time Systems	CO1	Explain the basic terminologies, Hardware considerations, and working principles of real-time system with examples.
			CO2	Explain working principles of commercial RTOS like RT Linux with neat sketch architecture diagram.
			CO3	Use software engineering concepts required to sketch real Time systems
			CO4	Illustrate the programming languages which are required to design real-time system.
			CO5	Analyze the performance of real time system using different RTS concepts & models
44	1CSPC358	Adv Database Laboratory	CO1	Construct complex data types by utilizing features of object based databases.
			CO2	Experiment with distributed concurrrency control protocols and joins concept in distributed DBMS
			CO3	Analyze different types of algorithm using data mining
			CO4	Perform different PL/SQL, NoSQL and OLAP queries on various databases.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO5	Follow professional and ethical principles during laboratory work in a team for laboratory activities.
45	1CSPC359	Obj oriented Modelling and Design	CO1	Identify with diagram conceptual, behavioral and architectural modeling of the UML.
			CO2	Demonstrate fundamental concepts of Object oriented modelling and design to solve simple real world problems.
			CO3	Apply object oriented modeling techniques and methodology to design solutions of simple real world problems.
			CO4	Compare structural and behavioral diagram using UML.
			CO5	Analyze simple real world problems and apply Object oriented modeling and design concepts to solve the same.
			CO6	Prepare and present a power point presentation on assigned topic.
			CO7	Follow professional and ethical principles during laboratory work in a team for Laboratory activities.
46	1CSPC360	PE IV- Augmented and VR	CO1	Demonstrate understanding and perspective on the VR/AR.
			CO2	Build Augmented Reality Application
			CO3	Build Virtual Reality Application
			CO4	Examine observations and determine results f experiment.
47	1CSPC361	PE IV- Digital Image Processing	CO1	explain fundamental concepts of digital image processing, image enhancement, restoration, color image processing, image segmentation, morphology etc.
			CO2	Implement various algorithms in digital image processing for enhancement, restoration, segmentation, color imaging, morphology
			CO3	Use modern languages, tools and libraries for implementation and manipulation of image processing algorithms.
			CO4	Compare different algorithms of image processing and apply them to solve real life problems.
			CO5	Develop solutions to real world problems by making use of combinations of appropriate image processing algorithms.
			CO6	Follow professional and ethical principles during laboratory work in a team for laboratory activities.
48	1CSPC362	PE IV-Open Source Technologies	CO1	Identify the need of open source technology, open source Ecosystem.
			CO2	Exercise the FOSS tools for the software development.
			CO3	Perform different commands to solve problem.
			CO4	Examine observations and determine results of experiment
49	1CSPR363	Internship/Intra-Inter institute activities	CO1	Make use of technology for solving real world problem
			CO2	Take part in developing solutions by examining the situations
			CO3	Justify the solutions for given problem
			CO4	Plan and create the detailed module for proposed solution
50	1CSMC319	Constitution of India	CO1	Know the background of the present constitution of India.
			CO2	Understand the working of the union, state and local levels.
			CO3	Gain consciousness on the fundamental rights and duties.
			CO4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			CO5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
	B.Tech Semester-VII			
51	1CSOE401	OE-III Intro to IPCV	CO1	Explain: Fundamental concepts of Image processing, Image enhancement, Image segmentation, Morphology, Video Processing etc
			CO2	Descibe: various image processing and computer vision algorithams
			CO3	Write: Algorithums and apply the concepts methematically to interpret the results with jestification
			CO4	Compare: Various algorithms and identify the sutable for solving real world problems
			CO5	Explain: Applications of computer vision under various disciplanes and domains along with recent trends used such machine and deep learning
52	1CSOE402	OE -III Intro to ML	CO1	Explain the fundamentals, challenges of machine learning
			CO2	Describe various machine learning algorithm
			CO3	Demonstrate the working of various machine learning algorithms with mathematical justifications for sample real-world data

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO4	Demonstrate and use various machine learning algorithms and models
			CO5	Comprehend strengths and weaknesses of various machine learning approaches and select appropriate machine learning algorithms for real-world applications
53	1CSHS403	PM	CO1	Disseminate project management framework and involved in each phase
			CO2	Use Project integration management techniques for software project
			CO3	Apply the relationship between scope, cost, time in project
			CO4	Summarize the software quality metrics.
			CO5	Illustrate importance of good communication and relationship between stakeholders for resolving issues.
			CO6	Analyze the observation and risk factors during project development
54	1CSPC404	INS	CO1	Explain OSI security architecture along with different symmetric algorithms
			CO2	Make use of public key cryptography, digital signature and hash function scheme
			CO3	Describe Intrusion Detection System and TCP layer security concepts.
			CO4	Apply authentication techniques, electronic mail security,IP security and WEB security techniques.
			CO5	Analyze the various applications along with various attacks.
55	1CSPC405	Distributed and Cloud Computing	CO1	Explain the principles underlying the functioning of distributed systems
			CO2	Apply the algorithms used in distributed system & visualize their working
			CO3	Explain Cloud Infrastructure and their Components
			CO4	Make use of different virtualization techniques
			CO5	Explain various cloud computing services and data security aspects in cloud
56	1CSPE406	PE V- Deep Learning	CO1	Describe the fundamentals of supervised and unsupervised neural networks and deep learning networks
			CO2	Explain feed forward networks and their training issues
			CO3	Distinguish different types of ANN architectures and identify their applications
			CO4	Formulate & analyze the correct parameters and hyper-parameters of deep learning model for getting improved performance
			CO5	Apply Deep Learning architectures for various real world applications and analyze their performance
57	1CSPE407	PE V- BDA	CO1	Solve examples using probability theory
			CO2	Explain components of business intelligence environment and discuss structure of decision making process .
			CO3	Examine big data and Hadoop ecosystem tools
			CO4	Summarize framework with respect to Hadoop
			CO5	Make use of R language for Data Analytics
58	1CSPE408	PE V- HPC	CO1	Comprehend parallel algorithm design and taxonomy of parallel architecture
			CO2	Apply Open MP and MPI directives and libraries to implement parallel program
			CO3	Develop different CUDA programs
			CO4	Analyze performance of parallel algorithms designed using Open MP. MPI and CUDA
			CO5	Develop HPC Scalable Applications
59	1CSPC451	INS Lab	CO1	Develope code for classical Encryption Techniques to sole the problem.
			CO2	Build cryptosystems by applying symmetric and public key encryption algorithm.
			CO3	Construct code for authentication algorithms.
			CO4	Demonstrate the network security system using open source tools.
			CO5	Identify and apply the security measures to information and network security.
			CO6	Follow professional and ethical principles during practical performance.
60	1CSPC452	DCC Lab	CO1	Develop the communication among processes at different hosts and apply the algorithms used in distributed system.
			CO2	Build highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud
			CO3	Apply various virtualization techniques

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO4	Debate on various cloud platforms and their services
			CO5	Communicate effectively in lab with orally and writing journals
61	1CSPE453	PE V- Deep Learning Lab	CO1	Identify and apply appropriate procedures, tools and technology for implementation of simple and complex neural network and deep learning architectures
			CO2	Identify and apply appropriate data sets, Deep Learning architectures to solve real world problems
			CO3	Design Python programs using libraries such as PyTorch, TensorFlow and API such as Keras for implementing Deep learning architectures for various applications
			CO4	Evaluate the tunable parameters influencing the accuracy or error of deep learning model and analyze how these parameters shape the performance of the model
			CO5	Implement and build a deep learning application for detection or prediction tasks from the real world
			CO6	Contribute activively by presenting his/her own ideas in a team and coordinate to carry out a task
62	1CSPE454	PE V- BDA Lab	CO1	Explain need of Data Analytics.
			CO2	Analyze data processing using Hadoop Ecosystem tools
			CO3	Create application to solve read the problems using R programming
			CO4	Demonstrate programs using analytics tools
			CO5	Follow given instructions during practical performance.
63	1CSPE455	PE V- HPC Lab	CO1	Comprehend parallel algorithm design and taxonomy of parallel architecture
			CO2	Compare the sequential and parallel approach of various problems with help of OpenMP, MPI, CUDA platform implementations.
			CO3	Justify use of different tools like cuDNN, Digits etc based on given application problems.
			CO4	Demonstrate parallel programming directives to solve problems
			CO5	Follow professional and ethical practices during laboratory work for given laboratory activities.
64	1CSPR456	Project Phase I	CO1	Identify and formulate the real world problem for their major project in the field of their own interest
			CO2	Survey technical literature, blogs, documents about latest technological trends etc. to come-up with an innovative idea for technical project
			CO3	Analyze the hardware and/or software requirements of the proposed work
			CO4	Identify and use relevant tools and technologies for documentation, designing, coding, testing and debugging the software / hardware pertaining to their major project.
			CO5	Defend or argue or appraise the results obtained during project work
			CO6	Design the prototype of the selected idea
			CO7	Exercise all the managerial (project planning, scheduling) and behavioral skills in a team to accomplish in goals of their project
			CO8	Develop summarizing, writing, documentation and presentation skills to showcase their ideas in the conferences/ journals leading to effective comminication

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Programme Name	:	Computer Science and Engineering PG

	PSO	Statement
	1	An ability to adapt to latest trends in software engineering practices and strategies in real-time software development lifecycle using open-source programming environment or commercial environment.
Revision 0 Courses	2	An ability to get acquainted with contemporary trends in industrial / research areas and thereby provide solutions to real life problems, by specifically using knowledge and skills in the areas of Data Analytics, Machine Learning, Internet of Things, Cloud Computing and Security.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
		M.Tech Semester-I		
1	OCSPC501	Computational Mathematics	CO1	Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations & functions.
			CO2	Comprehend the concepts of algebraic systems and lattices.
			CO3	Apply understanding of vector, matrices, probability and random variable in problem solving.
			CO4	Classify queuing system and its types.
2	OCSPC502	Design of Database System	CO1	Describe a database system using different design methodology, prototyping and implementation.
			CO2	Explain different DBMS like replication database, mobile database.
			CO3	Explain working of data warehouse and design data warehouse using simulators.
			CO4	Describe different Data warehousing and data mining techniques.
3	OCSPC503	Advanced Computer Networks	CO1	Explain issues in the design of network processors and design network Systems.
			CO2	Analyze different possible solutions for communications at each network layer and application layer.
			CO3	Explain the working of wired and wireless networks to understand networking Concepts.
			CO4	Develop solutions by applying knowledge of mathematics, probability, and statistics to network design problems
			CO5	Compare various storage and networking technologies
4	OCSPC504	Design and Analysis of Algorithms	CO1	Compare different algorithms with respect to time and space complexity.
			CO2	Select appropriate algorithm methodology for the problem.
			CO3	Analyze different computer algorithms
			CO4	Discuss the new trends and research directions in algorithms.
5	OCSPE505	Professional Elective I-Graphics and Visualization	CO1	Explain fundamental principles within interaction programming.
			CO2	Interpret the fundamental concepts within computer graphics such as geometrical transformations, illumination models, removal of hidden surfaces and rendering.
			CO3	Solve the various graphics algorithms and to some extent be able to compare them.
			CO4	Explain the fundamental concepts within information visualization and scientific visualization.
6	OCSPE506	Professional Elective I- Data Science	CO1	Illustrate basic fundamentals of data science.
			CO2	Describe different algorithms in data science.
			CO3	Apply R programming on data to generate the results.
			CO4	Solve statistical problems in data science.
			CO5	Distinguish different data analytical tools.
7	OCSPC507	Research Methodology	CO1	Describe the basics of research.
			CO2	Explain various methods involved in data collection and analysis.
			CO3	Describe various techniques used in research problem formulation.
			CO4	Prepare a scientific article.
			CO5	Use research methods to prepare a research proposal.
			CO1	Design a database system using different design methodology using development lifecycle

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
8	OCSPC551	Design of Database System Laboratory	CO2	Apply different types of fragmentation of distributed database over centralized database.
			CO3	Analyze the performance of different database systems like replication, mobile database.
			CO4	Construct schema of data warehouse and configure the same.
			CO5	Demonstrate different data mining techniques over a database.
9	OCSPC552	Advanced Computer Networks Laboratory	CO1	Understand fundamental principles of computer networking, and networking devices.
			CO2	Analyze different possible solutions for communications at each network layer and application layer.
			CO3	Compare various software defined networking and OpenFlow tools.
			CO4	Demonstrate various the protocols used in the computer network.
			CO5	Construct various simulations of wired and wireless networks to understand networking Concepts.
10	OCSAC508	Intellectual Property Rights	CO1	Explain the IPR laws and Acts
			CO2	Know about the Copyright and issues
			CO3	Comprehend different IPR Designs
			CO4	Know about the Trade Mark and issues.
			CO5	Explain the various Information Technology Acts in IPR
	M. Tech Semester-II			
11	OCSPC509	Software Design and Architecture	CO1	Illustrate the fundamental principles of Software design process.
			CO2	Describe software architecture for large scale software systems.
			CO3	Recognize major software architectural styles, design patterns, and frameworks
			CO4	Describe a software architecture using various documentation approaches and architectural description languages
			CO5	Utilize well-understood paradigms for designing a system
12	OCSCS510	Parallel Computing	CO1	Explain different parallel programming models and basics of shared memory programming.
			CO2	Apply OpenMP and MPI libraries to implement parallel programs.
			CO3	Explain Basic of GPGPU, CUDA Memory model and Architecture.
			CO4	Apply different parallel programming libraries like OpenACC, OpenCL.
			CO5	Make use of different deep learning tools like cuDNN, Digits etc.
13	OCSPC511	Cryptography and Network Security	CO1	Explain the computation with respect to the Security
			CO2	Explain the Cryptography, Encryption and Decryption concepts.
			CO3	Comprehend different Cryptographic Algorithms.
			CO4	Explain various security issues in the Networking.
			CO5	Describe various Network Security Mechanisms.
			CO6	Identify the Scope and Challenges in the Security area.
14	OCSPE512	Professional Elective II- Advanced Distributed Operating Systems	CO1	Explain characteristics & challenges of distributed systems and design issues in distributed operating systems.
			CO2	Explain various communication techniques.
			CO3	Analyze the synchronization issues in a distributed system.
			CO4	Explain issues in process management.
			CO5	Design and Implementation of different issues in DSM.
15	OCSPE513	Professional Elective II- Computer Vision and Image Processing	CO1	Explain the main characteristics of different computer vision and image processing techniques through observation of their operations.
			CO2	Explain different computer vision and image processing solutions.
			CO3	Perform critical assessment of the effectiveness of different computer vision and image processing approaches.
			CO4	Apply and combine suitable computer vision and image processing principles to create new and improved solutions for real-world applications.
16	OCSPE514	Professional Elective-III Soft Computing	CO1	Illustrate basic fundamentals of soft computing
			CO2	Explain neural network and genetic algorithm techniques.
			CO3	Illustrate basics of hybrid techniques.
			CO4	Solve numerical methods in soft computing.
			CO5	Distinguish different soft computing techniques.
17	OCSPE515	Professional Elective-III Bioinformatics	CO1	Define the scope of Bioinformatics.
			CO2	Explain the types of Databases and their uses.
			CO3	Describe the various data mining and analysis tools.
			CO4	Explain Biological algorithms.
			CO5	Explain Data Analysis algorithms.

Sr.No.	Course Code	Course Name	Course Outcome	CO Statement
			CO6	Define Genome Analysis and Sequence Alignment.
18	OCSCS554	Parallel Computing Lab	CO1	Apply OpenMP & MPI directives and libraries to implement parallel program
			CO2	Develop different CUDA programs like vector addition, matrix multiplication etc.
			CO3	Apply different parallel programming libraries like OpenACC, OpenCL.
			CO4	Make use of different deep learning tools like cuDNN, Digits etc.
			CO5	Communicate effectively both orally and writing journals
			CO6	Follow given instructions during practical performance.
19	OCSPE555	Professional Elective II Laboratory - Distributed Operating Systems Laboratory	CO1	Explain various communication techniques
			CO2	Analyze the synchronization issues in a distributed system
			CO3	Design and Implementation of different issues in DSM.
			CO4	Relate different algorithms and techniques for the design and development of distributed systems.
			CO5	Reproduce standard design principles in the construction of these systems.
20	OCSPE556	Professional Elective II Laboratory - Computer Vision and Image Processing Laboratory	CO1	Explain the main characteristics of different computer vision and image processing techniques through observation of their operations.
			CO2	Explain different computer vision and image processing solutions.
			CO3	Perform critical assessment of the effectiveness of different computer vision and image processing approaches.
			CO4	Apply and combine suitable computer vision and image processing principles to create new and improved solutions for real-world applications.
			CO5	Proficiently develop applications of Image processing.
21	OCSPC558	Internet of Things	CO1	Describe fundamental mechanisms of Internet of Things.
			CO2	Explain Governance issues regarding Internet of Things.
			CO3	Use components of RFID technology in experiments.
			CO4	Experiment working of protocols related to wireless technologies.
			CO5	Proficiently develop applications of Internet of Things.

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