



ACS College of Engineering

(Approved by AICTE, New Delhi, Govt. of Karnataka & Affiliated to Visvesvaraya Technological University, Belgaum)

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2.6.1: Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students

All the departments of the institution adopts the Programme outcome (PO) defined by National Board of Accreditation (NBA), New Delhi and are to be fulfilled by all the programs in higher education. Hence, the Program Specific outcomes are defined by each department and are in lined with the vision and mission of the institution and department as well as the graduate attributes.

The CourseOutcomes (COs) for each subject is well defined in the syllabus or defined by concernedfaculty member in consultation with senior faculty teaching the same subject and HoD.The POs, PEOs, and PSOs and COs are available on Institutionwebsite and are also communicatedto students, teachers and other staff by displaying at following places:

Institution Website (www.acsce.edu.in)

Classrooms

Laboratories

Department Notice Board

HOD Chamber

Department Library

Department Newsletter

Laboratory Manuals.

Course Outcomes(CO's) of the course in the respective program are published in

Course Delivery Plan

Respective Class rooms

IA Test paper

Course materials

Admission Brochures

The COs is circulated to students through faculty announcements during the commencement of each semester and from time to time during the entire duration of the semester.

Principal

Campus

207, Kambipura, Mysore Road, Bengaluru - 560 074

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A.C.S. College of Engineering

Kambipura, Mysore Road, Kengeri Road

Bangalore - 560 074

Course Outcomes (COs) are defined for every course, and are statements that describe the competencies gained by the student through the course. Every CO is aligned to one or more POs, and is measured at the end of the course, through various assessments, designed specifically to effectively measure the CO and contribute to the PO that it is mapped to. The number of COs for a course is not fixed, and may have about six COs.

When COs are well defined, the CO-PO mapping becomes redundant, as one can map the CO to the PO through comprehending the essence of the CO. However, the strength of the mapping is dependent on the course instructor and this component, necessitates the need to have the CO-PO mapping together with its strength.

Syllabus: All courses of the curriculum have well defined COs, the CO-PO mapping with its strength and is included in the syllabus. The hardcopy of the syllabus is made available to every student.

Website:

The syllabus of all programs offered by the department is uploaded on the institutional website, which includes the COs of various courses of the curriculum.

Course handout:

The course handouts for every program includes Vision-Mission, PEOs, POs, PSOs of the Program offered by the department and COs of various courses of the Curriculum

Library:

Institute's central library keeps all the POs, PSOs and COs for easy access to students and faculty through the syllabus books of various programs.

Lab Manual:

All POs, PSOs and COs of specific lab course are printed on lab manuals and issued to all students at the commencement of every semester.

Course Files:

All the faculty members will prepare a course file for each semester that lists the POs, PSOs and COs.



ACS College of Engineering
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(A Unit of RajaRajeswari Group of Institutions)

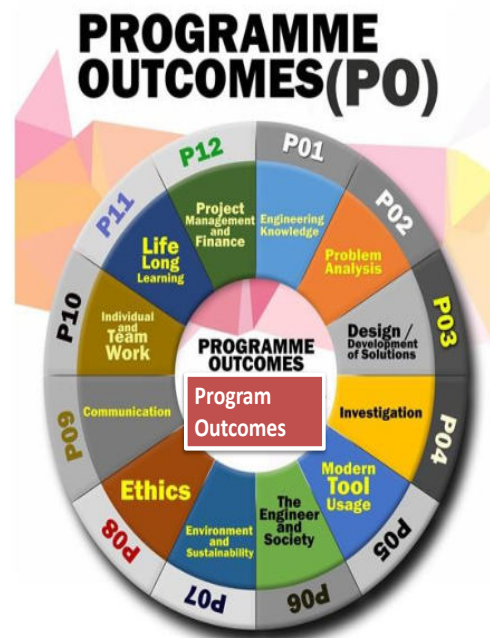


PROGRAMME OUTCOME, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES OF ALL DEPARTMENTS -2020-21 (CRITERIA - 2)

Department of Aeronautical Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

Program Outcomes:



PO1 - Engineering Knowledge: Apply knowledge of mathematics and science, with fundamentals of Aeronautical Engineering to be able to solve complex engineering problems related to Aeronautical Engineering.

PO2 - Problem Analysis: Identify, Formulate, review research literature and analyze complex engineering problems related to Aeronautical Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3 - Design/Development of solutions: Design solutions for complex aircraft problems related to Aeronautical Engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural societal and environmental considerations

PO4 - Conduct Investigations of Complex problems: Use research-based knowledge and research methods including design of aircraft structure experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, Select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to Aeronautical Engineering related complex engineering activities with an understanding of the limitations.

PO6 - The Engineer and Society: Apply Reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Aeronautical professional engineering practice.

PO7 - Environment and Sustainability: Understand the impact of the Aeronautical professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development

PO8 - Ethics: Apply Ethical Principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary Settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with High society and with write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11 - Project Management and Finance: Demonstrate knowledge and understanding of the engineering management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.

PO12 - Life-Long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning the broadest content of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1: AEROMODELLING	Apply their Engineering knowledge of all the fundamental, Core subjects & the Hardware and Software skills in the development (design, fabrication, analysis, testing and flying) of Aero models(RC, UAV & DRONES).
PSO-2: AEROSPACE EXPOSURE	Students will be given additional exposure in advanced development in the fields like AEROSPACE and Helicopter designs.
PSO-3: Career Improvement through NETWORK	Graduates will get quality industrial exposures and career opportunities in the field of aeronautics and aerospace from eminent scientists of ISRO, NAL, and DRDO taking advantage from the department's Strong network.

Course Outcomes:

Year / SEM : 2 nd year / 3 rd sem	Year of Study : 2020-21
Course Name: Aero Thermodynamics – 18AE32	
CO1	Apply the concepts and definitions of thermodynamics.
CO2	Differentiate thermodynamic work and heat and apply I law and II law of thermodynamics to different process.
CO3	Apply the principles of various gas cycles.

Year / SEM : 2 nd year / 3 rd sem	Year of Study : 2020-21
Course Name: Mechanics of Materials – 18AE33	
CO1	Apply the basic concepts of strength of materials.

CO2	Compute stress, strain under different loadings.
CO3	Distinguish the properties of different materials

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Elements of Aeronautics– 18AE34		
CO1	Appreciate and apply the basic principle of aviation	
CO2	Apply the concepts of fundamentals of flight, basics of aircraft structures, aircraft propulsion and aircraft materials during the development of an aircraft	
CO3	Comprehend the complexities involved during development of flight vehicles	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Mechanics of Fluid– 18AE35		
CO1	Evaluate the effect of fluid properties.	
CO2	Apply the governing laws of fluid flow.	
CO3	Classify different types of fluid flows.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Measurement and Metrology– 18AE36		
CO1	Apply the standards of measurement, system of limits, fits, tolerances and gauging.	
CO2	Identify and use appropriate measuring instruments	
CO3	Acquire the knowledge on measurement and measurement systems	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Measurement and Metrology Lab– 18AEL37A		
CO1	Identify and classify different measuring tools related to experiments.	
CO2	Identify, define, and explain accuracy, precision, and some additional terminology.	
CO3	Conduct, Analyze, interpret, and present measurement data from	

	measurements experiments.
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Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Machine Shop Lab– 18AEL38		
CO1	Demonstrate the operation of general purpose machine tools and manufacturing process.	
CO2	Identify the special purpose machine tools for specific requirements	
CO3	Develop physical models using different manufacturing processes.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Constitution Of India, Professional Ethics And Cyber Law (Cpc)-18CPC39		
CO1	Have constitutional knowledge and legal literacy	
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers	
CO3	Understand the cybercrimes and cyber laws for cyber safety measures	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Aerodynamics-I– 18AE42		
CO1	Evaluate typical airfoil characteristics and two-dimensional flows over airfoil	
CO2	Compute and analyse the incompressible flow over finite wings	
CO3	Apply finite wing theory and design high lift systems from the aerodynamics view point	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Aircraft Propulsion– 18AE43		
CO1	Apply the basic principle and theory of aircraft propulsion.	
CO2	Explain the functions of centrifugal, axial compressors, axial and radial turbines.	
CO3	Analyse the performance of nozzles & inlets and combustion chamber.	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Mechanisms and Machine Theory – 18AE44		
CO1	Apply the theory of velocity, acceleration and static force analysis to design of mechanisms.	
CO2	Design spur gears, gear train, balancing of rotating and reciprocating masses	
CO3	Apply governors and gyroscope	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Aircraft Material Science – 18AE45		
CO1	Identify appropriate aircraft materials for a given application.	
CO2	Explain the properties of super alloys, ablative materials and high energy material.	
CO3	Understand material corrosion process and apply prevention technique.	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Turbo machines – 18AE46		
CO1	Compute the energy transfer and energy transformation in turbo machines.	
CO2	Analyse the design of turbo machine blades	
CO3	Apply hydraulic pumps and turbines for specific requirements	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Material Testing Lab– 18AEL47A		
CO1	Apply the relations among materials and their properties.	
CO2	Differentiate the formation, properties and significance of the alloys through different experiments	
CO3	Understand the different types, advantages and applications of various NDT methods	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2020-21
Course Name: Computer Aided Aircraft Drawing Lab– 18AEL48		
CO1	Distinguish drawings of machine and aircraft components	

CO2	Identify assembly drawings either manually or by using standard CAD packages
CO3	Practice with standard components and their assembly of an aircraft

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Management And Entrepreneurship– 18AE51	
CO1	Explain about the management and planning.
CO2	Apply the knowledge on planning, organizing, staffing, directing and controlling.
CO3	Describe the requirements towards the small-scale industries and project preparation

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: AERODYNAMICS - II – 18AE52	
CO1	Utilize the concepts of compressible flow and shock phenomenon
CO2	Apply knowledge of oblique shock and expansion wave formation
CO3	Measure the parameters high speed flow

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Aircraft Structures - I – 18AE53	
CO1	Apply the basic concepts of stress and strain analysis.
CO2	Compute the impact stress.
CO3	Identify appropriate materials for suitable application based on properties

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Introduction To Composite Materials – 18AE54	
CO1	Explain the advantages of using composite materials as an alternative to conventional materials for specific applications
CO2	Describe the advanced fabrication and processing for producing composite parts.
CO3	Evaluate the micro- and macro-mechanical behavior of composite laminates

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-21
Course Name: Aircraft Systems & Instrumentation– 18AE55		
CO1	Distinguish the conventional and modern control systems	
CO2	Classify the aircraft systems	
CO3	Categorize different types of aircraft instruments	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-21
Course Name: BASICS OF ROCKETS & MISSILES– 18AE56		
CO1	Apply the principle of super position to Simple Harmonic Motions	
CO2	Determine the vibrations using vibration instruments	
CO3	Analyze the multi-degree freedom systems	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-21
Course Name: Aerodynamics Lab– 18AEL57		
CO1	Apply the flow visualization techniques.	
CO2	Estimate the pressure distribution over the bodies.	
CO3	Calculate the lift and drag	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-21
Course Name: Energy Conversion And Fluid Mechanics Lab– 18AEL58		
CO1	Operate the instrument and measure the BP, FP, IP and AF ratio.	
CO2	Find the efficiency of the engine and Estimate the calorific value of the given fuel	
CO3	Verify the Bernoulli's equation	
CO4	Evaluate the viscosity of fluid	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-21
Course Name: Aircraft Performance– 18AE61		

C01	Apply the basic airplane performance parameters.
C02	Differentiate the aircraft performance in steady un accelerated and accelerated flight
C03	Explain the aircraft maneuver performance

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
Course Name: Aircraft Structures - II– 18AE62		
C01	Utilize the concepts of thin walled beams.	
C02	Calculate the buckling of plates.	
C03	Analysis the stress in wings and fuselage frames	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
Course Name: Finite Element Method – 18AE63		
C01	Apply discretisation technique for domain decomposition.	
C02	Evaluate the effects of different loading and boundary conditions	
C03	Analyze the governing equations of finite element analysis	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
Course Name: Gas Turbine Technology– 18AE644		
C01	Select the suitable materials for engine manufacturing.	
C02	Evaluate the performance of the engine.	
C03	Test the engine using several types of engine testing methods	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
Course Name: Aircraft Propulsion Lab – 18AEL66		
C01	Analyze the cascade testing of axial compressor and axial turbine blade row.	
C02	Evaluate the performance of a jet engine.	
C03	Perform the measurement of a flame and nozzle flow	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-21
Course Name: Aircraft Structures Lab – 18AEL67		
CO1	Compute the deflection of simply supported beam and cantilever beam.	
CO2	Verify the Maxwell's theorem.	
CO3	Determine the buckling load, shear failure and shear centre	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-21
Course Name: Control Engineering– 17AE71		
CO1	Apply the concepts of control systems.	
CO2	Reduce the block diagrams and signal flow graphs	
CO3	Determine the frequency response analysis by using various types of plots	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-21
Course Name: Computational Fluid Dynamics – 17AE72		
CO1	Differentiate the FDM, FVM and FEM	
CO2	Perform the flow, structural and thermal analysis.	
CO3	Utilize the discretization methods according to the application	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-21
Course Name: Aircraft Stability And Control – 17AE73		
CO1	Apply the basic concepts of aircraft stability and control.	
CO2	Differentiate the static longitudinal and static directional stability.	
CO3	Estimate the dynamic derivatives	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-21
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Course Name: Helicopter Dynamics– 17AE743	
CO1	Apply the basic concepts of helicopter dynamics.
CO2	Compute the critical speed by using various methods.
CO3	Distinguish the turbo rotor system stability by using transfer matrix and finite element formulation

Year / SEM : 4th year / 7th sem	Year of Study : 2020-21
Course Name: Guidance, Navigation & Control– 17AE754	
CO1	Apply the basic concepts of navigation, guidance and control
CO2	Compare the different types of missile guidance system performance
CO3	Integrate the flight and fire control system

Year / SEM : 4th year / 7th sem	Year of Study : 2020-21
Course Name: Flight Simulation Lab– 17AEL76	
CO1	Plot the root locus and bode plot
CO2	Calculate the dynamics response of aircraft.
CO3	Use computational tools to model aircraft trajectory

Year / SEM : 4th year / 7th sem	Year of Study : 2020-21
Course Name: Modeling & Analysis Lab – 17AEL77	
CO1	Draw the geometric models of symmetric, cambered aerofoil, nozzle, wing and other structures.
CO2	Apply different types of meshing.
CO3	Perform the flow and stress analysis

Year / SEM : 4th year / 8th sem	Year of Study : 2020-21
Course Name: Avionics– 17AE81	
CO1	Select the suitable data bus based on the application.

CO2	Identify the suitable navigation systems.
CO3	Distinguish the avionics system architecture

Year / SEM : 4th year / 8th sem		Year of Study : 2020-21
Course Name: Flight Vehicle Design – 17AE82		
CO1	Calculate the thrust to weight ratio and wing loading.	
CO2	Compute the flight vehicle performance.	
CO3	Select the subsystems as per vehicle design	

Year / SEM : 4th year / 8th sem		Year of Study : 2020-21
Course Name: Flight Testing – 17AE831		
CO1	Measure The Flight Parameters.	
CO2	Estimate The Performance Of Flight.	
CO3	Apply The FAR Regulations	

DEPARTMENT OF AEROSPACE ENGINEERING

2.6.1 Program outcomes, program specific outcomes and course outcomes



PO1 - Engineering Knowledge: Apply knowledge of mathematics and science, with fundamentals of Aerospace Engineering and able to solve complex engineering problems related to Aerospace Engineering.

PO2 - Problem Analysis: Identify, Formulate, review research literature and analyze complex engineering problems related to Aerospace Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3 - Design/Development of solutions: Design solutions for complex problems related to Aerospace Engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural societal and environmental considerations

PO4 - Conduct Investigations of Complex problems: Use research-based knowledge and research methods including design of space vehicle structure experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, Select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to Aerospace Engineering related complex engineering activities with an understanding of the limitations.

PO6 - The Engineer and Society: Apply Reasoning informed by the contextual knowledge to assess societal,

health, safety, legal and cultural issues and the consequent responsibilities relevant to the Aerospace professional engineering practice.

PO7 - Environment and Sustainability: Understand the impact of the Aerospace professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development

PO8 - Ethics: Apply Ethical Principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary Settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with High society and with write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11 - Project Management and Finance: Demonstrate knowledge and understanding of the engineering management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12 - Life-Long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning the broadest content of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1: Professional Knowledge	Apply the knowledge of aerospace engineering in innovative, dynamic and challenging environment for design and development of flight or space vehicles through simulation, Programming skills and general purpose CAE packages.
PSO-2: Leadership Skills	Providing different types of in house training and industry practice to fabricate, test and develop the products with more innovative technologies.

PSO-3:	To prepare students to become technocrats with broad aerospace knowledge for design and development of systems and subsystems for aerospace and associated fields.
Attitude	
Development	

Course Outcomes:

Year / SEM : 2 nd year / 3 rd sem	
Course Name: Engineering Mathematics - III– 18MAT31	
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.

Year / SEM : 2 nd year / 3 rd sem	
Course Name: AERO-THERMODYNAMICS– 18AS32	
CO1	Apply the concepts and definitions of thermodynamics.
CO2	Differentiate thermodynamic work and heat and apply I law and II law of thermodynamics to different process.
CO3	Apply the principles of various gas cycles.

Year / SEM : 2 nd year / 3 rd sem	
Course Name: Mechanics of Materials– 18AS33	
CO1	Apply the basic concepts of strength of materials.
CO2	Compute stress, strain under different loading.
CO3	Distinguish the different failure theories.

Year / SEM : 2 nd year / 3 rd sem	
Course Name: INTRODUCTION TO AEROSPACE ENGINEERING– 18AS34	
CO1	Apply the basic knowledge & principles of aviation & spaceflight.

CO2	Apply the concepts of fundamentals of flight, basics of aircraft structures, aircraft & rocket propulsion and aircraft materials during the development of an aircraft
CO3	Appreciate the complexities involved during development of flight vehicles.

Year / SEM : 2 nd year / 3 rd sem	
Course Name: Mechanics of Fluid– 18AS35	
CO1	Evaluate the effect of fluid properties.
CO2	Apply the governing laws of fluid flow.
CO3	Classify different types of fluid flows.

Year / SEM : 2 nd year / 3 rd sem	
Course Name: AEROSPACE MATERIALS– 18AS36	
CO1	Apply the knowledge about the mechanical behaviour of different aircraft & aerospace materials.
CO2	Explain the applications of Aluminium alloys, Ceramics and Composites Materials.
CO3	Evaluate the importance of high temperature materials and their characterization.

Year / SEM : 2 nd year / 3 rd sem	
Course Name: MATERIAL TESTING LAB – 18ASL38	
CO1	Apply the relations among materials properties.
CO2	Differentiate the formation, properties and significance of the alloys through different Experiments.
CO3	Differentiate the types, advantages and applications of various NDT methods

Year / SEM : 2 nd year / 3 rd sem	
Course Name: MEASUREMENTS AND METROLOGY LAB– 18ASL37	
CO1	Identify and classify different measuring tools related to experiments.
CO2	Identify, define, and explain accuracy, precision, and some additional terminology.
CO3	Conduct, Analyze, interpret, and present measurement data from measurements experiments.

Year / SEM : 2 nd year / 4 th sem	
Course Name: ENGINEERING MATHEMATICS - IV– 18MAT41	
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Year / SEM : 2 nd year / 4 th sem	
Course Name: Aerodynamics-I– 18AS42	
CO1	Evaluate typical airfoil characteristics and two-dimensional flows over airfoil
CO2	Compute and analyse the in-compressible flow over finite wings
CO3	Apply finite wing theory and design high lift systems from the aerodynamics view point

Year / SEM : 2 nd year / 4 th sem	
Course Name: AEROSPACE STRUCTURES – I– 18AS43	
CO1	Apply the basic concepts of stress and strain analysis.
CO2	Compute the impact stress.
CO3	Identify appropriate materials for suitable application based on properties.

Year / SEM : 2 nd year / 4 th sem	
Course Name: Mechanisms and Machine Theory – 18AS44	
CO1	Apply the theory of velocity, acceleration and static force analysis to design of mechanisms.
CO2	Design spur gears, gear train, balancing of rotating and reciprocating masses
CO3	Apply governors and gyroscope

Year / SEM : 2 nd year / 4 th sem	
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Course Name: Introduction to Space Technology– 18AS45	
CO1	Distinguish the types of aerospace propulsion
CO2	Determine the attitude of the satellites.
CO3	Support the space mission operations.

Year / SEM : 2ndyear / 4th sem	
Course Name: COMPOSITE MATERIALS – 18AS46	
CO1	Explain the advantages of using composite materials as an alternative to conventional materials for specific applications.
CO2	Describe the advanced fabrication and processing for producing composite parts.
CO3	Evaluate the micro- and macro-mechanical behavior of composite laminates.

Year / SEM : 2ndyear / 4th sem	
Course Name: ENERGY CONVERSION AND FLUID MECHANICS LAB – 18ASL47	
CO1	Operate the instrument and measure the BP, FP, IP and AF ratio.
CO2	Find the efficiency of the engine and Estimate the calorific value of the given fuel.
CO3	Verify the Bernoulli's equation.
CO4	Evaluate the viscosity of fluid.

Year / SEM : 2ndyear / 4th sem	
Course Name: Computer Aided Aircraft Drawing Lab– 18ASL48	
CO1	Distinguish drawings of machine and aircraft components
CO2	Identify assembly drawings either manually or by using standard CAD packages
CO3	Practice with standard components and their assembly of an aircraft

Year / SEM : 3rd year / 5th sem	Course Name: Management and Entrepreneurship– 18AS51
CO1	Explain about the management and planning.

CO2	Apply the knowledge on planning, organizing, staffing, directing and controlling.
CO3	Describe the requirements towards the small-scale industries and project preparation.

Year / SEM : 3 rd year / 5 th sem	
Course Name: AERODYNAMICS - II- 18AS52	
CO1	Utilize the concepts of compressible flow and shock phenomenon
CO2	Apply knowledge of oblique shock and expansion wave formation.
CO3	Measure the parameters high speed flow.

Year / SEM : 3 rd year / 5 th sem	
Course Name: AEROSPACE PROPULSION- 18AS53	
CO1	Analyze the engineering concepts of air breathing propulsion systems
CO2	Distinguish the different types of compressors.
CO3	Choose the propellant based on the application.

Year / SEM : 3 rd year / 5 th sem	
Course Name: AEROSPACE STRUCTURES - II- 18AS54	
CO1	Compute the shear flow in open and closed section
CO2	Analyze the stability problems of thin walled structures.
CO3	Distinguish the mini and micro structures.

Year / SEM : 3 rd year / 5 th sem	
Course Name: Aircraft Systems & Instrumentation- 18AS55	
CO1	Distinguish the conventional and modern control systems.
CO2	Classify the aircraft systems.
CO3	Categorize different types of aircraft instruments.

Year / SEM : 3rd year / 5th sem	
Course Name: Flight Mechanics– 18AS56	
CO1	Apply the basic concepts of aircraft performance, and stability.
CO2	Use static stability concepts and stability parameters.
CO3	Estimate the dynamic stability derivatives.

Year / SEM : 3rd year / 5th sem	
Course Name: Aerodynamics Lab– 18ASL57	
CO1	Apply the flow visualization techniques.
CO2	Estimate the pressure distribution over the bodies.
CO3	. Calculate the lift and drag.

Year / SEM : 3rd year / 5th sem	
Course Name: PROPULSION LAB– 18ASL58	
CO1	Analyze the performance of jet engine.
CO2	Evaluate the performance of a propellant.
CO3	Differentiate among different equipments required for study of propulsion.

Year / SEM : 3rd year / 5th sem	
Course Name: Environmental Studies– 18CIV59	
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

Year / SEM : 3rd year / 6th sem	
Course Name: MISSILES AND LAUNCH VEHICLES– 18AS61	
CO1	Identify the types of space launch vehicles and missiles.
CO2	Distinguish the solid and liquid propellant motors.
CO3	Classify different types of materials used for rockets and missies

Year / SEM : 4th year / 7th sem	
Course Name: COMPUTATIONAL FLUID DYNAMICS – 18AS62	
CO1	Differentiate the FDM, FVM and FEM
CO2	Perform the flow, structural and thermal analysis.
CO3	Utilize the discretization methods according to the application.

Year / SEM : 3rd year / 6th sem	
Course Name: FINITE ELEMENT METHOD– 18AS63	
CO1	Apply discretisation technique for domain decomposition.
CO2	Evaluate the effects of different loading and boundary conditions
CO3	Analyze the governing equations of finite element analysis

Year / SEM : 3rd year / 6th sem	
Course Name: DESIGN, MODELLING & ANALYSIS LAB – 18ASL66	
CO1	Draw the geometric models of symmetric, cambered aerofoil, nozzle, wing and other structures.
CO2	Apply different types of meshing.
CO3	Perform the flow and stress analysis

Year / SEM : 3rd year / 6th sem	
Course Name: Aerospace Structures Lab– 17ASL67	

CO1	Compute the deflection of simply supported beam and cantilever beam.
CO2	Verify the Maxwell's theorem.
CO3	Determine the buckling load, shear failure and shear centre.

Year / SEM : 3 rd year / 6 th sem	
Course Name: Hypersonics-18AS641	
CO1	Apply the basics of hypersonic flows.
CO2	Apply the approximate methods for inviscid hypersonic flows.
CO3	Classify the viscous interactions in hypersonic flows.

Year / SEM : 3 rd year / 6 th sem	
Course Name: Theory of Vibrations– 18AS642	
CO1	Apply the principle of super position to Simple Harmonic Motions.
CO2	Determine the vibrations using vibration instruments.
CO3	Analyze the multi-degree freedom systems.

Year / SEM : 3 rd year / 6 th sem	
Course Name: Introduction To Astrophysics And Space Environment– 18AS643	
CO1	Evaluate the Black body radiation, specific intensity, flux density, etc.
CO2	Apply the relativistic quantum mechanics.
CO3	Identify and sun and the solar system.

Year / SEM : 3 rd year / 6 th sem	
Course Name: Radar and Microwave Engineering– 18AS644	
CO1	Apply of concepts of Radars.
CO2	Classify the modulators, duplexer and circulators.
CO3	Identify the applications of different types of radars.

Year / SEM : 4 th year / 7 th sem	
Course Name: Space Mechanics – 18AS71	
CO1	Apply the basic concepts of space mechanics and the general N-body.
CO2	Explain satellite injection and satellite orbit perturbations.
CO3	Distinguish between interplanetary and ballistic missile trajectories.

Year / SEM : 4 th year / 7 th sem	
Course Name: Control Engineering – 18AS72	
CO1	Apply the concepts of control systems.
CO2	Reduce the block diagrams and signal flow graphs.
CO3	Determine the frequency response analysis by using various types of plots..

Year / SEM : 4 th year / 7 th sem	
Course Name: SPACE SIMULATION LAB – 18ASL76	
CO1	Do the stability analysis using Root locus, Bode plot, Nyquist plot and Polar plot techniques.
CO2	Simulate the Hoffmann transfer and orbit maneuvering.
CO3	Simulate the trajectory of the rocket or missile.

Year / SEM : 4 th year / 7 th sem	
Course Name: AVIONICS AND INSTRUMENTATION LAB – 18ASL77	
CO1	Perform measurements on different instruments used for flight operations
CO2	Perform analog /digital conversions and use microprocessors.
CO3	Handle functioning of MIL-STD-1553B Data Bus.

Year / SEM : 4 th year / 7 th sem	
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Course Name: AVIONICS SYSTEMS – 18AS731	
CO1	Select the suitable data bus based on the application.
CO2	Identify the suitable navigation systems.
CO3	Distinguish the avionics system architecture.

Year / SEM : 4th year / 7th sem	
Course Name: SPACE VEHICLE DESIGN– 18AS732	
CO1	Carry out space mission analysis and design process
CO2	Explain a spacecraft configuration.
CO3	Apply the concepts of space craft attitude control and instrumentation

Year / SEM : 4th year / 7th sem	
Course Name: Air and Missile Defense Systems– 18AS733	
CO1	Students will understand the advanced concepts of missile guidance and control
CO2	Necessary mathematical knowledge that are needed in understanding the physical processes.
CO3	The students will have an exposure on various topics such as missile systems, missile airframes, autopilots, guidance laws.

Year / SEM : 4th year / 7th sem	
Course Name: Heat & Mass Transfer – 18AS734	
CO1	Describe the fundamental of heat and mass transfer.
CO2	Familiarize the student in the area of conduction, convection and radiation.
CO3	Analyze the problems due to heat transfer in several areas.

Year / SEM : 4th year / 7th sem	
Course Name: SATELLITE COMMUNICATION– 18AS741	
CO1	Apply of concepts of orbital mechanics.

CO2	Classify the modulation and Multiplexing Schemes.
CO3	Identify the applications of satellites.wind tunnel

Year / SEM : 4th year / 7th sem	
Course Name: WIND TUNNEL TECHNIQUES– 18AS742	
CO1	Apply the principles and procedures for model testing in the wind tunnel.
CO2	Classify the types and functions of wind tunnel.
CO3	Distinguish the conventional measurement techniques and special wind tunnel techniques.

Year / SEM : 4th year / 7th sem	
Course Name: GUIDANCE, NAVIGATION AND CONTROL – 18AS743	
CO1	Apply the basic concepts of navigation, guidance and control.
CO2	Compare the different types of missile guidance system performance.
CO3	Integrate the flight and fire control system.

Year / SEM : 4th year / 7th sem	
Course Name: Global Navigation Satellite Systems– 18AS744	
CO1	Describe about the GPS and its signals.
CO2	Classify the types of satellite constellation.
CO3	Identify the orbits, position and errors.

Year / SEM : 4th year / 8th sem	
Course Name: SPACECRAFT SYSTEMS – 18AS81	
CO1	Identify the spacecraft mission and configuration.
CO2	Describe the power requirements and its design concepts.
CO3	Classify the Propulsion, thermal control and telemetry systems.

Year / SEM : 4th year / 8th sem	
Course Name: Satellite Navigation Systems– 18AS821	
CO1	Identify the spacecraft environment for design consideration.
CO2	Apply the navigation concepts and systems.
CO3	Classify the control actuators.

Year / SEM : 4th year / 8th sem	
Course Name: CRYOGENICS– 18AS822	
CO1	Recognize the basic of cryogenic engineering.
CO2	Identify the storage and instrumentation required for cryogenic liquids.
CO3	Classify the types of cryogenic equipments.

Year / SEM : 4th year / 8th sem	
Course Name: ROBOTICS– 18AS823	
CO1	Identify the mathematical representation of robots.
CO2	Classify the manipulators.
CO3	Classify the sensors and actuators.

Year / SEM : 4th year / 8th sem	
Course Name: OPTIMIZATION TECHNIQUES – 18AS824	
CO1	Identify the unconstrained and constrained minimization effect of fluid properties.
CO2	Apply the direct search methods, discrete and dynamics programming.
CO3	Classify the optimisation application

Department of Biomedical Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes



Program Outcomes:

PO1 - Engineering Knowledge: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6- The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10-Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12-Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1:	An ability to apply mathematical knowledge to design, develop, and analyse Bio-medical problems and applications
PSO-2:	Impart basic and advanced Bio-medical knowledge needed for the student relevant to excel as Bio-medical engineer

Course Outcomes:

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21	
Course Name: Electronic Instrumentation – 18BM32			
CO1	Analyze instrument characteristics, errors and generalized measurement system.		
CO2	Analyze and use the circuit for the measurement of R, L, C, F, I, V etc		
CO3	Use of Ammeters, Voltmeter and Multimeters and CRO for measurement		
CO4	Analyze and interpret different signal generator circuits for the generation of various waveforms		
CO5	Understand and use different display devices and recorders		
Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21	
Course Name: Analog Electronics Circuits – 18BM33			
CO1	Explain the biasing of BJT and FET		
CO2	Model BJT/FET for ac/dc analysis		
CO3	Design Single stage, Multistage amplifier, with and without feedback		
CO4	Analyze Frequency response of BJT and FET.		

CO5	Acquire the knowledge of classifications of Power amplifier, operation, and able to design power amplifier
CO6	Apply the knowledge gained in designing of BJT/FET/UJT based Oscillators.

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Digital Design and HDL– 18BM34		
CO1	Simplify Boolean functions using K-map and Quine-McCluskey minimization technique	
CO2	Analyze, design and write verilog code for combinational logic circuits. (MUX, De-MUX, adder and subtractor, and comparator circuits)	
CO3	Analyze the concepts of Latches and Flip Flops. (SR, D, T and JK).	
CO4	Analyze and design of synchronous sequential circuits	
CO5	Implement Combinational circuits (adders, subtractors, multiplexers) using Verilog descriptions	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Human Anatomy and Physiology– 18BM35		
CO1	Describe internal environment of human body and explain the fundamental concept of Homeostasis	
CO2	Explain the structure and functioning of various types of tissues.	
CO3	Describe the structure and explain the functioning of various nervous system, cardiovascular system, respiratory system, digestive system and musculoskeletal system	
CO4	Demonstrate and analyze various physiological parameters in normal and abnormal conditions	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Network Analysis– 18BM36		
CO1	Apply the basic concepts (Laws, theorems) of networks to obtain solution.	
CO2	Choose the Appropriate/specific technique to analyze the networks.	
CO3	Realize and Analyze the network behaviour	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-21
Course Name: Analog Electronics Lab– 18BML37		
CO1	Able to design Single stage, Multistage amplifier, with and without feedback	
CO2	Able to analyse Frequency response of BJT and FET	

CO3	Acquire the knowledge of Power amplifiers, operation, and able to design power amplifier
CO4	Apply the knowledge gained in the design of BJT/FET circuits in Oscillators
CO5	Knowledge of UJT characteristics and its application
CO6	Applications of theorems in various practical fields.

Year / SEM : 2ndyear / 3rdsem		Year of Study : 2020-21
Course Name: Digital Design and HDL Lab– 18BML38		
CO1	Realize Boolean expression using Universal gates / basic gates using ICs and Verilog	
CO2	Demonstrate the function of adder/subtractor circuits using gates/ICs & Verilog.	
CO3	Design and analyze the Comparator, Multiplexers Decoders, Encoders circuits using ICs and verilog	
CO4	Design and analysis of different Flip-flops and counters using gates and FFs	
CO5	Able to use FPGA/CPLD kits for down loading Verilog codes for shift registers and counters and check output	

Year / SEM : 2ndyear / 4thsem		Year of Study : 2020-21
Course Name: SC & DAC– 18BM42		
CO1	Understand the basic principles and operation of op-amp.	
CO2	Design and develop circuits to meet the practical applications	
CO3	Implement and integrate the op-amp circuits in electronic gadgets	

Year / SEM : 2ndyear / 4thsem		Year of Study : 2020-21
Course Name: Embedded Microcontrollers– 18BM43		
CO1	Learn architecture of 8051 and MSP 430.	
CO2	Learn programming skills using Assembly language and C	
CO3	Design and interfacing of microcontroller based embedded systems.	
CO4	Build projects	

Year / SEM : 2ndyear / 4thsem	Year of Study : 2020-21
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Course Name: Control system– 18BM44	
CO1	Apply modeling knowledge in implementation physical systems.
CO2	Understand the reduction of block diagram & analyze using Signal flow graph.
CO3	Comment on performance of a system by evaluating various parameters.
CO4	Model a system by applying the concept of State Space analysis

Year / SEM : 2ndyear / 4thsem	Year of Study : 2020-21
Course Name: Biomedical Transducers & Measurements– 18BM45	
CO1	Understand the working principle and construction details of Transducers.
CO2	Improve the measurement techniques through different approach.
CO3	Practically can implement the technology in measurement field.

Year / SEM : 2ndyear / 4thsem	Year of Study : 2020-21
Course Name: Scientific Analytical Instrumentation– 18BM46	
CO1	The students get well versed with the principle, construction and working of various analytical Instrumentation
CO2	Students get detailed information about the application of analytical techniques in medicine, industry etc.

Year / SEM : 2ndyear / 4thsem	Year of Study : 2020-21
Course Name: Embedded Controllers Lab– 18BML47	
CO1	Get hands-on exposure in 8051 and MSB 430 platform
CO2	Enhance programming skills using Assembly language and C.
CO3	Design and interfacing of microcontroller based embedded systems.
CO4	Build projects

Year / SEM : 2ndyear / 4thsem	Year of Study : 2020-21
Course Name: Biomedical Transducers & Measurements Lab– 18BML48	
CO1	Analyze the response and plot the characteristics of temperature measurement transducers such as RTD, Thermistor, and Thermocouple & AD590.
CO2	Analyze the response and plot the characteristics of displacement measuring

	transducers such as LVDT and Potentiometric transducer.
CO3	Analyze the response and plot the characteristics of strain gauge type load cell
CO4	Analyze the response and plot the characteristics of pressure transducer
CO5	Measure unknown values of resistance, capacitance and Inductance using different bridges
CO6	Design , build and test the circuits for practical applications using transducers
CO7	Measure BP, solution concentration, pH and conductivity for different biomedical applications.

Year / SEM : 3rd year / 5thsem		Year of Study : 2020-21
Course Name: Technological Innovation Management and Entrepreneurship – 18ES51		
CO1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business	
CO2	Describe the functions of Managers, Entrepreneurs and their social responsibilities	
CO3	Understand the components in developing a business plan	
CO4	Awareness about various sources of funding and institutions supporting entrepreneurs	

Year / SEM : 3rd year / 5thsem		Year of Study : 2020-21
Course Name: Fundamentals Signals & DSP– 18BM52		
CO1	Visualize, Classify and perform computation on discrete time signals, systems and properties	
CO2	Perform the transformation techniques from time domain to other and vice versa, and analyze the system and properties (Z-Transform, DFT etc.)	
CO3	Realize / implement the Direct/ cascade/ parallel/ lattice forms of the given digital system (IIR/ FIR)	
CO4	Compute DFT by FFT algorithms	
CO5	Develop transformation from analog system to digital system and design and implement IIR and FIR filters	
CO6	Demonstrate the advanced concepts of signal processing (Multirate and Adaptive filtering) and architecture of DSP processor	

Year / SEM : 3rd year / 5thsem		Year of Study : 2020-21
Course Name: Clinical Instrumentation-1– 18BM53		
CO1	Analyze and interpret the types of heart abnormalities.	

CO2	Describe the constructional details of equipment's used in cardiology.
CO3	Explain the basic principles of ophthalmology instruments.
CO4	Discuss the clinical methods and surgical procedures in ophthalmology.
CO5	Use few of the ophthalmological instruments for diagnostic purpose.

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Biomedical Equipment's- 18BM54	
CO1	Define and analyze the ECG, EEG and BP signals.
CO2	Discuss the factors to be considered in the measurements of respiratory and audiometric signals.
CO3	Describe the principle and working of cardiac pacemakers, defibrillators and surgical devices.
CO4	Describe the principle and working of therapeutic instruments like Dialysis, heart-lung, ventilator, lithotripter and incubators.
CO5	Interpret the concepts involved with the measurement of man and instruments.
CO6	Discuss the physiological effects from electric shocks and maintenance of medical equipment's as per standard.

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Rehabilitation Engineering- 18BM55	
CO1	Define rehabilitation and explain the composition of rehabilitation team.
CO2	Discuss the engineering principles of rehabilitation engineering.
CO3	Apply engineering skills in the development of prosthetic and orthotic devices.
CO4	Evaluate the orthopaedic design and applications. Approved
CO5	Apply the principles of engineering in the development of mobility aids for physically handicap

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: VLSI Design- 18BM56	
CO1	Identify the CMOS layout levels, and the design layers used in the process sequence.

C02	Describe the general steps required for processing of CMOS integrated circuits.
C03	Design static CMOS combinational and sequential logic at the transistor level.
C04	Demonstrate different logic styles such as complementary CMOS logic, pass-transistor Logic, dynamic logic, etc.
C05	Interpret the need for testability and testing methods in VLSI

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Signal Conditioning Circuits and Data Acquisition Lab– 18BML57	
C01	Sketch/draw circuit schematics, construct circuits on breadboards, analyze and troubleshoot circuits containing Op-amps, resistors, diodes, capacitors and independent sources.
C02	Memorize and reproduce the manufacturer's data sheets of IC 555 timer, IC μ a741 op-amp and data converters like IC ADC 0800 and IC DAC 0809.
C03	Design and evaluate analog integrated circuits like Amplifiers, Oscillators, Active filters, Precision Rectifiers and Voltage level detectors, and compare the experimental results with theoretical values.
C04	Demonstrate and analyze the working of Sample-Hold, Programmable gain amplifier and Analog Multiplexer circuits in data acquisition system.
C05	Design and evaluate different resolution data converters using discrete components and ICs.

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2020-21
Course Name: Clinical Instrumentation and Signal Processing Lab – 18BML58	
C01	Design and verify the different bio amplifiers & filters
C02	Acquire and analyze the ECG, EEG and respiratory signals
C03	Analyze the visual ability and audibility using appropriate instruments.
C04	Demonstrate the working of different diagnostic and therapeutic hospital equipment's
C05	Install and operate different types of hospital instruments
C06	Apply and analyze the signal processing algorithms on standard signals.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-21
Course Name: ENVIRONMENTAL STUDIES – 18CIV59		
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale	
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment	
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components	
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
Course Name: Analog and digital Communication– 18BM61		
CO1	Explain the basics concepts of analog modulation techniques.	
CO2	Discuss the basic concepts of digital modulation techniques.	
CO3	Describe the basic concepts of digital data and pulse communication.	
CO4	Explain and analyze different digital modulation techniques.	
CO5	Describe different wireless area networks and their applications	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
Course Name: Medical Image Processing– 18BM62		
CO1	Define the general terminology of digital image processing.	
CO2	Identify the need for image transforms and their types both in spatial and frequency domain.	
CO3	Identify different types of image degradation and apply restoration techniques.	
CO4	Describe image compression models and learn image compression techniques.	
CO5	Explain and apply various methodologies for image segmentation	
CO6	Implement image processing and analysis algorithms	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-21
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Course Name JAVA Programming-18BM63	
CO1	Explain the object-oriented concepts and JAVA.
CO2	Develop computer programs to solve real world problems in Java.
CO3	Develop multithreaded applications with synchronization.
CO4	Develop applets for web applications
CO5	Design GUI based applications

Year / SEM : 3rd year / 6thsem	Year of Study : 2020-21
Course Name: Hospital Design, Planning and Management -18BM642	
CO1	Design and construct the hospital with an effective administration and financial management.
CO2	Plan and develop an effective hospital supportive system for all types of hospital services.
CO3	Evaluate the proper functioning and services provided by the hospitals

Year / SEM : 3rd year / 6thsem	Year of Study : 2020-21
Course Name: OCCUPATIONAL HEALTH AND SAFETY -18CV653	
CO1	Identify hazards in the workplace that pose a dangerous health disorders.
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation.
CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety

Year / SEM : 3rd year / 6thsem	Year of Study: 2020-21
Course Name: MIP Lab -18BML66	
CO1	Implement and analyze image enhancement techniques.
CO2	Implement and analyze Image segmentation and image compression techniques.
CO3	Develop and analyze Image processing algorithms in practical applications/case studies

Year / SEM : 3rd year / 6thsem	Year of Study: 2020-21
Course Name: JAVA PROGRAMMING LAB-18BML67	

CO1	To Understand OOPs concepts and basics of Java programming	
CO2	To Create Java programs using inheritance and polymorphism.	
CO3	To Implement error-handling techniques using exception handling and multithreading.	
CO4	To Develop GUI using Applets and Swing components.	
Co5	Analyze, design and develop solutions to real-world problems applying OOPs concepts through JAVA	
Year / SEM : 3rd year / 6thsem		Year of Study: 2020-21
Course Name: MINI PROJECT-18BMP68		
NO COURSE OUTCOMES		

Year / SEM : 3rd year / 7thsem		Year of Study : 2020-21
Course Name: Biomedical Digital Signal Processing -17BM71		
CO1	Analyze the nature of Biomedical signals and related concepts	
CO2	Apply filters to remove noise from biomedical signals.	
CO3	Apply averaging technique on biomedical signals and extract the features of EEG signals.	
CO4	Analyze event detection techniques for EEG and ECG signals.	
CO5	Apply signal compression techniques on biomedical signals.	
CO6	Write simple algorithms for Biomedical signal processing	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-21
Course Name: computer communication Networks in healthcare – 17BM72		
CO1	Explain the different formats of data generated in clinical field or Medical field.	
CO2	Discriminate the functionality between the layers in OSI model and TCP/IP suite.	
CO3	Discuss the concept of physical and data link layer.	
CO4	Distinguish the IEEE standards designed to understand the interconnectivity between different LANs.	
CO5	Apply different algorithms to route a packet to the destination for process to process delivery.	
CO6	Discuss the concepts of Bluetooth technology, and transport & application layer.	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-21
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Course Name: ARM Processor– 17BM73	
CO1	Depict the organization, architecture, bus technology, memory and operation of the ARM microprocessors
CO2	Employ the knowledge of Instruction set of ARM processors to develop basic Assembly Language Programs
CO3	Recognize the importance of the Thumb mode of operation of ARM processors and develop C programs for ARM processors
CO4	Describe the techniques involved in Exception and Interrupt handling in ARM Processors and understand the fundamental concepts of Embedded Operating Systems
CO5	Develop embedded C programs to interact with Built in Peripherals
CO6	Design, analyze and write programs using RTOS (Micro C/OS) on ARM based development boards.

Year / SEM : 4th year / 7th sem	Year of Study : 2020-21
Course Name: Biometric systems – 17BM744	
CO1	Explain the general principles of designing biometric-based systems.
CO2	Analyze various biometric systems, their characteristics and performance.
CO3	Discuss the online identification biometric techniques.
CO4	Recognize some of the personal privacy and security implications of biometrics based identification technology.
CO5	Analyze the privacy and security issues of biometrics.
CO6	Develop simple model of biometric system.

Year / SEM : 4th year / 7th sem	Year of Study : 2020-21
Course Name: Lasers & Optical fibers in medicine – 17BM752	
CO1	Explain the basics and principles of LASERS in Medicine.
CO2	Discuss the fundamentals and properties of optical fibers for UV, IR, power transmission and advancement.
CO3	Describe the working of optical fibre bundles for imaging devices applying the light guided fundamentals & principles.
CO4	Explain and demonstrate the working of endoscopic therapy, diagnostic & imaging principles.
CO5	Outline the clinical applications of fiber optic Lasers systems.

Year / SEM : 4th year / 7th sem	Year of Study : 2020-21
Course Name: Biomedical DSP Lab –17BML76	
CO1	Apply the signal processing techniques on biomedical signals and evaluate their performance.
CO2	Develop/Write signal processing algorithms for the analysis of biomedical signals

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-21
Course Name: ARM Processor Lab –17BML77		
CO1	Write ALP for implementation of specific arithmetic or logical operations.	
CO2	Write programs to demonstrate functioning of various devices interfaced to ARM processor.	
CO3	Develop programs for ARM processors to implement real world problems.	
CO4	Design and develop mini projects.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-21
Course Name: Project Work Phase- I + Project Work Seminar –17BMP78		
CO1	Collect the literature and materials in the proposed project work	
CO2	Analyze the current state of art work in the proposed project work	
CO3	Prepare synopsis with objectives and methodology	
CO4	Justify the proposed project and its probable outcome in the seminar presentation.	
CO5	Communicate the concepts by effective presentation 6. Participate effectively as an individual and member of project team.	
CO6	Participate effectively as an individual and member of project team.	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2020-21
Course Name: Medical Imaging system – 17BM81		
CO1	Describe the fundamentals of x-ray radiography and computed tomography, and analyze the system requirements.	
CO2	Explain principles of ultrasound imaging and diagnostic methods and analyze the system requirements.	
CO3	Discuss the fundamentals of radionuclide imaging, MRI, thermal imaging and analyze the system requirements.	
CO4	Describe the concepts of image Guided Intervention and image guided surgery.	
CO5	Design and develop prototype of simple medical imaging system.	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2020-21
Course Name: Biomaterials and artificial organs– 17BM82		
CO1	Explain the principle and biology underlying the design of implants and artificial organs.	
CO2	Differentiate classes of materials used in medicine.	

CO3	Discuss the application of biomaterials in medicine.
CO4	Discuss concept of biocompatibility and the methods of biomaterial testing.
CO5	Discuss the design process in some of the prominent artificial organs.

Year / SEM : 4th year / 8th sem		Year of Study : 2020-21
Course Name: BIOMEMS – 17BM831		
CO1	Discuss MEMS with current and potential markets for types of Microsystems.	
CO2	Identify the suitable material to develop a microsystem.	
CO3	Explain the principles of emerging Bio-MEMS technology.	
CO4	Apply the principles of microsensors and microactuators to design microsystem.	
CO5	Illustrate micromanufacturing techniques.	

Year / SEM : 4th year / 8th sem		Year of Study : 2020-21
Course Name: Internship– 17BM84		
CO1	Acquire practical experience within industry in which the internship is done.	
CO2	Apply knowledge and skills learned to classroom work.	
CO3	Experience the activities and functions of professionals.	
CO4	Develop and refine oral and written communication skills.	
CO5	Recognize the areas for future knowledge and skill development.	
CO6	Acquire the basic knowledge of administration, marketing, finance and economics.	
CO7	Develop the skills to enable lifelong learning	

Year / SEM : 4th year / 8th sem		Year of Study : 2020-21
Course Name: Technical Seminar– 17BMS86		
CO1	Develop knowledge in the field of Biomedical Engineering and other disciplines through independent learning and collaborative study.	
CO2	Identify and discuss the current, real-time issues and challenges in engineering & technology.	
CO3	Develop written and oral communication skills.	
CO4	Explore concepts in larger diverse social and academic contexts.	
CO5	Apply principles of ethics and respect in interaction with others.	
CO6	Develop the skills to enable life-long learning.	

Year / SEM : 4 th year / 8 th sem	Year of Study : 2020-21
Course Name: Project Phase-2 – 17BMP85	
CO1	Describe the project and be able to defend it.
CO2	Develop critical thinking and problem solving skills.
CO3	Learn to use modern tools and techniques.
CO4	Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
CO5	Develop skills to work in a team to achieve common goal.
CO6	Develop skills of project management and finance.
CO7	Develop skills of self-learning, evaluate their learning and take appropriate actions to improve it.
CO8	Prepare themselves for life-long learning to face the challenges and support the technological changes to meet the societal needs.

Department of Civil Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes



Course outcomes (COs)	
Year / SEM: 2 nd year / 3 rd sem	Year of Study: 2020-21
Course Name: STRENGTH OF MATERIALS – 18CV32	
CO1	To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements
CO2	To evaluate the development of internal forces and resistance mechanism for one dimensional and two-dimensional structural elements
CO3	To analyse different internal forces and stresses induced due to representative loads on structural elements
CO4	To evaluate slope and deflections of beams
CO5	To evaluate the behaviour of torsion members, columns and struts
Year / SEM: 2 nd year / 3 rd sem	Year of Study: 2020-21
Course Name: – FLUIDS MECHANICS - 18CV33	
CO1	Possess a sound knowledge of fundamental properties of fluids and fluid Continuum
CO2	Compute and solve problems on hydrostatics, including practical applications

CO3	Apply principles of mathematics to represent kinematic concepts related to fluid flow
CO4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications
CO5	Compute the discharge through pipes and over notches and weirs
Year / SEM: 2ndyear / 3rdsem	
Year of Study: 2020-21	
Course Name: – BUILDING MATERIALS AND CONSTRUCTION – 18CV34	
CO1	Select suitable materials for buildings and adopt suitable construction techniques
CO2	Decide suitable type of foundation based on soil parameters
CO3	Supervise the construction of different building elements based on suitability
CO4	Exhibit the knowledge of building finishes and form work requirements
Year / SEM: 2ndyear / 3rdsem	
Year of Study: 2020-21	
Course Name: BASIC SURVEYING – 18CV35	
CO1	Posses a sound knowledge of fundamental principles Geodetics
CO2	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems
CO3	Capture geodetic data to process and perform analysis for survey problems
CO4	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours
Year / SEM: 2ndyear / 3rdsem	
Year of Study: 2020-21	
Course Name: ENGINEERING GEOLOGY – 18CV36	
CO1	Apply geological knowledge in different civil engineering practice
CO2	Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials
CO3	Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct
CO4	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems
CO5	Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering construction
Year / SEM: 2ndyear / 3rdsem	
Year of Study: 2020-21	
Course Name: COMPUTER AIDED BUILDING PLANNING AND DRAWING LABORATORY – 18CVL37	

CO1	Prepare, read and interpret the drawings in a professional set up
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building
CO3	Plan and design a residential or public building as per the given requirements

Year / SEM: 2ndyear / 3rdsem	Year of Study: 2020-21
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Course Name: BUILDING MATERIALS TESTING LABORATORY– 18CVL38
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CO1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion
CO2	Identify, formulate and solve engineering problems of structural elements subjected to flexure
CO3	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials

5th Semester BE-CBCS SYLLABUS 2018-19 Scheme

Year / SEM: 3rd year / 5th sem	Year of Study: 2020-21
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Course Name: CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP – 18CV51

CO1	Prepare a project plan based on requirements and prepare schedule of a project by understanding the activities and their sequence
CO2	Understand labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety
CO3	Analyze the economics of alternatives and evaluate benefits and profits of a construction activity based on monetary value and time value
CO4	Establish as an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies

Year / SEM: 3rd year / 5th sem	Year of Study: 2020-21
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Course Name: ANALYSIS OF INDETERMINATE STRUCTURES – 18CV52

CO1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope deflection method
CO2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method
CO3	Construct the bending moment diagram for beams and frames by Kani's method
CO4	Construct the bending moment diagram for beams and frames using flexibility method
CO5	Analyze the beams and indeterminate frames by system stiffness method

Year / SEM: 3rd year / 5th sem	Year of Study: 2020-21
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Course Name: DESIGN OF RC STRUCTURAL ELEMENTS – 18CV53

CO1	Understand the design philosophy and principles
CO2	Solve engineering problems of RC elements subjected to flexure, shear and torsion
CO3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings
CO4	Owens professional and ethical responsibility

Year / SEM: 3rd year / 5th sem		Year of Study: 2020-21
Course Name: BASIC GEOTECHNICAL ENGINEERING – 18CV54		
CO1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects	
CO2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils	
CO3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures	
CO4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure	
CO5	Capable of estimating load carrying capacity of single and group of piles	

Year / SEM: 3rd year / 5th sem		Year of Study: 2020-21
Course Name: MUNICIPAL WASTEWATER ENGINEERING – 18CV55		
CO1	Select the appropriate sewer appurtenances and materials in sewer network	
CO2	Design the sewers network and understand the self purification process in flowing water	
CO3	Design the varies physic- chemical treatment units	
CO4	Design the various biological treatment units	
CO5	Design various AOPs and low cost treatment units	

Year / SEM: 3rd year / 5th sem		Year of Study: 2020-21
Course Name: HIGHWAY ENGINEERING – 18CV56		
CO1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data	
CO2	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction	
CO3	Design road geometrics, structural components of pavement and drainage	
CO4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts	

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2020-21
Course Name: SURVEYING PRACTICE – 18CVL57		
CO1	Apply the basic principles of engineering surveying and for linear and angular measurements	
CO2	Comprehend effectively field procedures required for a professional surveyor	
CO3	Use techniques, skills and conventional surveying instruments necessary for engineering practice	

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2020-21
Course Name: CONCRETE AND HIGHWAY MATERIALS LABORATORY – 18CVL58		
CO1	Able to interpret the experimental results of concrete and highway materials based on laboratory tests	
CO2	Determine the quality and suitability of cement	
CO3	Design appropriate concrete mix Using Professional codes	
CO4	Determine strength and quality of concrete	
CO5	Evaluate the strength of structural elements using NDT techniques	
CO6	Test the soil for its suitability as sub grade soil for pavements	

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2020-21
Course Name: ENVIRONMENTAL STUDIES – 18CIV59		
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale	
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment	
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components	
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues	

7th Semester BE-CBCS SYLLABUS 2017-18 Scheme

Year / SEM: 3 rd year / 7 th sem		Year of Study: 2020-21
Course Name: MUNICIPAL AND INDUSTRIAL WASTE WATER ENGINEERING – 17CV71		
CO1	Acquires capability to design sewer and Sewerage treatment plant	
CO2	Evaluate degree of treatment and type of treatment for disposal, reuse and recycle	
CO3	Identify waste streams and design the industrial waste water treatment plant	

CO4	Manage sewage and industrial effluent issues
Year / SEM: 3rd year / 7th sem	
Year of Study: 2020-21	
Course Name: DESIGN OF RCC AND STEEL STRUCTURES – 17CV72	
CO1	Students will acquire the basic knowledge in design of RCC and Steel Structures
CO2	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members
Year / SEM: 3rd year / 7th sem	
Year of Study: 2020-21	
Course Name: Hydrology and Irrigation Engineering – 17CV73	
CO1	Understand the importance of hydrology and its components
CO2	Measure precipitation and analyze the data and analyze the losses in precipitation
CO3	Estimate runoff and develop unit hydrographs
CO4	Find the benefits and ill-effects of irrigation.
CO5	Find the quantity of irrigation water and frequency of irrigation for various crops
CO6	Find the canal capacity, design the canal and compute the reservoir capacity
Year / SEM : 3rd year / 7th sem	
Year of Study : 2020-21	
Course Name: Ground Water & Hydraulics – 17CV742	
CO1	Find the characteristics of aquifers
CO2	Estimate the quantity of ground water by various methods
CO3	Locate the zones of ground water resources
CO4	Select particular type of well and augment the ground water storage
Year / SEM: 3rd year / 7th sem	
Year of Study: 2020-21	
Course Name: Rehabilitation and Retrofitting of Structures – 17CV753	
CO1	Understand the cause of deterioration of concrete structures.
CO2	Able to assess the damage for different type of structures
CO3	Summarize the principles of repair and rehabilitation of structures
CO4	Recognize ideal material for different repair and retrofitting technique

Year / SEM: 3rd year / 7th sem		Year of Study: 2020-21
Course Name: Environmental Engineering Laboratory – 17CVL76		
CO1	Acquire capability to conduct experiments and estimate the concentration of different parameters.	
CO2	Compare the result with standards and discuss based on the purpose of analysis.	
CO3	Determine type of treatment, degree of treatment for water and waste water.	
CO4	Identify the parameter to be analyzed for the student project work in environmental stream	

Year / SEM: 3rd year / 7th sem		Year of Study: 2020-21
Course Name: Computer Aided Detailing of Structures – 17CVL77		
CO1	Prepare detailed working drawings	

4th Semester BE-CBCS SYLLABUS 2018-19 Scheme

Year / SEM: 2nd year / 4th sem		Year of Study: 2020-21
Course Name: Analysis of Determinate Structures – 18CV42		
CO1	Identify different forms of structural systems	
CO2	Construct ILD and analyse the beams and trusses subjected to moving load	
CO3	Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and beams	
CO4	Determine the stress resultants in arches and cables	

Year / SEM: 2nd year / 4th sem		Year of Study: 2020-21
Course Name: Applied Hydraulics - 18CV43		
CO1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters	
CO2	Design the open channels of various cross sections including economical channel Sections	
CO3	Apply Energy concepts to flow in open channel sections, Calculate Energy Dissipation	
CO4	Compute water surface profiles at different conditions	
CO5	Design turbines for the given data, and to know their operation characteristics under different operating conditions	

Year / SEM: 2nd year / 4th sem		Year of Study: 2020-21
Course Name: Concrete Technology - 18CV44		

CO1	Relate material characteristics and their influence on microstructure of concrete.
CO2	Distinguish concrete behavior based on its fresh and hardened properties.
CO3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
CO4	Adopt suitable concreting methods to place the concrete based on requirement
CO5	Select a suitable type of concrete based on specific application

Year / SEM: 2ndyear / 4th sem

Year of Study: 2020-21

Course Name: ADVANCED SURVEYING - 18CV45

CO1	Apply the knowledge of geometric principles to arrive at surveying problems
CO2	Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems
CO3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instrument
CO4	Design and implement the different types of curves for deviating type of alignments

Year / SEM: 2ndyear / 4th sem

Year of Study: 2020-21

Course Name: WATER SUPPLY AND TREATMENT ENGINEERING - 18CV46

CO1	Estimate average and peak water demand for a community
CO2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community
CO3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system
CO4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards

Year / SEM: 2ndyear / 4th sem

Year of Study: 2020-21

Course Name: ENGINEERING GEOLOGY LABORATORY - 18CVL47

CO1	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices
CO2	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects
CO3	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods
CO4	The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area
CO5	The students will be able to identify the different structures in the field

Year / SEM: 2nd year / 4th sem		Year of Study: 2020-21
Course Name: FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY - 18CVL48		
CO1	Properties of fluids and the use of various instruments for fluid flow measurement	
CO2	Working of hydraulic machines under various conditions of working and their characteristics	

6th Semester BE-CBCS SYLLABUS 2018-19 Scheme

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21
Course Name: DESIGN OF STEEL STRUCTURAL ELEMENTS – 18CV61		
CO1	Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel	
CO2	Understand the Concept of Bolted and Welded connections	
CO3	Understand the Concept of Design of compression members, built-up columns and columns splices	
CO4	Understand the Concept of Design of tension members, simple slab base and gusseted base	
CO5	Understand the Concept of Design of laterally supported and un-supported steel beams	

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21
Course Name: APPLIED GEOTECHNICAL ENGINEERING – 18CV62		
CO1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects	
CO2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils	
CO3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures	
CO4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure	
CO5	Capable of estimating load carrying capacity of single and group of piles	

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21
Course Name: HYDROLOGY AND IRRIGATION ENGINEERING - 18CV63		
CO1	Understand the importance of hydrology and its components	
CO2	Measure precipitation and analyze the data and analyze the losses in precipitation	
CO3	Estimate runoff and develop unit hydrographs	

CO4	Find the benefits and ill-effects of irrigation
CO5	Find the quantity of irrigation water and frequency of irrigation for various crops
CO6	Find the canal capacity, design the canal and compute the reservoir capacity

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21	
Course Name: SOLID WASTE MANAGEMENT - 18CV642			
CO1	Analyse existing solid waste management system and to identify their drawbacks		
CO2	Evaluate different elements of solid waste management system		
CO3	Suggest suitable scientific methods for solid waste management elements		
CO4	Design suitable processing system and evaluate disposal sites		

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21	
Course Name: OCCUPATIONAL HEALTH AND SAFETY - 18CV653			
CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others		
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard		
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation		
CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors		
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety		

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21	
Course Name: SOFTWARE APPLICATION LAB - 18CVL66			
CO1	use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work		

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-21	
Course Name: ENVIRONMENTAL ENGINEERING LABORATORY – 18CVL67			
CO1	Acquire capability to conduct experiments and estimate the concentration of different parameters		

CO2	Compare the result with standards and discuss based on the purpose of analysis
CO3	Determine type of treatment, degree of treatment for water and waste water
CO4	Identify the parameter to be analyzed for the student project work in environmental stream

8th Semester BE-CBCS SYLLABUS 2017-18 Scheme

Year / SEM: 4th year / 8th sem		Year of Study: 2020-21
Course Name: QUANTITY SURVEYING AND CONTRACTS MANAGEMENT – 17CV81		
CO1	Prepare detailed and abstract estimates for roads and building	
CO2	Prepare valuation reports of buildings	
CO3	Interpret Contract document's of domestic and international construction works	

Year / SEM: 4th year / 8th sem		Year of Study: 2020-21
Course Name: DESIGN OF PRE STRESSED CONCRETE ELEMENTS – 17CV82		
CO1	Understand the requirement of PSC members for present scenario	
CO2	Analyze the stresses encountered in PSC element during transfer and at working	
CO3	Understand the effectiveness of the design of PSC after studying losses	
CO4	Capable of analyzing the PSC element and finding its efficiency	
CO5	Design PSC beam for different requirements	

Year / SEM: 4th year / 8th sem		Year of Study: 2020-21
Course Name: HYDRAULIC STRUCTURES – 17CV832		
CO1	Check the stability of gravity dams and design the dam.	
CO2	Estimate the quantity of seepage through earth dams	
CO3	Design spillways and aprons for various diversion works	
CO4	Select particular type of canal regulation work for canal network	

Department of Computer Science and Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

Program Outcomes:



PO1. Apply knowledge of mathematics and science, with fundamentals of Computer Science & Engineering to be able to solve complex engineering problems related to CSE.

PO2. Apply mathematical foundations, algorithmic principles, and computer Science theory in the modelling and design of computer based systems in a way that demonstrates comprehension of tradeoffs involved in design choices.

PO3. Analyze a problem, and identify and define the computing requirements appropriate to its solution

PO4. Design and development principles in the construction of software systems of varying complexity

PO5. Design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as

well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;

PO6. Use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;

PO7. Work effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary environment

PO8. Demonstrate knowledge of contemporary issues and understand professional, ethical, legal, security and social issues and responsibilities

PO9. Analyze the local and global impact of computing on individuals, organizations, and society;

PO10. Demonstrate knowledge and understanding of the engineering and management principles including financial implications and apply these to his/her work, as a member and leader in a team, and to manage project work as part of a multidisciplinary team

PO11. Communicate effectively in both verbal and written forms;

PO12. Recognize the need for, and be motivated to engage in life-long learning and continuing professional development

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1:	Foundation of mathematical concepts: To use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.
PSO-2:	Foundation of Computer System: the ability to interpret the fundamental concepts and methodology of computer systems. Students can understand the functionality of hardware and software aspects of computer systems.
PSO-3:	Foundations of Software development: the ability to grasp the software development lifecycle and methodologies of software systems. Possess competent skills and knowledge of software design process. Familiarity and practical proficiency with a broad area of programming concepts and provide new ideas and innovations towards research

Course Outcomes:

Year / SEM : 2ndyear / 3rdsem		Year of Study : 2020-2021
Course Name: --DATA STRUCTURES AND APPLICATIONS-18CS32		
CO1	Use different types of data structures, operations and algorithms	
CO2	Apply searching and sorting operations on files	
CO3	Use stack, Queue, Lists, Trees and Graphs in problem solving	
CO4	Implement all data structures in a high-level language for problem solving.	

Year / SEM : 2ndyear / 3rdsem		Year of Study : 2020-2021
Course Name: ANALOG AND DIGITAL ELECTRONICS – 18CS33		
CO1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.	
CO2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.	
CO3	Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods	
CO4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.	
CO5	Develop simple HDL programs	

Year / SEM : 2ndyear / 3rdsem		Year of Study : 2020-2021
Course Name: COMPUTER ORGANIZATION – 18CS34		
CO1	Explain the basic organization of a computer system.	
CO2	Demonstrate functioning of different sub systems, such as processor, Input/output,and memory.	
CO3	Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.	
CO4	Design and analyse simple arithmetic and logical units.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-2021
Course Name: SOFTWARE ENGINEERING– 18CS35		
CO1	Design a software system, component, or process to meet desired needs within realistic constraints.	
CO2	Assess professional and ethical responsibility	
CO3	Function on multi-disciplinary teams	
CO4	Use the techniques, skills, and modern engineering tools necessary for engineering practice	
CO5	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-2021
Course Name: DISCRETE MATHEMATICAL STRUCTURES – 18CS36		
CO1	Use propositional and predicate logic in knowledge representation and truth verification..	
CO2	Demonstrate the application of discrete structures in different fields of computer science.	
CO3	Solve problems using recurrence relations and generating functions.	
CO4	Application of different mathematical proofs techniques in proving theorems in the courses..	
CO5	Compare graphs, trees and their applications.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-2021
Course Name: ANALOG AND DIGITAL ELECTRONICS LABORATORY – 18CSL37		
CO1	Use appropriate design equations / methods to design the given circuit..	
CO2	Examine and verify the design of both analog and digital circuits using simulators.	
CO3	Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.	
CO4	Compile a laboratory journal which includes; aim, tool/instruments/software/components used, design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.	

Year / SEM : 2ndyear / 3rdsem		Year of Study : 2020-2021
Course Name: DATA STRUCTURES LABORATORY – 18CSL38		
CO1	Analyze and Compare various linear and non-linear data structures	
CO2	Code, debug and demonstrate the working nature of different types of data structures and their applications	
CO3	Implement, analyze and evaluate the searching and sorting algorithms	
CO4	Choose the appropriate data structure for solving real world problems	
Year / SEM : 2ndyear / 4th sem		Year of Study : 2020-2021
Course Name: DESIGN AND ANALYSIS OF ALGORITHMS – 18CS42		
CO1	Describe computational solution to well known problems like searching, sorting etc.	
CO2	Estimate the computational complexity of different algorithms.	
CO3	Devise an algorithm using appropriate design strategies for problem solving.	

Year / SEM : 2ndyear / 4th sem		Year of Study : 2020-2021
Course Name: OPERATING SYSTEMS – 18CS43		
CO1	Demonstrate need for OS and different types of OS	
CO2	Apply suitable techniques for management of different resources	
CO3	Use processor, memory, storage and file system commands.	
CO4	Realize the different concepts of OS in platform of usage through case studies	

Year / SEM : 2ndyear / 4th sem		Year of Study : 2020-2021
Course Name: MICROCONTROLLER AND EMBEDDED SYSTEMS – 18CS44		
CO1	Describe the architectural features and instructions of ARM microcontroller	
CO2	Apply the knowledge gained for Programming ARM for different applications.	
CO3	Interface external devices and I/O with ARM microcontroller.	
CO4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.	
CO5	Develop the hardware /software co-design and firmware design approaches.	

CO6	Demonstrate the need of real time operating system for embedded system Applications
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Year / SEM : 2ndyear / 4th sem	Year of Study : 2020-2021
Course Name: OBJECT ORIENTED CONCEPTS – 18CS45	
CO1	Explain the object-oriented concepts and JAVA.
CO2	Develop computer programs to solve real world problems in Java.
CO3	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using swings.

Year / SEM : 2ndyear / 4th sem	Year of Study : 2020-2021
Course Name: DATA COMMUNICATION – 18CS46	
CO1	Explain the various components of data communication.
CO2	Explain the fundamentals of digital communication and switching.
CO3	Compare and contrast data link layer protocols.
CO4	Summarize IEEE 802.xx standards

Year / SEM : 2ndyear / 4th sem	Year of Study : 2020-2021
Course Name: DESIGN AND ANALYSIS OF ALGORITHM LABORATORY– 18CSL47	
CO1	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
CO2	Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
CO3	Analyze and compare the performance of algorithms using language features..
CO4	Apply and implement learned algorithm design techniques and data structures to solve real-world problems.

Year / SEM : 2ndyear / 4th sem	Year of Study : 2020-2021
Course Name: MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY – 18CSL48	
CO1	Develop and test program using ARM7TDMI/LPC2148.
CO2	Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY – 17CS51/18CS51		
CO1	Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship	
CO2	Utilize the resources available effectively through ERP	
CO3	Make use of IPRs and institutional support in entrepreneurship	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: COMPUTER NETWORKS – 17CS52/18CS52		
CO1	Explain principles of application layer protocols	
CO2	Outline transport layer services and infer UDP and TCP protocols	
CO3	Classify routers, IP and Routing Algorithms in network layer	
CO4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard	
CO5	Describe Multimedia Networking and Network Management	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: DATABASE MANAGEMENT SYSTEM – 17CS53/18CS53		
CO1	Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.	
CO2	Use Structured Query Language (SQL) for database manipulation.	
CO3	Design and build simple database systems	
CO4	Develop application to interact with databases.	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: AUTOMATA THEORY AND COMPUTABILITY – 17CS54/18CS54		
CO1	Tell the core concepts in automata theory and Theory of Computation	
CO2	Explain how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).	
CO3	Interpret Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.	
CO4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness	
CO5	Classify a problem with respect to different models of Computation.	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: ADVANCED JAVA AND J2EE– 17CS553/18CS553		
CO1	Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs	
CO2	Build client-server applications and TCP/IP socket programs	
CO3	Illustrate database access and details for managing information using the JDBC API	
CO4	Describe how servlets fit into Java-based web application architecture	
CO5	Develop reusable software components using Java Beans	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: ARTIFICIAL INTELLIGENCE– 17CS562/18CS562		
CO1	Identify the AI based problems.	
CO2	Apply techniques to solve the AI problems	
CO3	Define learning and explain various learning techniques	
CO4	Discuss expert systems	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: COMPUTER NETWORK LABORATORY– 17CSL57/18CSL57		
CO1	Analyze and Compare various networking protocols.	
CO2	Demonstrate the working of different concepts of networking.	
CO3	Implement, analyze and evaluate networking protocols in NS2 / NS3	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: DBMS LABORATORY WITH MINI PROJECT – 15CSL58/18CSL58		
CO1	Use Structured Query Language (SQL) for database Creation and manipulation	
CO2	Demonstrate the working of different concepts of DBMS	
CO3	Implement and test the project developed for an application.	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: CRYPTOGRAPHY, NETWORK SECURITY AND CYBER LAW – 17CS61/18CS61		
CO1	Discuss cryptography and its need to various applications	
CO2	Design and develop simple cryptography algorithms	
CO3	Understand cyber security and need cyber Law	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: COMPUTER GRAPHICS AND VISUALIZATION – 17CS62/18CS62		
CO1	Design and implement algorithms for 2D graphics primitives and attributes.	
CO2	Illustrate Geometric transformations on both 2D and 3D objects.	
CO3	Understand the concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.	
CO4	Discuss about suitable hardware and software for developing graphics packages using OpenGL.	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: SYSTEM SOFTWARE AND COMPILER DESIGN-17CS63/18CS63		
CO1	Illustrate system software such as assemblers, loaders, linkers and macroprocessors	
CO2	Design and develop lexical analyzers, parsers and code generators	
CO3	Discuss about lex and yacc tools for implementing different concepts of system software	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: OPERATING SYSTEMS – 17CS64/18CS64		
CO1	Demonstrate need for OS and different types of OS	
CO2	Discuss suitable techniques for management of different resources	
CO3	Illustrate processor, memory, storage and file system commands	
CO4	Explain the different concepts of OS in platform of usage through case studies	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: OPERATION RESEARCH– 17CS653/18CS653		
CO1	Explain optimization techniques for various problems.	
CO2	Understand the given problem as transportation and assignment problem and solve.	
CO3	Illustrate game theory for decision support system.	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: PYTHON APPLICATION PROGRAMMING– 17CS664/18CS664		
CO1	Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.	
CO2	Demonstrate proficiency in handling Strings and File Systems.	
CO3	Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.	
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.	

CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python
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Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: SYSTEM SOFTWARE AND OPERATING SYSTEM LABORATORY – 17CSL67/18CSL67		
CO1	Implement and demonstrate Lexer's and Parser's	
CO2	Implement different algorithms required for management, scheduling, allocation and communication used in operating system..	

Year / SEM : 3rd year / 6th sem		Year of Study : 2020-2021
Course Name: COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT – 17CSL68/18CSL68		
CO1	Apply the concepts of computer graphics	
CO2	Implement computer graphics applications using OpenGL	
CO3	Implement real world problems using OpenGL	

Year / SEM: 3rd year / 6th sem		Year of Study: 2020-2021
Course Name: OCCUPATIONAL HEALTH AND SAFETY – 18CV653		
CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others	
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard	
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation	

CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: TECHNOLOGY AND ITS APPLICATIONS – 15CS71/18CS71		
CO1	Adapt HTML and CSS syntax and semantics to build web pages.	
CO2	Construct and visually format tables and forms using HTML and CSS	
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.	
CO4	Appraise the principles of object oriented development using PHP	
CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: ADVANCED COMPUTER ARCHITECTURES– 15CS72/18CS72		
CO1	Explain the concepts of parallel computing and hardware technologies	
CO2	Compare and contrast the parallel architectures	
CO3	Illustrate parallel programming concepts	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: MACHINE LEARNING– 15CS73/18CS73		
CO1	Identify the problems for machine learning. And select the either supervised, unsupervised or reinforcement learning.	
CO2	Explain theory of probability and statistics related to machine learning	
CO3	Investigate concept learning, ANN, Bayes classifier, k nearest neighbor, Q,	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: UNIX SYSTEM PROGRAMMING– 15CS744/18CS744		
CO1	Ability to understand and reason out the working of Unix Systems	
CO2	Build an application/service over a Unix system.	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: STORAGE AREA NETWORKS– 15CS754/18CS754		
CO1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization	
CO2	Explain components and the implementation of NAS	
CO3	Describe CAS architecture and types of archives and forms of virtualization	
CO4	Illustrate the storage infrastructure and management activities	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: MACHINE LEARNING LABORATORY– 15CSL76/18CSL76		
CO1	Understand the implementation procedures for the machine learning algorithms.	
CO2	Design Java/Python programs for various Learning algorithms.	
CO3	Apply appropriate data sets to the Machine Learning algorithms.	
CO4	Identify and apply Machine Learning algorithms to solve real world problems.	

Year / SEM : 4th year / 7th sem		Year of Study : 2020-2021
Course Name: WEB TECHNOLOGY LABORATORY WITH MINI PROJECT– 15CSL77/18CSL77		
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.	
CO2	Have a good understanding of Web Application Terminologies, Internet Tools other web services.	
CO3	Learn how to link and publish web sites	

Year / SEM : 4th year / 8th sem		Year of Study : 2020-2021
Course Name: IOT TECHNOLOGY– 15CS81/18CS81		
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models	
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.	
CO3	Appraise the role of IoT protocols for efficient network communication	
CO4	Elaborate the need for Data Analytics and Security in IoT.	
CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.	

Year / SEM : 4th year / 8th sem		Year of Study : 2020-2021
Course Name: BIG DATA ANALYTICS– 15CS82/18CS82		
CO1	Master the concepts of HDFS and MapReduce framework	
CO2	Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration	
CO3	Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making	
CO4	Infer the importance of core data mining techniques for data analytics	
CO5	Compare and contrast different Text Mining Techniques	

Year / SEM : 4th year / 8th sem		Year of Study : 2020-2021
Course Name: MODERN INTERFACE DESIGN – 15CS832/18CS832		
CO1	Design the user interface, design, menu creation and windows creation and connection between menu and windows	

Department of Electronics and Communication Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

Program Outcomes:



PO1 - Engineering Knowledge: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6- The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10-Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12-Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1:	PSO1: Specify, design, build and test analog, digital and embedded systems for signal processing.
PSO-2:	Understand and architect wired and wireless analog and digital communication systems as per specifications and determine their performance.

Course Outcomes:

Year / SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20, 2020-2021
Course Name: NETWORK THEORY – 18EC32	
CO1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting.
CO2	Solve network problems by applying Superposition/ Reciprocity/ Thevenin's/ Norton's/ Maximum Power Transfer/Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
CO3	Calculate current and voltages for the given circuit under transient conditions.
CO4	Apply Laplace transform to solve the given network.

CO5	Solve the given network using specified two port network parameter like Z or Y or T or h.
CO6	Understand the concept of resonance
Year / SEM : 2ndyear / 3rdsem	
Year of Study : 2019-20, 2020-2021	
Course Name: ELECTRONIC DEVICES– 18EC33	
CO1	Understand the principles of semiconductor Physics
CO2	Understand the principles and characteristics of different types of semiconductor devices
CO3	Understand the fabrication process of semiconductor devices
CO4	Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

Year / SEM : 2ndyear / 3rdsem	
Year of Study : 2019-20,2020-2021	
Course Name: DIGITAL SYSTEM DESIGN– 18EC34	
CO1	Explain the concept of combinational and sequential logic circuits.
CO2	Design the combinational logic circuits.
CO3	Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines
CO4	Design applications of Combinational & Sequential Circuits.

Year / SEM : 2ndyear / 3rdsem	
Year of Study : 2019-20, 2020-2021	
Course Name: COMPUTER ORGANIZATION AND ARCHITECTURE– 18EC35	
CO1	Explain the basic organization of a computer system.
CO2	Explain different ways of accessing an input / output device including interrupts.
CO3	Illustrate the organization of different types of semiconductor and other secondary storage memories
CO4	Illustrate simple processor organization based on hardwired control and micro programmed control

Year / SEM : 2ndyear / 3rdsem	
Year of Study : 2019-20, 2020-2021	
Course Name: POWER ELECTRONICS AND INSTRUMENTATION– 18EC36	
CO1	Build and test circuits using power electronic devices
CO2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.
CO3	Define instrument errors.
CO4	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
CO5	Describe the principle of operation of Digital instruments and PLCs.
CO6	Use Instrumentation amplifier for measuring physical parameters.

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20, 2020-2021
Course Name: ELECTRONIC DEVICES AND INSTRUMENTATION LABORATORY– 18ECL37		
CO1	Understand the characteristics of various electronic devices and measurement of parameters.	
CO2	Design and test simple electronic circuits.	
CO3	Use of circuit simulation software for the implementation and characterization of electronic circuits and devices	

Year / SEM : 2 nd year / 3 rd sem		Year of Study: 2019-20, 2020-2021
Course Name: DIGITAL SYSTEM DESIGN LABORATORY– 18ECL38		
CO1	Demonstrate the truth table of various expressions and combinational circuits using logicgates.	
CO2	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers.	
CO3	Construct flips-flops, counters and shift registers.	
CO4	Simulate Serial adder and Binary Multiplier.	

Year / SEM : 2 nd year / 4 th sem		Year of Study: 2019-20, 2020-2021
Course Name: ANALOG CIRCUITS– 18EC42		
CO1	Understand the characteristics of BJTs and FETs.	
CO2	Design and analyze BJT and FET amplifier circuits.	
CO3	Design sinusoidal and non-sinusoidal oscillators	
CO4	Understand the functioning of linear ICs.	
CO5	Design of Linear IC based circuits.	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20, 2020-2021
Course Name: CONTROL SYSTEMS– 18EC43		
CO1	Develop the mathematical model of mechanical and electrical systems.	
CO2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.	
CO3	Determine the time domain specifications for first and second order systems.	
CO4	Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.	
CO5	Determine the stability of a system in the frequency domain using Nyquist and bode plots.	

Year / SEM : 2 nd year / 4 th sem		Year of Study: 2019-20, 2020-2021
Course Name: ENGINEERING STATISTICS and LINEAR ALGEBRA– 18EC44		
CO1	Identify and associate Random Variables and Random Processes in Communication events.	
CO2	Analyse and model the Random events in typical communication events to extract quantitative statistical parameters.	
CO3	Analyse and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency.	
CO4	Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values.	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20, 2020-2021
Course Name: SIGNALS AND SYSTEMS– 18EC45		
CO1	Analyse the different types of signals and systems.	
CO2	Determine the linearity, causality, time-invariance, and stability properties of continuous and discrete time systems.	
CO3	Represent continuous and discrete systems in time and frequency domain using different transforms Test whether the system is stable.	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20, 2020-2021
Course Name: MICROCONTROLLER– 18EC46		
CO1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.	
CO2	Write 8051 Assembly level programs using 8051 instruction set.	
CO3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.	
CO4	Write 8051 Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using 8051 serial port and to generate an external interrupt using a switch.	
CO5	Write 8051 Assembly language programs to generate square wave on 8051 I/O port pin using interrupt and C Programme to send & receive serial data using 8051 serial port.	
CO6	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.	

Year / SEM : 2 nd year / 4 th sem		Year of Study :2019-20, 2020-2021
Course Name: MICROCONTROLLER LABORATORY– 18ECL47		
CO1	Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.	
CO2	Interface different input and output devices to 8051 and control them using Assembly language programs.	
CO3	Interface the serial devices to 8051 and do the serial transfer using C programming.	

Year / SEM : 2nd year / 4th sem		Year of Study : 2019-20, 2020-2021
Course Name: ANALOG CIRCUITS LABORATORY– 18ECL48		
CO1	Design analog circuits using BJT/FETs and evaluate their performance characteristics.	
CO2	Design analog circuits using OPAMPs for different applications	
CO3	Simulate and analyze analog circuits that uses ICs for different electronic applications.	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP– 18ES51		
CO1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business	
CO2	Describe the functions of Managers, Entrepreneurs, and their social responsibilities	
CO3	Understand the components in developing a business plan	
CO4	Awareness about various sources of funding and institutions supporting entrepreneurs	

Year / SEM : 3rd year / 5th sem		Year of Study : 2020-2021
Course Name: DIGITAL SIGNAL PROCESSING– 18EC52		
CO1	Determine response of LTI systems using time domain and DFT techniques.	
CO2	Compute DFT of real and complex discrete time signals.	
CO3	Computation of DFT using FFT algorithms and linear filtering approach.	
CO4	Design and realize FIR and IIR digital filters	
CO5	Understand the DSP processor architecture	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: PRINCIPLES OF COMMUNICATION SYSTEMS– 18EC53		
CO1	Analyze and compute performance of AM and FM modulation in the presence of noise at the receiver.	
CO2	Analyze and compute performance of digital formatting processes with quantization noise.	
CO3	Multiplex digitally formatted signals at Transmitter and demultiplex the signals and reconstruct digitally formatted signals at the receiver.	
CO4	Design/Demonstrate the use of digital formatting in Multiplexers, Vocoders and Video transmission	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: INFORMATION THEORY and CODING– 18EC54		
CO1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source	
CO2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms	
CO3	Model the continuous and discrete communication channels using input, output and joint probabilities	
CO4	. Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes	
CO5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: ELECTROMAGNETIC WAVES– 18EC55		
CO1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.	
CO2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distributions by using Divergence Theorem.	
CO3	Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different current configurations	
CO4	Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits.	
CO5	Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: Verilog HDL– 17EC56		
CO1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.	
CO2	Design and verify the functionality of digital circuit/system using test benches	
CO3	Identify the suitable Abstraction level for a particular digital design.	
CO4	Write the programs more effectively using Verilog tasks, functions and directives.	
CO5	Perform timing and delay Simulation	
CO6	Interpret the various constructs in logic synthesis	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: DSP LAB – 18ECL57		
CO1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.	
CO2	Modelling of discrete time signals and systems and verification of its properties and results.	
CO3	Implementation of discrete computations using DSP processor and verify the results.	
CO4	Realize the digital filters using a simulation tool and a DSP processor and verify the frequency and phase response	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: HDL LAB– 18ECL58		
CO1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.	
CO2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms	
CO3	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.	
CO4	Interface the hardware to the programmable chips and obtain the required output.	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2020-2021
Course Name: ENVIRONMENTAL STUDIES– 18CIV59		
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,	
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.	
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components. managers face when dealing with complex issues.	
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-2021
Course Name: DIGITAL COMMUNICATION– 18EC61		
CO1	Associate and apply the concepts of Bandpass sampling to well specified signals and channels.	
CO2	Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.	
CO3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.	
CO4	Demonstrate that bandpass signals subjected to corruption and distortion in a bandlimited channel can be processed at the receiver to meet specified performance criteria.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-2021
Course Name: EMBEDDED SYSTEMS– 18EC62		
CO1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.	
CO2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.	
CO3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.	
CO4	Develop the hardware /software co-design and firmware design approaches.	
CO5	Explain the need of real time operating system for embedded system applications.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-2021
Course Name: MICROWAVE and ANTENNAS - 18EC63		
CO1	Describe the use and advantages of microwave transmission.	
CO2	Analyze various parameters related to microwave transmission lines and waveguides	
CO3	Identify microwave devices for several applications	
CO4	Analyze various antenna parameters necessary for building a RF system	
CO5	Recommend various antenna configurations according to the applications	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-2021
Course Name: ARTIFICIAL NEURAL NETWORKS-18EC642		
CO1	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.	
CO2	Understand the concepts and techniques of neural networks through the study of the most important neural network models.	
CO3	Evaluate whether neural networks are appropriate to a particular application	
CO4	Apply neural networks to particular application, and to know what steps to take to improve performance.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2020-2021
Course Name: DIGITAL SYSTEM DESIGN USING VERILOG-17EC644		
CO1	Construct the combinational circuits, using discrete gates and programmable logic devices.	
CO2	Describe how arithmetic operations can be performed for each kind of code, and also combinational circuits that implement arithmetic operations.	
CO3	Design a semiconductor memory for specific chip design.	
CO4	Design embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.	
CO5	Synthesize different types of I/O controllers that are used in embedded system..	

Year / SEM : 3 rd year / 6 th sem		Year of Study: 2020-2021
Course Name EMBEDDED CONTROLLER LAB -18ECL66		
CO1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.	
CO2	Develop assembly language programs using ARM Cortex M3 for different applications.	
CO3	Interface external devices and I/O with ARM Cortex M3.	
CO4	Develop C language programs and library functions for embedded system applications.	

Year / SEM : 3 rd year / 6 th sem		Year of Study: 2020-2021
Course Name: COMMUNICATION LAB-18ECL67		
CO1	Determine the characteristics and response of microwave waveguide.	
CO2	Determine the characteristics of microstrip antennas and devices and compute the parameters associated with it.	
CO3	Design and test the digital and analog modulation circuits and display the waveforms.	
CO4	Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes.	

Year / SEM : 3 rd year / 7 th sem		Year of Study : 2020-2021
Course Name: MICROWAVES AND ANTENNAS-17EC71		
C01	Describe the use and advantages of microwave transmission	
C02	Analyze various antenna parameters necessary for building an RF system	
C03	Analyze various parameters related to microwave transmission lines and waveguides	
C04	Identify microwave devices for several applications	
C05	Recommend various antenna configurations according to the applications	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: DIGITAL IMAGE PROCESSING– 17EC72		
C01	Understand image formation and the role human visual system plays in perception of gray and color image data.	
C02	Apply image processing techniques in both the spatial and frequency (Fourier) domains.	
C03	Design image analysis techniques in the form of image segmentation and to evaluate the Methodologies for segmentation	
C04	Conduct independent study and analysis of Image Enhancement techniques.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: POWER ELECTRONICS– 17EC73		
C01	Describe the characteristics of different power devices and identify the various applications associated with it.	
C02	Illustrate the working of power circuit as DC-DC converter.	
C03	Illustrate the operation of inverter circuit and static switches	
C04	Determine the output response of a thyristor circuit with various triggering options.	
C05	Determine the response of controlled rectifier with resistive and inductive loads.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: MULTIMEDIA COMMUNICATION– 17EC741		
CO1	Understand basics of different multimedia networks and applications.	
CO2	Understand different compression techniques to compress audio and video.	
CO3	Describe multimedia Communication across Networks.	
CO4	Analyse different media types to represent them in digital form	
CO5	Compress different types of text and images using different compression techniques and analyse DMS.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: SATELLITE COMMUNICATION– 17EC755		
CO1	Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.	
CO2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.	
CO3	Describe the various applications of satellite with the focus on national satellite system.	
CO4	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: ADVANCED COMMUNICATION LAB–17ECL76		
CO1	Determine the characteristics and response of microwave devices and optical waveguide.	
CO2	Determine the characteristics of microstrip antennas and devices and compute the parameters associated with it.	
CO3	Simulate the digital modulation schemes with the display of waveforms and computation of performance parameters.	
CO4	Design and test the digital modulation circuits/systems and display the waveforms.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: VLSI LAB–17ECL77		
C01	Write test bench to simulate various digital circuits.	
C02	Interpret concepts of DC Analysis, AC Analysis and Transient Analysis in analog circuits.	
C03	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.	
C04	Use basic amplifiers and further design higher level circuits like operational amplifier and analog/digital converters to meet desired parameters.	
C05	Use transistors to design gates and further using gates realize shift registers and adders to meet desired parameters.	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2020-2021
Course Name: Project Work Phase- I + Project Work Seminar –17ECP78		
C01	Collect the literature and materials in the proposed project work	
C02	Analyze the current state of art work in the proposed project work	
C03	Prepare synopsis with objectives and methodology	
C04	Justify the proposed project and its probable outcome in the seminar presentation.	
C05	Communicate the concepts by effective presentation 6. Participate effectively as an individual and member of project team.	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2020-2021
Course Name: WIRELESS CELLULAR and LTE 4G BROADBAND– 17EC81		
C01	Understand the system architecture and the functional standard specified in LTE 4G.	
C02	Analyze the role of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users.	
C03	Demonstrate the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.	
C04	Test and Evaluate the Performance of resource management and packet data processing and transport algorithms.	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2020-2021
Course Name: FIBER OPTICS and NETWORKS– 17EC82		
C01	Classification and working of optical fiber with different modes of signal propagation.	
C02	Describe the transmission characteristics and losses in optical fiber communication.	
C03	Describe the construction and working principle of optical connectors, multiplexers, and amplifiers.	
C04	Describe the constructional features and the characteristics of optical sources and detectors.	
C05	Illustrate the networking aspects of optical fiber and describe various standards associated with it.	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2020-2021
Course Name: RADAR ENGINEERING– 17EC833		
CO1	Understand the radar fundamentals and radar signals.	
CO2	Explain the working principle of pulse Doppler radars, their applications, and limitations	
CO3	Describe the working of various radar transmitters and receivers.	
CO4	Analyze the range parameters of pulse radar system which affect the system performance	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2020-2021
Course Name: Internship– 17EC84		
CO1	Acquire practical experience within industry in which the internship is done.	
CO2	Apply knowledge and skills learned to classroom work.	
CO3	Experience the activities and functions of professionals.	
CO4	Develop and refine oral and written communication skills.	
CO5	Recognize the areas for future knowledge and skill development.	

Year / SEM : 4 th year / 8 th sem		Year of Study: 2020-2021
Course Name: Technical Seminar– 17ECS86		
CO1	Develop knowledge in the field of Biomedical Engineering and other disciplines through independent learning and collaborative study.	
CO2	Identify and discuss the current, real-time issues and challenges in engineering & technology.	
CO3	Develop written and oral communication skills.	
CO4	Explore concepts in larger diverse social and academic contexts.	
CO5	Apply principles of ethics and respect in interaction with others.	
CO6	Develop the skills to enable life-long learning.	

Year / SEM : 4 th year / 8 th sem	Year of Study : 2020-2021
Course Name: Project – 17ECP85	
CO1	Describe the project and be able to defend it.
CO2	Develop critical thinking and problem solving skills.
CO3	Learn to use modern tools and techniques.
CO4	Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
CO5	Develop skills to work in a team to achieve common goal.
CO6	Develop skills of project management and finance.
CO7	Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.
CO8	Prepare themselves for life-long learning to face the challenges and support the technological changes to meet the societal needs.

Department of Mechanical Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

Program Outcomes:



PO1 - Engineering Knowledge: Apply knowledge of mathematics and science, with fundamentals of Mechanical Engineering to be able to solve complex engineering problems related to Mechanical Engineering.

PO2 - Problem Analysis: Identify, Formulate, review research literature and analyze complex engineering problems related to Mechanical Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3 - Design/Development of solutions: Design solutions for complex aircraft problems related to Mechanical Engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural societal and environmental considerations

PO4 - Conduct Investigations of Complex problems: Use research-based knowledge and research methods including design of aircraft structure experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, Select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to Mechanical Engineering related complex engineering activities with an understanding of the limitations.

PO6 - The Engineer and Society: Apply Reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Mechanical

professional engineering practice.

PO7 - Environment and Sustainability: Understand the impact of the Mechanical professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development

PO8 - Ethics: Apply Ethical Principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary Settings.

PO10 -Communication: Communicate effectively on complex engineering activities with the engineering community and with High society and with write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11 -Project Management and Finance: Demonstrate knowledge and understanding of the engineering management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.

PO12 -Life-Long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning the broadest content of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1: (Knowledge)	Mechanical Graduates will have strong fundamental technical knowledge and are capable to develop core competency in diversified areas such as Production, Design, Thermal, Industrial and allied fields with the use of software tools to expand their knowledge horizon and inculcate lifelong learning.
PSO-2: (Skill)	Graduates will have effective communication, leadership, team building, problem solving, decision making skills, and software and creative skills by understanding contemporary issues there by contributing to their overall personality and career development.
PSO-3: (Attitude)	Graduates will practice ethical responsibilities and service towards their peers, employers, society and follow these percepts in their daily life.

Course Outcomes:

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2020-2021
Course Name: --MECHANICS OF MATERIALS		18ME32
CO1	Understand simple, compound, thermal stresses and strains their relations and strain energy.	
CO2	Analyse structural members for stresses, strains and deformations.	
CO3	Analyse the structural members subjected to bending and shear loads.	
CO4	Analyse shafts subjected to twisting loads.	
CO5	Analyse the short columns for stability.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study :2020-2021
Course Name: BASIC THERMODYNAMICS - 18ME33		
CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.	
CO2	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.	
CO3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties	
CO4	Interpret the behavior of pure substances and its application in practical problems.	
CO5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations	

Year / SEM : 2 nd year / 3 rd sem		Year of Study :2020-2021
Course Name: MATERIAL SCIENCE: 18ME34		
CO1	Understand the mechanical properties of metals and their alloys.	
CO2	Analyze the various modes of failure and understand the microstructures of ferrous and nonferrous materials.	
CO3	Describe the processes of heat treatment of various alloys.	
CO4	Acquire the Knowledge of composite materials and their production process as well as applications.	
CO5	Understand the properties and potentialities of various materials available and material selection procedures	

Year / SEM : 2 nd year / 3 rd sem		Year of Study :2020-2021
Course Name: METAL CUTTING AND FORMING:18ME35A		
CO1	Explain the construction & specification of various machine tools.	
CO2	Discuss different cutting tool materials, tool nomenclature & surface finish.	
CO3	Apply mechanics of machining process to evaluate machining time.	
CO4	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.	
CO5	Understand the concepts of different metal forming processes.	
CO6	Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study :2020-2021
Course Name: COMPUTER AIDED MACHINE DRAWING: 18ME36A		
CO1	Identify the national and international standards pertaining to machine drawing.	
CO2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings	
CO3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.	
CO4	Interpret the Machining and surface finish symbols on the component drawings.	
CO5	Preparation of the part or assembly drawings as per the conventions	

Year / SEM : 2 nd year / 3 rd sem		Year of Study :2020-2021
Course Name: MATERIAL TESTING LAB: 18MEL37A		
CO1	Acquire experimentation skills in the field of material testing.	
CO2	Develop theoretical understanding of the mechanical properties of materials by performing experiments.	
CO3	Apply the knowledge to analyse a material failure and determine the failure inducing agent/s.	
CO4	Apply the knowledge of testing methods in related areas.	
CO5	Understand how to improve structure/behavior of materials for various industrial applications.	

Year / SEM : 2ndyear / 3rdsem	Year of Study :2020-2021
WORKSHOP AND MACHINE SHOP PRACTICE: 18MEL38A	
CO1	To read working drawings, understand operational symbols and execute machining operations.
CO2	Prepare fitting models according to drawings using hand tools- V-block, marking gauge, files, hack saw, drills etc.
CO3	Understand integral parts of lathe, shaping and milling machines and various accessories and attachments used.
CO4	Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various machining operations.
CO5	Perform cylindrical turning operations such as plain turning, taper turning, step turning, thread Cutting, facing, knurling, internal thread cutting, eccentric turning and estimate cutting time.
CO6	Perform machining operations such as plain shaping, inclined shaping, keyway cutting, Indexing.

Year / SEM : 2ndyear / 3rdsem		Year of Study :2020-2021
CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC): 18CPC39		
CO1	Have constitutional knowledge and legal literacy.	
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers.	
CO3	Understand the the cybercrimes and cyber laws for cyber safety measures.	

Year / SEM : 2ndyear / 4thsem		Year of Study :2020-2021
Course Name: APPLIED THERMODYNAMICS: 18ME42		
CO1	Apply thermodynamic concepts to analyze the performance of gas power cycles	
CO2	Apply thermodynamic concepts to analyze the performance of vapour power cycles.	
CO3	Understand combustion of fuels and performance of I C engines.	
CO4	Understand the principles and applications of refrigeration systems.	
CO5	Apply Thermodynamic concepts to determine performance parameters of refrigeration and air-conditioning systems.	
CO6	Understand the working principle of Air compressors and Steam nozzles, applications, relevance of air and identify methods for performance improvement.	

Year / SEM : 2ndyear / 4thsem		Year of Study :2020-2021
Course Name: FLUID MECHANICS: 18ME43		
CO1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.	
CO2	Explain the principles of pressure, buoyancy and floatation	
CO3	Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.	
CO4	Describe the principles of fluid kinematics and dynamics.	
CO5	Explain the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.	

Year / SEM : 2 nd year / 4 th sem		Year of Study :2020-2021
Course Name: KINEMATICS OF MACHINES: 18ME44		
CO1	Knowledge of mechanisms and their motion.	
CO2	Understand the inversions of four bar mechanisms.	
CO3	Analyse the velocity, acceleration of links and joints of mechanisms.	
CO4	Analysis of cam follower motion for the motion specifications.	
CO5	Understand the working of the spur gears.	
CO6	Analyse the gear trains speed ratio and torque	

Year / SEM : 2 nd year / 4 th sem		Year of Study :2020-2021
Course Name: METAL CASTING AND WELDING: 18ME45B		
CO1	Describe the casting process and prepare different types of cast products.	
CO2	Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, Sand Slinger moulding machines.	
CO3	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces.	
CO4	Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mould castings.	
CO5	Understand the Solidification process and Casting of Non-Ferrous Metals.	
CO6	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing.	
CO7	Describe methods for the quality assurance of components made of casting and joining process	

Year / SEM : 2 nd year / 4 th sem		Year of Study :2020-2021
Course Name: MECHANICAL MEASUREMENTS AND METROLOGY:18ME46B		
CO1	Understand the objectives of metrology, methods of measurement, standards of measurement & various measurement parameters.	
CO2	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design	
CO3	Understand the working principle of different types of comparators.	
CO4	Describe measurement of major & minor diameter, pitch, angle and effective diameter of screw threads.	
CO5	Explain measurement systems, transducers, intermediate modifying devices and terminating devices.	
CO6	Describe functioning of force, torque, pressure, strain and temperature measuring devices.	

Year / SEM : 2 nd year / 4 th sem		Year of Study :2020-2021
Course Name: MECHANICAL MEASUREMENTS AND METROLOGY LAB: 18ME47B		
CO1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer.	
CO2	Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.	
CO3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.	
CO4	Analyse tool forces using Lathe/Drill tool dynamometer.	
CO5	Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer	
CO6	Understand the concepts of measurement of surface roughness	

Year / SEM : 2 nd year / 4 th sem		Year of Study :2020-2021
Course Name: FOUNDRY, FORGING AND WELDING LAB: 18MEL48B		
CO1	Understand needs, functions, roles, scope and evolution of Management.	
CO2	Understand importance, purpose of Planning and hierarchy of planning and also analyse its types.	
CO3	Discuss Decision making, Organizing, Staffing, Directing and Controlling.	
CO4	Select the best economic model from various available alternatives.	
CO5	Understand various interest rate methods and implement the suitable one.	
CO6	Estimate various depreciation values of commodities. CO7: Prepare the project reports effectively.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: MANAGEMENT AND ECONOMICS:18ME51		
CO1	Understand needs, functions, roles, scope and evolution of Management	
CO2	Understand importance, purpose of Planning and hierarchy of planning and also analyse its types.	
CO3	Discuss Decision making, Organizing, Staffing, Directing and Controlling.	
CO4	Select the best economic model from various available alternatives.	
CO5	Understand various interest rate methods and implement the suitable one.	
CO6	Estimate various depreciation values of commodities.	
CO7	Prepare the project reports effectively.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: DESIGN OF MACHINE ELEMENTS I: 18ME52		
CO1	Apply the concepts of selection of materials for given mechanical components.	
CO2	List the functions and uses of machine elements used in mechanical systems.	
CO3	Apply codes and standards in the design of machine elements and select an element based on the Manufacturer's catalogue.	
CO4	Analyse the performance and failure modes of mechanical components subjected to combined loading and fatigue loading using the concepts of theories of failure.	
CO5	Demonstrate the application of engineering design tools to the design of machine components like shafts, couplings, power screws, fasteners, welded and riveted joints.	
CO6	CO6: Understand the art of working in a team.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: DYNAMICS OF MACHINES:18ME53		
CO1	Analyse the mechanisms for static and dynamic equilibrium.	
CO2	Carry out the balancing of rotating and reciprocating masses.	
CO3	Analyse different types of governors used in real life situation.	
CO4	Analyse the gyroscopic effects on disks, airplanes, stability of ships, two and four wheelers	
CO5	Understand the free and forced vibration phenomenon.	
CO6	Determine the natural frequency, force and motion transmitted in vibrating systems.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: TURBO MACHINES: 18ME54		
CO1	Model studies and thermodynamics analysis of turbomachines. radial power absorbing machine and the problems involved during its operation.	
CO2	Analyse the energy transfer in Turbo machine with degree of reaction and utilisation factor.	
CO3	Classify, analyse and understand various type of steam turbine.	
CO4	Classify, analyse and understand various type of hydraulic turbine.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: FLUID POWER ENGINEERING: 18ME55		
CO1	Identify and analyse the functional requirements of a fluid power transmission system for a given application.	
CO2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.	
CO3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro- pneumatics for a given application.	
CO4	Select and size the different components of the circuit.	
CO5	Develop a comprehensive circuit diagram by integrating the components selected for the given application.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: OPERATIONS MANAGEMENT: 18ME56		
CO1	Explain the concept and scope of operations management in a business context.	
CO2	Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage.	
CO3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.	
CO4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.	
CO5	Evaluate a selection of frameworks used in the design and delivery of operations.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: FLUID MECHANICS AND MACHINES LAB:18MEL57		
CO1	Perform experiments to determine the coefficient of discharge of flow measuring devices.	
CO2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.	
CO3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.	
CO4	Determine the energy flow pattern through the hydraulic turbines and pumps.	
CO5	Exhibit his competency towards preventive maintenance of hydraulic machines.	

Year / SEM : 3 rd year / 5 th sem		Year of Study :2020-2021
Course Name: ENERGY CONVERSION LABORATORY:18MEL58		
CO1	Perform experiments to determine the properties of fuels and oils.	
CO2	Conduct experiments on engines and draw characteristics.	
CO3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.	
CO4	Identify exhaust emission, factors affecting them and exhibit his competency towards preventive maintenance of IC engines	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: FINITE ELEMENT METHODS: 18ME61		
CO1	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso- parametric elements.	
CO2	Develop element characteristic equation and generation of global equation.	
CO3	Formulate and solve Axi-symmetric and heat transfer problems.	
CO4	Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems.	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: DESIGN OF MACHINE ELEMENTS II: 18ME62		
CO1	Apply design principles for the design of mechanical systems involving springs, belts, pulleys, and wire ropes.	
CO2	Design different types of gears and simple gear boxes for relevant applications.	
CO3	Understand the design principles of brakes and clutches.	
CO4	Apply design concepts of hydrodynamic bearings for different applications and select Anti friction bearings for different applications using the manufacturers, catalogue.	
CO5	Apply engineering design tools to product design.	
CO6	Become good design engineers through learning the art of working in a team.	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: HEAT TRANSFER: 18ME63		
CO1	Understand the modes of heat transfer and apply the basic laws to formulate engineering systems.	
CO2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems.	
CO3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.	
CO4	Analyze heat transfer due to free and forced convective heat transfer.	
CO5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena.	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: NON-TRADITIONAL MACHINING: 18ME641		
CO1	Understand the compare traditional and non-traditional machining process and recognize the need for Non- traditional machining process.	
CO2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.	
CO3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.	
CO4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.	
CO5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: NON CONVENTIONAL ENERGY SOURCES: 18ME651		
CO1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations. .	
CO2	Know the need of renewable energy resources, historical and latest developments.	
CO3	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc.	
CO4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.	
CO5	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications	
CO6	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.	
CO7	Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: COMPUTER AIDED MODELLING AND ANALYSIS LAB: 18MEL66		
CO1	Use the modern tools to formulate the problem, create geometry, discretize, apply boundary conditions to solve problems of bars, truss, beams, and plate to find stresses with different-loading conditions.	
CO2	Demonstrate the ability to obtain deflection of beams subjected to point, uniformly distributed and varying loads and use the available results to draw shear force and bending moment diagrams.	
CO3	Analyze and solve 1D and 2D heat transfer conduction and convection problems with different boundary conditions.	
CO4	Carry out dynamic analysis and finding natural frequencies of beams, plates, and bars for various boundary conditions and also carry out dynamic analysis with forcing functions.	

Year / SEM : 3 rd year / 6 th sem		Year of Study :2020-2021
Course Name: HEAT TRANSFER LAB: 18MEL67		
CO1	Determine the thermal conductivity of a metal rod and overall heat transfer coefficient of composite slabs.	
CO2	Determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.	
CO3	Evaluate temperature distribution characteristics of steady and transient heat conduction through solid cylinder experimentally.	
CO4	Determine surface emissivity of a test plate and Stefan Boltzmann constant	
CO5	Estimate performance of a refrigerator and effectiveness of a fin and Double pipe heat exchanger.	

Year / SEM : 4 th year / 7 th sem		Year of Study :2020-2021
Course Name: CONTROL ENGINEERING: 18ME71		
CO1	Identify the type of control and control actions.	
CO2	Develop the mathematical model of the physical systems.	
CO3	Estimate the response and error in response of first and second order systems subjected standard input signals.	
CO4	Represent the complex physical system using block diagram and signal flow graph and obtain transfer function.	
CO5	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain.	
CO6	Analyse the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.	

Year / SEM : 4th year / 7thsem		Year of Study :2020-2021
Course Name: COMPUTER AIDED DESIGN AND MANUFACTURING: 18ME72		
CO1	Define Automation, CIM, CAD, CAM and explain the differences between these concepts. Solve simple problems of transformations of entities on computer screen	
CO2	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines.	
CO3	Analyse the automated flow lines to reduce time and enhance productivity.	
CO4	Explain the use of different computer applications in manufacturing, and able to prepare part programs for simple jobs on CNC machine tools and robot programming.	
CO5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.	

Year / SEM : 4th year / 7thsem		Year of Study :2020-2021
Course Name: TOTAL QUALITY MANAGEMENT: 18ME734		
CO1	Explain the various approaches of TQM	
CO2	Infer the customer perception of quality.	
CO3	Analyse customer needs and perceptions to design feedback systems.	
CO4	Apply statistical tools for continuous improvement of systems	
CO5	Apply the tools and technique for effective implementation of TQM	

Year / SEM : 4th year / 7thsem		Year of Study :2020-2021
Course Name: MECHATRONICS:18ME744		
CO1	Illustrate various components of Mechatronics systems.	
CO2	Assess various control systems used in automation.	
CO3	Design and conduct experiments to evaluate the performance of a mechatronics system or component with respect to specifications, as well as to analyse and interpret data.	
CO4	Apply the principles of Mechatronics design to product design.	
CO5	Function effectively as members of multidisciplinary teams.	

Year / SEM : 4 th year / 7 th sem		Year of Study :2020-2021
Course Name: INDUSTRIAL SAFETY: 18ME753		
CO1	Understand the basic safety terms and international standards.	
CO2	Identify the hazards and risk analysis around the work environment and industries.	
CO3	Use the safe measures while performing work in and around the work area of the available laboratories. Able to recognize the sign boards and its application	
CO4	Recognise the types of fires extinguishers and to demonstrate the portable extinguishers used for different classes of fires.	
CO5	Report the case studies by sharing experience of the employees working in housekeeping, laboratories like workshops, electrical labs, machine shops, electronics and computer laboratories.	
CO6	Recognise the chemical and electrical hazards for its prevention and control.	

Year / SEM : 4 th year / 7 th sem		Year of Study :2020-2021
Course Name: COMPUTER AIDED MANUFACTURING LAB: 18MEL76		
CO1	To expose the students to the techniques of CNC programming and cutting tool path generation through CNC simulation software by using G-Codes and M-codes.	
CO2	To educate the students on the usage of CAM packages.	
CO3	To make the students understand the importance of automation in industries through exposure to FMS, Robotics, and Hydraulics and Pneumatics	

Year / SEM : 4 th year / 7 th sem		Year of Study :2020-2021
Course Name: DESIGN LAB: 18MEL77		
CO1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts.	
CO2	Carry out balancing of rotating masses.	
CO3	Analyse the governor characteristics.	
CO4	Determine stresses in disk, beams, plates and hook using photo elastic bench.	
CO5	Determination of Pressure distribution in Journal bearing.	
CO6	Analyse the stress and strains using strain gauges in compression and bending test and stress distribution in curved beams.	

Year / SEM : 4th year / 8thsem		Year of Study :2020-2021
Course Name: ENERGY ENGINEERING: 18ME81		
CO1	Understand the construction and working of steam generators and their accessories.	
CO2	Identify renewable energy sources and their utilization.	
CO3	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, nuclear, hydel and tidal.	

Year / SEM : 4th year / 8thsem		Year of Study :2020-2021
Course Name: NON-DESTRUCTIVE TESTING AND EVALUATION:18ME823		
CO1	Classify various Non-destructive testing methods.	
CO2	Check different metals and alloys by visual inspection method.	
CO3	Explain and perform non-destructive tests like: Liquid penetrant test, Magnetic particle test, Ultrasonic test, X- ray and Gamma ray radiography, Leak Test, Eddy current test.	
CO4	Identify defects using relevant NDT methods.	
CO5	Differentiate various defect types and select the appropriate NDT methods for better evaluation.	
CO6	Document the testing and evaluation of the results.	



ACS College of Engineering

Approved by AICTE New Delhi, Affiliated to VTU, Belagavi
(A Unit of RajaRajeswari Group of Institutions)

CET Code : E186 COMED-K : E003 PGCET : T918



2.6.1: Programme and course outcomes for all programmes offered by the institution are stated and displayed on website and communicated to teachers and students.

PROGRAM OUTCOMES DISPLAYING AT FOLLOWING PLACES



Photo: Program outcomes displayed at classroom

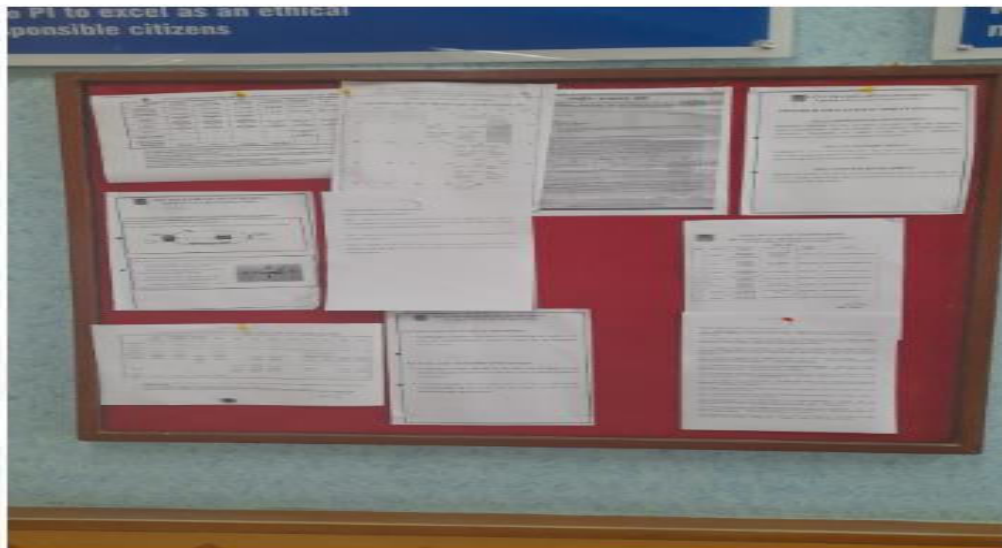
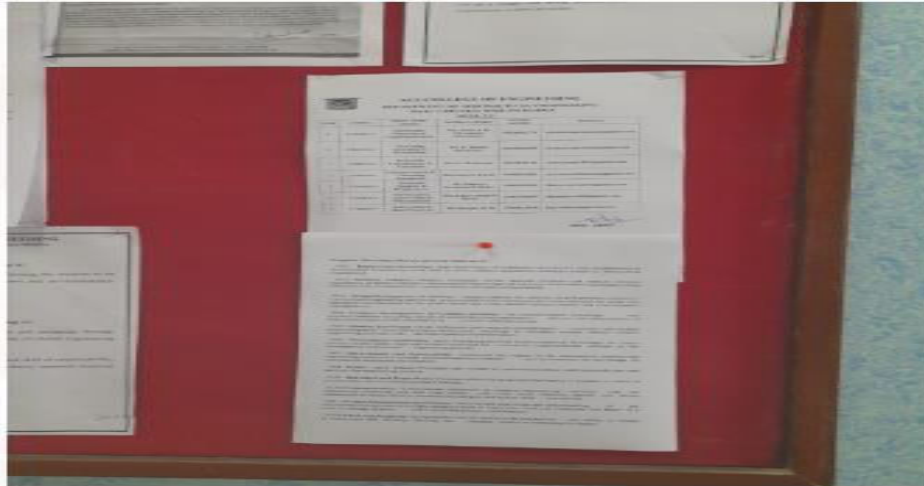


Photo: Program outcomes displayed at Department Notice Board

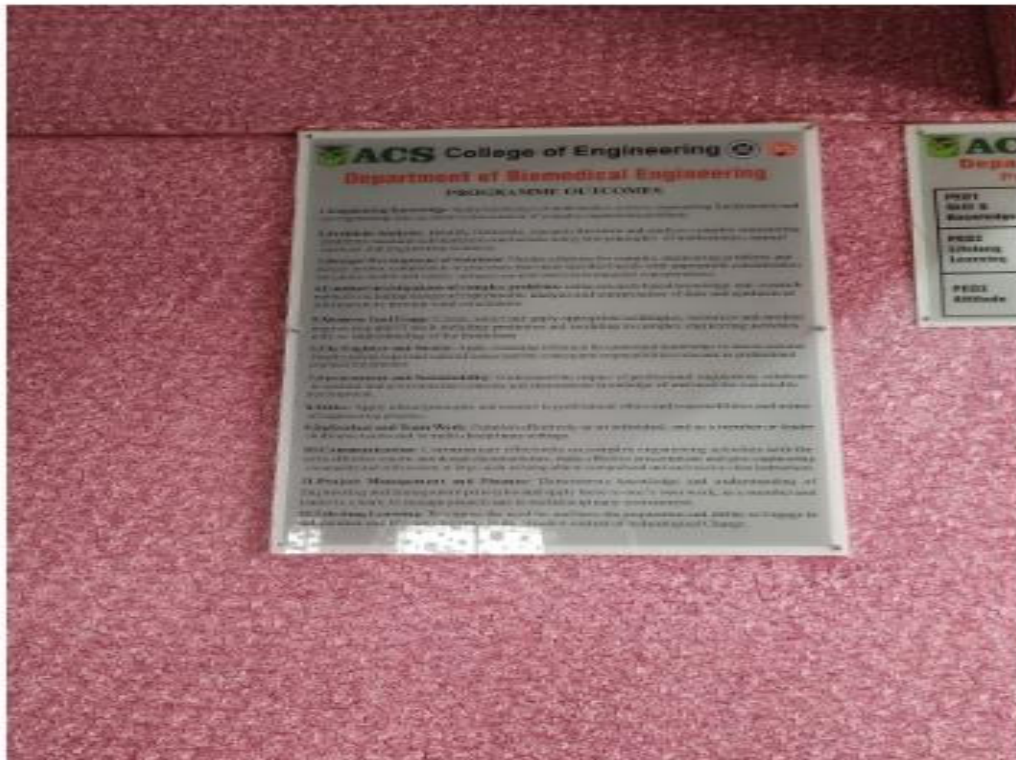


Photo: Program outcomes displayed at HOD Chamber

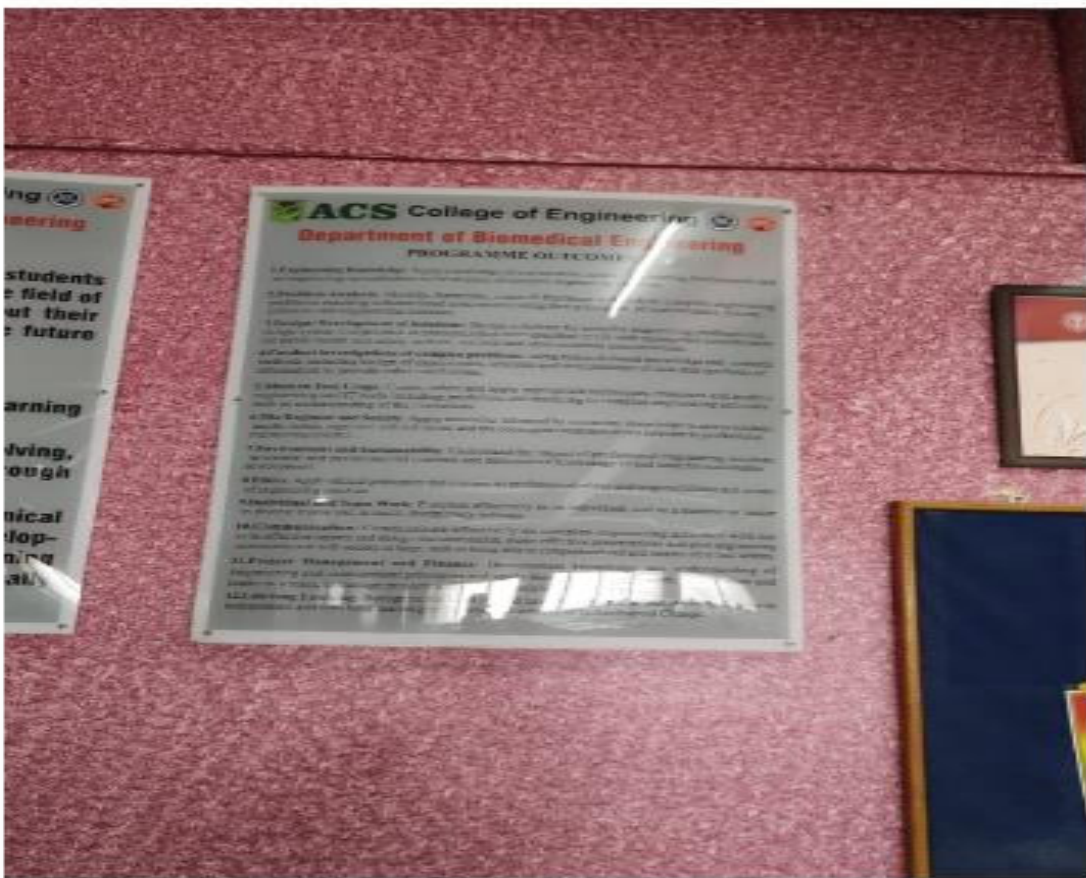


Photo: Program outcomes displayed at Department Library

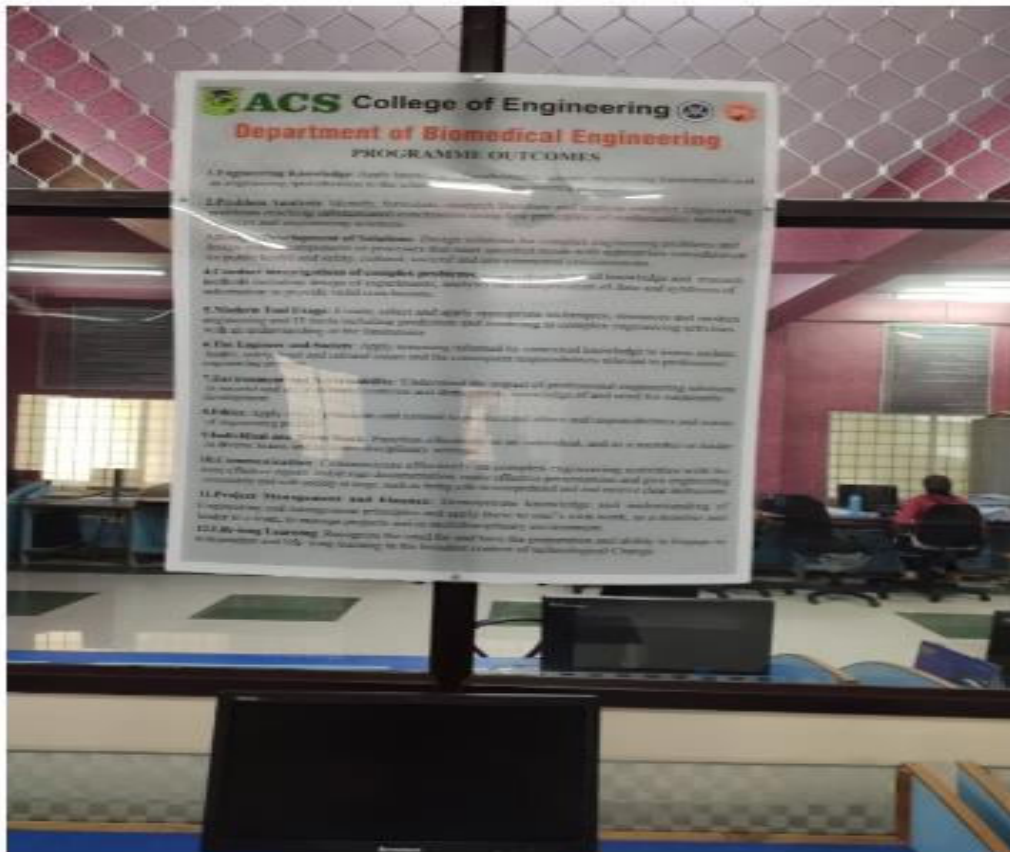


Photo: Program outcomes displayed at MIP Laboratory at 3rd Floor ROOM NO 323



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ACS COLLEGE OF ENGINEERING

Department of Civil Engineering

Civil Engineering department was started in the year 2009 with current intake of 60. The institution is affiliated to Visvesvaraya Technological University, Belgaum and is striving to grow as one of the finest centres. At ACSCE, department of Civil Engineering is one of the oldest branches and was started in the year 2009. The department has been imparting quality education to meet the technological advancement and industrial requirements. This has been made possible due to qualified and dedicated faculty, state of the art laboratories and infrastructure facilities. The department offers an undergraduate programme leading to B.E (Bachelor of Engineering) and a post graduate program M.Tech. (Master of Technology) in Structural Engineering in 2013 affiliated to Visvesvaraya Technological University, Belgaum and approved by AICTE New Delhi. The department has research centre for Ph.D.

Vision of the department:
"To achieve Excellence in Technology, Innovation and Research in ethical way to Lead and Serve the Nation"

Mission:
Create and develop sustained environment of learning, to produce high caliber dynamic civil engineers with due consideration of economy, ecology, and ethical issues of nation and to provide services to society and construction industry to assist in developing capabilities globally with respect to science, Technology and research.

Program Outcomes (POs)

At the end of the B.E program, students are expected to have developed the following outcomes.

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Photo: Program outcomes displayed at Department Newsletter.