Course Outcomes for different Subjects

2018-Scheme

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester: 1/2

Subject Name: Basic Electronics	
Subject Code:18ELN14/24	
C104.1	Describe the operation of diodes, BJT, FET and Operational Amplifiers
C104.2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators
C104.3	Describe general operating principles of SCR and its applications.
C104.4	Explain the working and design of Fixed voltage IC regulator using 7805 and Astable oscillator using Timer IC 555.
C104.5	Explain the different number systems and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops
C104.6	Describe the basic principle of operation of communication system and Mobile phones

Semester: 3	
Subject Name: Network Theory	
Subject Code:18EC32	
C202.1	Determine currents and voltages using source transformation/source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting.
C202.2	Solve network problems by applying Superposition/ Reciprocity/The venin's/ Norton's/ Maximum Power Transfer/ Mailman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
C202.3	Calculate current and voltages for the given circuit under transient conditions and apply Laplace transform to solve the given network
C202.4	Solve the given network using specified two port network parameter like Z or Y or T or h.
C202.5	Understand the concept of resonance and determine the parameters that characterize series/parallel resonance circuits.

Subject Name: Electronic Devices	
Subject Code:18EC33	
C203.1	Understand the basics of semiconductor physics and electronic devices.
C203.2	Describe the electrical parameters of P-N junctions, also recognize the construction and working principles of optoelectronic devices.
C203.3	Demonstrate the mathematical models BJTs along with their fabrication and constructional details.

C203.4	Identify the structure of JFET and MOSFET, also understand their operation.
C203.5	List the fabrication steps of PN junctions and relate to the evolution of IC's.

Subject Name: Digital System Design

Subject Code:18EC34

C204.1	Explain the concept of combinational and sequential circuits.
C204.2	Design combinational logic circuits.
C204.3	Design sequential circuits using SR, JK, D, and T flip flops and Mealy and Moore machines.
C204.4	Design applications of combinational and sequential circuits.

Subject Name: Computer Organization and Architecture

Subject Code:18EC35

C205.1	Explain the basic organization of a computer system.
C205.2	Explain different ways of accessing an input / output device including interrupts.
C205.3	Illustrate the organization of different types of semiconductor and other secondary storage memories
C205.4	Illustrate simple processor organization based on hardwired control and micro programmed control.

Subject Name: Power Electronics & Instrumentation

Subject Code:18EC36

C206.1	Build and test circuits using power electronic devices.
C206.2	Analyse and design-controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.
C206.3	Define instrument errors.
C206.4	Develop circuits for multi range Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
C206.5	Describe the principle of operation of Digital instruments and PLCs.
C206.6	Use Instrumentation amplifier for measuring physical parameters.

Subject Name: Electronic Devices & Instrumentation Lab

Subject Code:18ECL37

C207.1	Understand the characteristics of various electronic devices and measurement of parameters.
C207.2	Design and test simple electronic circuits
C207.3	Use of circuit simulation software for the implementation and characterization of electronic circuits and devices.

Subject Name: Digital System Design Lab	
Subject Code:18ECL38	
C208.1	Design, realize and verify DeMorgan's theorem, SOP, POS forms
C208.2	Demonstrate the truth table of various expressions and combinational circuits using logic gates
C208.3	Design various combinational circuits such as adders, subtractors, comparators, multiplexers, demultiplexers
C208.4	Construct flip-flops, counters and shift registers
C208.5	Simulate Serial adder and Binary Multiplier
Semester:4	
Subject Name: Analog Circuits	
Subject Code:18EC42	
C214.1	Understand the characteristics of BJTs and FETs.
C214.2	Design and analyze BJT and FET amplifier circuits
C214.3	Design sinusoidal and non-sinusoidal oscillators.
C214.4	Understand the functioning of linear ICs
C214.5	Design of Linear IC based circuits.
Subject Name: Control Systems	
Subject Code:18EC43	
C215.1	Develop the mathematical model of mechanical and electrical systems
C215.2	Develop transfer function of a given control system using Block diagram reduction technique and signal flew graph method.
C215.3	Determine time domain specifications for first and second order systems
C215.4	Determine the stability of a system in the time domain using Routh- Hurwitz criteria and root locus technique
C215.5	Determine the stability of a system in the frequency domain using Nyquist and bode plots
Subject Name: Engineering Statistics & Linear Algebra	
Subject Code:18EC44	
C216.1	Identify and associate Random Variables and Random Processes in Communication events.
C216.2	Analyse and model the Random events in typical communication events to extract quantitative statistical parameters.
C216.3	Analyse and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency.

C216.4	Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values.

Subject Name: Signals & Systems

Subject Code:18EC45

C217.1	Understand basic operations on signals and classify the signals as continuous/discrete, periodic/aperiodic, even/odd, energy/power and deterministic/random signals.
C217.2	Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems. Understand LTI system response by computation of Convolutions based on impulse response.
C217.3	Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum.
C217.4	Interpret the properties by analyzing the spectral characteristics of continuous and discrete time signal using Fourier analysis.
C217.5	Compute Z-transforms, inverse Z- transforms of complex LTI systems. Analyze various properties of the system and compute the response in Z domain.

Subject Name: Microcontroller

Subject Code:18EC46

C218.1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 805 l Microcontroller
C218.2	Interfacing of805 l to external memory and Instruction set of 8051. Write 8051 Assembly level programs using 8051 instructions set.
C218.3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051. Write 8051 Assembly language programs to generate square wave on 8051 1/0 port pin using interrupt and C Programs to send & receive serial data using 8051 serial port
C218.4	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 1/0 ports.

Subject Name: Microcontroller Laboratory

Subject Code:18ECL47

C219.1	Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.
C219.2	Interface different input and output devices to 8051 and control them using Assembly language programs.
C219.3	Interface the serial devices to 8051 and do the serial transfer using C programming.

Subject Name: Analog Circuits Laboratory

Subject Code:18ECL48

C220.1	Design analog circuits using BJT/FETs and evaluate their performance characteristics.
C220.2	Design analog circuits using OPAMPs for different applications

C220.3	Simulate and analyze analog circuits that uses ICs for different electronic applications.

Year: 3

Semester: 5

Subject Name: Technological Innovation Management & Entrepreneurship	
Subject Code:18ES51	
C301.1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business
C301.2	Describe the functions of Managers, Entrepreneurs and their social responsibilities
C301.3	Understand the components in developing a business plan
C301.4	Awareness about various sources of funding and institutions supporting entrepreneurs

Subject Name: Digital signal Processing	
Subject Code:18EC52	
C302.1	Understand the concept of DFT, Compute DFT of real and complex discrete time signals and study various properties of DFT.
C302.2	Analyze the Computational Complexity in Direct computation of DFT and study FFT algorithms. Apply concept of DFT in linear filtering as an application in processing long data signals.
C302.3	Design and realize FIR digital filters using various methodologies.
C302.4	Design and realize IIR digital filters.
C302.5	Understand the DS processor architecture and various data processing formats. Implement FIR & IIR filters in fixed point systems.

Subject Name: Principles of Communication Systems	
Subject Code:18EC53	
C303.1	Analyze and compare the performance of different AM techniques involved in any type of communication system even in the presence of noise at the receiver.
C303.2	Understand the performance of systems for generation and detection of angle modulated signals and different parameters affecting FM systems.
C303.3	Distinguish different types of noise present in the communication systems and their effects on the receivers affecting the performance of the system
C303.4	Analyze and compute performance of digital formatting processes with quantization noise and multiplex digitally formatted signals at transmitter and demultiplex the signals and reconstruct digitally formatted signals at the receiver
C303.5	Understand the design and demonstrate the use of digital formatting in Multiplexers, Vocoders, Video transmission.

Subject Name: Information Theory & Coding	
Subject Code:18EC54	
C304.1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source
C304.2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms
C304.3	Model the continuous and discrete communication channels using input, output and joint probabilities
C304.4	Determine a code word comprising of the check bits computed using Linear Block codes and Design the encoding and decoding circuits for Linear Block codes and cyclic codes.
C304.5	Design the encoding circuit and determine a code word using convolutional codes.
Subject Name: Electromagnetic Waves	
Subject Code:18EC55	
C305.1	Evaluate problems on electrostatic force, electric field due to point, linear charges
C305.2	Apply gauss law to evaluate electric field due to different charge distributions
C305.3	Determine potential and energy to point charge and capacitance using Laplace equation
C305.4	Calculate magnetic force, potential energy and magnetization to magnetic materials
C305.5	Apply maxwell's equation for time varying fields, EM waves in free space, poynting theorem
Subject Name: Verilog HDL	
Subject Code:18EC56	
C306.1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction
C306.2	Design and verify the functionality of digital circuit/system using test benches
C306.3	Identify the suitable Abstraction level for a particular digital design.
C306.4	Write the programs more effectively using Verilog tasks, functions and directives.
C306.5	Perform timing and delay Simulation and Interpret the various constructs in logic synthesis.
Subject Name: DSP Lab	
Subject Code:18ECL57	
C307.1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
C307.2	Modelling of discrete time signals and systems and verification of its properties and results.
C307.3	Implementation of discrete computations using DSP processor and verify the results.
C307.4	Realize the digital filters using a simulation tool and a DSP processor and analyze the response of the filter for an audio signal.
C307.5	Write programs using Matlab / Scilab / Octave to illustrate DSP concepts.

Subject Name: HDL Lab	
Subject Code:18ECL58	
C308.1	Write the Verilog/VHDL programs to simulate Combinational circuits in Data flow, Behavioral and Gate level abstraction
C308.2	Describe sequential circuits like flip flops and counters in behavioral description and obtain simulation waveforms
C308.3	Use FPGA/CPLD kits for down loading Verilog codes and check output
C308.4	Synthesize combinational and sequential circuits on programmable ICs test the hardware
C308.5	Interface the hardware to the programmable chips and obtain the required output
Semester: 6	
Subject Name: Digital Communication	
Subject Code:18EC61	
C310.1	Associate and apply the concepts of Bandpass sampling to well specified signals and channels.
C310.2	Analyze and compute performance parameters and transfer rates for low pas and bandpass symbol under ideal and corrupted non band limited channels.
C310.3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
C310.4	Demonstrate by simulation and emulation that bandpass signals subjected to corrupted and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specified performance criteria.
C310.5	Understand the principles of spread spectrum communications
Subject Name: Embedded systems	
Subject Code:18EC62	
C311.1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
C311.2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
C311.3	Understand the basic hardware components and their selection method based on the characteristics attributes of an embedded system.
C311.4	Develop the hardware software co-design and firmware design approaches.
C311.5	Explain the need of real time operating system for embedded system applications.
Subject Name: Microwave and Antennas	
Subject Code:18EC63	
C312.1	Students will be able understand microwave tubes, properties and transmission media
C312.2	Students will be able to analyze and describe microwave circuits and devices for several applications

C312.3	Students will be able to describe Microstrip lines and understand the basics of antenna theory and parameters necessary for building RF system
C312.4	Students will be able to describe the concept of antenna arrays that produce any desired pattern and study the radiation characteristics of dipole (wire) antenna
C312.5	Students will be able to discuss different types, more specialized and application-oriented antennas

Subject Name: DSD using Verilog

Subject Code:18EC644

C316.1	Construct the combinational circuits using discrete gates and programmable logic device
C316.2	Describe how arithmetic operations can be performed for each kind of code and also combinational circuits that implement arithmetic operations
C316.3	Describe a semiconductor memory for specific chip design
C316.4	Describe embedded systems using small microcontrollers, large CPUs/DSPs or hard or soft processor cores
C316.5	Synthesize different types of I/O controllers that are used in embedded system.

Subject Name: Python Application Programming

Subject Code:18EC646

C318.1	Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
C318.2	Demonstrate proficiency in handling Strings and File Systems.
C318.3	Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
C318.4	Interpret the concepts of Object-Oriented Programming as used in Python.
C318.5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Subject Name: Embedded Systems Lab

Subject Code:18ECL66

C324.1	Understand the instruction set of 32-bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language. Develop assembly language programs using ARM Cortex M3 for different applications.
C324.2	Interface external devices and I/O with ARM Cortex M3.
C324.3	Develop C language programs and library functions for embedded system applications.
C324.4	Demonstrate technical competence in developing solution using hardware/software tools.
C324.5	Develop technical writing skills important for effective communication.
C324.6	Develop confidence to work individually.

Subject Name: Communication Lab	
Subject Code:18ECL67	
C325.1	Design and test the communication cicuits for different analog modulation schemes.
C325.2	Design and demonstrate digital modulation techniques.
C325.3	Demonstrate and measure the wave propagation in microstrip antennas.
C325.4	Characteristics of microstrip devices and measurement of its parameters.
C325.5	Understand the probability of error computations of coherent digital modulation schemes.
Subject Name: Mini Project	
Subject Code:18ECMP68	
C326.1	Apply knowledge to survey available literature in the preferred field, identify and analyze to formulate the problem definition for project through detailed investigation.
C326.2	Use appropriate tools to implement and demonstrate the defined project.
C326.3	Design and develop sustainable solution for the social benefit.
C326.4	Work with professional ethics as an individual or a member of a team.
C326.5	Communicate technical content effectively through written report and oral presentations.
C326.6	Develop a viable system with the scope for enhancement and continue life-long learning.

Year:4

Semester:7 and 8

Subject Name: Computer Networks	
Subject Code:18EC71	
C401.1	Understand the concepts of Networking
C401.2	Describe the various Network architectures
C401.3	Identify the services and protocols of different Layers
C401.4	Distinguish the basic network configurations and standards associated with each network
C401.5	Analyze a simple network and measure its parameters
Subject Name: VLSI Design	
Subject Code:18EC72	
C402.1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
C402.2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.

C402.3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements
C402.4	Interpret Memory elements along with timing considerations
C402.5	Interpret testing and testability issues in VLSI Design

Subject Name: Satellite Communication

Subject Code:18EC732

C404.1	Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.
C404.2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.
C404.3	Describe the various applications of satellite with the focus on national satellite system.
C404.4	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.
C404.5	Describe the satellites used for the applications in remote sensing, weather forecasting and navigation

Subject Name: Multimedia Communication

Subject Code:18EC743

C409.1	Understand basics of different multimedia networks and applications.
C409.2	Understand different compression techniques to compress audio and video.
C409.3	Describe multimedia Communication across Networks.
C409.4	Analyze different media types to represent them in digital form.
C409.5	Compress different types of text and images using different compression techniques.

Subject Name: Computer Networks Lab

Subject Code:18ECL76

C416.1	Use the network simulator for learning and practice of networking algorithms.
C416.2	Illustrate the operations of network protocols and algorithms using C programming.
C416.3	Simulate the network with different configurations to measure the performance parameters.
C416.4	Implement the data link and routing protocols using C programming.

Subject Name: VLSI Lab

Subject Code:18ECL77

C417.1	Design and simulate combinational and sequential digital circuits using Verilog HDL
C417.2	Understand the Synthesis process of digital circuits using EDA tool.

C417.3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list
C417.4	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.
C417.5	Perform RTL-GDSII flow and understand the stages in ASIC design.

Subject Name: Project work phase-I

Subject Code:18ECP78

C418.1	Apply knowledge to survey available literature in the preferred field, identify and analyse to formulate the problem definition for project through detailed investigation.
C418.2	Use appropriate tools to implement and demonstrate the defined project.
C418.3	Design and develop sustainable solution for the social benefit.
C418.4	Work with professional ethics as an individual or a member of a team.
C418.5	Communicate technical content effectively through written report and oral presentations.
C418.6	Develop a viable system with the scope for enhancement and continue life-long learning.

Subject Name: Wireless and Cellular Communication

Subject Code:18EC81

C419.1	Evaluate concepts of propagation mechanisms in wireless channel
C419.2	Develop a scheme for idle mode, call setup, call progress in GSM
C419.3	Develop a scheme for idle mode, call setup, call progress in CDMA
C419.4	Understand the basic operations of air interface in LTE 4G systems

Subject Name: Network Security

Subject Code:18EC821

C420.1	Explain network security services and mechanisms and explain security concepts
C420.2	Understand the concept of Transport Level Security and Secure Socket Layer.
C420.3	Explain Security concerns in Internet Protocol security
C420.4	Explain Intruders, Intrusion detection and Malicious Software
C420.5	Describe Firewalls, Firewall Characteristics, Biasing and Configuration

Subject Name: Radar Engineering

Subject Code:18EC823

C422.1	Understand the radar fundamentals and radar signals.

C422.2	Explain the working principle of pulse Doppler radars, their applications and limitations
C422.3	Describe the working of various radar transmitters and receivers.
C422.4	Analyze the range parameters of pulse radar system which affect the system performance

Subject Name: Project Work phase-II	
Subject Code:18ECP83	
C425.1	Apply knowledge to survey available literature in the preferred field, identify and analyse to formulate the problem definition for project through detailed investigation.
C425.2	Use appropriate tools to implement and demonstrate the defined project.
C425.3	Design and develop sustainable solution for the social benefit.
C425.4	Work with professional ethics as an individual or a member of a team.
C425.5	Communicate technical content effectively through written report and oral presentations.
C425.6	Develop a viable system with the scope for enhancement and continue life-long learning.

ELECTRICAL AND ELECTRONICS ENGINEERING

Course Name: Engineering Mathematics _ I(18MAT11/21)	
At the end of the course student will be able to	
1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
4	Solve first order linear/nonlinear differential equation analytically using standard methods.
5	Make use of matrix theory for solving system of linear equations and compute Eigen values and Eigen vectors required for matrix diagonalization process.
Course Name: Engineering Physics(18PHY11/21)	
At the end of the course student will be able to	
1	Memorize the setup of differential equations for the types of oscillations and analyze the solutions and also to recognize the importance of shock waves and its applications.
2	Describe the Elastic properties and Electrical properties of the materials and identify their applications in Engineering.
3	Summarize the Basic theorems of Electricity and Magnetism, interrelation between time varying electric field and magnetic fields and the transverse nature of the EM waves.
4	Explain the principle, conditions, requisites and generation of laser and its different applications mainly optical fiber communication through the study of construction, working and types of optical fibers.
5	Discuss the basic principles and hypothesis in quantum mechanics and to Apply it to study the motion of particles in a potential well.
Course Name: Basic Electrical Engineering(18ELE13/23)	
At the end of the course student will be able to	
1	Analyze the DC Circuits to determine the power and to interpret the concepts of AC fundamentals.
2	Analyze the Single phase and 3-Phase AC circuits to determine active power, reactive power and power factor.
3	Estimate the losses and efficiency of a single phase transformer by understanding its operating principle.
4	Demonstrate the Domestic wiring by employing earthling and circuit protective devices.
5	Interpret the performance characteristics of DC generators and Motors by understanding its operating principles.
6	Apply the operating principles of a 3-phase synchronous generator (to determine its EMF induced) and 3-phase Induction motor (to find slip).
Course Name: Civil Engineering(18CIV14)	
At the end of the course student will be able to	
1	Mention the applications of various fields of Civil Engineering.
2	Compute the resultant of given force system subjected to various loads.
3	Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads
4	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.
5	Express the relationship between the motions of bodies and analyze the bodies in motion.

Course Name: Engineering Drawings(18EGDL15/25)

At the end of the course student will be able to

1	Mention the applications of various fields of Civil Engineering.
2	Compute the resultant of given force system subjected to various loads.
3	Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads
4	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.
5	Express the relationship between the motions of bodies and analyze the bodies in motion

Course Name: Engineering Physics Lab(18PHYL16/26)

At the end of the course student will be able to

1	Demonstrate the phenomenon of interference and diffraction using simple experiments
2	Interpret the characteristics of bipolar junction transistors and photo-diode and also to Analyze the resonance concept and its applications in electrical circuits.
3	Calculate the electrical properties like Dielectric Constant of the Dielectric material, Fermi energy of a metal through simple experiments and Compare the theoretical and experimental values of magnetic field set up by a circular coil.
4	Visualize laser source and application of laser in the optical fiber and diffraction experiments to calculate the related quantities.
5	Practice the measurement of quantities, honest recording, representing and analyzing the data and expressing the final results.

Course Name: Basic Electrical Engineering Lab(18ELEL17/27)

At the end of the course student will be able to

1	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.
2	Apply KVL, KCL and interpret the effect of open and short circuit in simple circuits.
3	Measurement of current, power and comparison of power factor of lamps.
4	Measurement of resistance, inductance of a choke coil and measurement of earth resistance.
5	Determine impedance of an electrical circuit and power consumed in a 3 phase load.
6	Analyze two way and three way control of lamps.

Course Name: Technical English (18EGH18/28)

At the end of the course student will be able to

1	Use grammatical English and essential of language skills and identify the nuances of phonetics , intonation and flawless pronunciation.
2	Implement English vocabulary at command and language proficiency
3	Identify common errors in spoken and written communication
4	Understand and improve the non verbal communication and kinesics
5	Perform well in campus recruitment, engineering and all other general competitive examinations.

Course Name: Engineering Mathematics _ II (18MAT21)	
At the end of the course student will be able to	
1	Illustrate the application of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
3	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.
4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
Course Name: Engineering Chemistry (18CHE12/22)	
At the end of the course student will be able to	
1	Apply the knowledge of thermodynamic function in electrochemical systems.
2	Interpretation on metallic corrosion, control & the surface modification.
3	Utilization of chemical fuels & renewable source for the production and consumption of energy
4	Apply the knowledge on facts & techniques related to environmental pollution waste management & water chemistry.
5	Explain the basic principles involved in different Analytical/Instrumentation techniques & Nanoscience.
Course Name: Computer Programming Structure (18CPS13/23)	
At the end of the course student will be able to	
1	Illustrate simple algorithms from the different domains such as mathematics, physics etc.
2	Construct a programming solution to the given problem using C.
3	Identify and correct the syntax and logical errors in C programs.
4	Modularize the given problem using functions and structures.
Course Name: Basic Electronics Engineering (18ELN14/24)	
At the end of the course student will be able to	
1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.
2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.
3	Describe general operating principles of SCRs and its application.
4	Explain the working and design of Fixed voltage IC regulator using 7805 and Astable oscillator using Timer IC 555.
5	Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops.
6	Describe the basic principle of operation of communication system and mobile phones.
Course Name: Elements of Mechanical Engineering (18ME15/25)	
At the end of the course student will be able to	
1	Identify different sources of energy, their conversion process and also describe the basic concepts thermodynamics and solving simple numerical problems on steam.
2	Explain the working principle of boilers, Turbines, Pumps, IC Engines and Refrigeration.
3	Demonstrate the working principles of an I.C Engine, Refrigeration, air conditioning and also calculate the performance parameters of an IC engine.
4	Recognize & Classify the various engineering materials, metal joining processes and power transmission elements. Also solve simple numerical on power transmission elements.

5	Describe the working of conventional machine Tools, Machining processes and the advanced manufacturing system.

Course Name: Engineering Chemistry Lab (18ME15/25)

At the end of the course student will be able to

1	Analyse materials quantatively using different analytical techniques & instruments to enhance the sensitivity & accuracy.
2	Analyze various materials quantatively by classical volumetric method.

Course Name: Computer Programming Lab (18CS15/25)

At the end of the course student will be able to

1	Write algorithms, flowcharts and program for simple problems.
2	Correct syntax and logical errors to execute a program.
3	Correct syntax and logical errors to execute a program.
4	Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.

Course Name: Technical English (18EGH28)

At the end of the course student will be able to

1	Identify common errors in spoken and written communication
2	Get familiarized with English vocabulary and language proficiency
3	Improve nature and style of sensible writing and acquire employment and workplace communication skills.
4	Improve their Technical Communication Skills through Technical Reading and writing practices
5	Perform well in campus recruitment, engineering and all other general competitive examinations.

Course Name: Engineering Mathematics _ II (18MAT31)

At the end of the course student will be able to

1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
2	Know the use of periodic signals and Fourier series to analyze circuits and system communications beams. Finding series of function
3	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform
4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.

Course Name: Electric Circuit Analysis (18EE32)

At the end of the course student will be able to

1	Use mathematical knowledge and fundamental laws of electrical network to obtain solution using solution techniques and simplify network to solve electrical engineering problems.
2	Apply appropriate network theorems to solve dc and ac electrical Network
3	Identify, formulate, and solve engineering problems during switching operation of dc circuits
4	Analyze a unbalanced three phase system and two port network

Course Name: Transformers & Generators (18EE33)

At the end of the course student will be able to

1	Using fundamental knowledge of maths and science engineering to describe the construction of 3 phase transformers, auto transformer, territory transformer and operation of single phase transformer under different load conditions and also the armature reaction, commutation.
2	Analyze and calculate equivalent circuit parameters and pre determination of efficiency, voltage regulation by interpretation of data by conducting test on transformer and synchronous generator also able to analyze different transformer connections.

3	Develop necessary condition for parallel operation of transformer and synchronous generators.
4	Able to describe capability curves for synchronous generator starting, controlling and hunting, effects saliency with reasoning.

Course Name: Analog Electronics Circuit (18EE34)

At the end of the course student will be able to

1	Apply the knowledge of diode characteristics and able to design wave shaping electronics circuits like clippers, clampers using diode.
2	Design and analyze various biasing circuit to fix the Q-point of transistor and FET for amplifier and switching application.
3	Analyze the transistor amplifier circuits in AC domain using hybrid parameters model and feedback amplifiers.
4	Design power amplifier circuits and Oscillator circuits

Course Name: Digital System Design (18EE35)

At the end of the course student will be able to

1	Apply the fundamentals of Boolean algebra to develop optimal logic circuits
2	Review and analyze the various digital components used in digital circuits
3	Design digital circuits to solve engineering problems
4	Comprehend the differences between the various types of memories and their uses.

Course Name: Electrical & Electronics Measurements (18EE36)

At the end of the course student will be able to

1	Be able to analyze working of different bridge circuits using the knowledge of science and mathematics for measurement of resistance, Inductance and capacitance,
2	Be able to apply the contextual knowledge in working and construction of various meters such as power factor meter, frequency meter, digital voltmeter etc. by considering safety issues.
3	Be able to understand the construction and working of various meters used for measurement.
	Be able to investigate the performance of different electronic instruments.
4	Be able to explain display devices and electronic devices with the help of basic knowledge of science.

Course Name: Electrical Machines lab-1 (18EEL37)

At the end of the course student will be able to

1	Assess the equivalent circuit, voltage regulation and efficiency of transformers.
2	Evaluate the performance of two single phase transformers of different KVA rating connected in parallel.
3	Analyze the performance of 3 single phase transformers connected in star-delta, delta – delta and V – V (open delta) for three phase operation and phase conversion.
4	Assess the voltage regulation and efficiency of salient pole and non-salient pole synchronous generator by direct & indirect methods.
5	Practically demonstrate the synchronization of synchronous generator to infinite bus.

Course Name: Electronics Lab (18EEL38)

At the end of the course student will be able to

1	Design and test rectifier circuits with and without capacitor filters.
2	Determine h-parameter models of transistor for all modes.
3	Design and test BJT and FET amplifier.[
4	Design and test RC phase shift oscillator circuit
5	Realize Boolean expressions, adders, subtractors and code conversion using gates and ICs.
6	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters.

	Course Name: Mathematics-IV (18MAT41)
	At the end of the course student will be able to
1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory
2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.
	Course Name: Power Generation, Economics (18EE42)
	At the end of the course student will be able to
1	Describe the working of hydroelectric, steam, nuclear power plants and state functions of major equipment of the power plants.
2	Classify various substations and explain the functions of major equipment in substations.
3	Illustrate the types of grounding and importance of grounding.
4	Understand the economic aspects of power system operation and its effects.
5	Explain the importance of power factor improvement.
	Course Name: Transmission & Distribution (18EE43)
	At the end of the course student will be able to
1	Using the Fundamental knowledge of Electrical Engineering to describe the generation and various methods of overhead transmission line.
2	To Analysis various line parameters of overhead transmission line.
3	To design insulators for different voltage level.
4	To formulate the corona, Underground cable, reliability, power quality in power system and distribution.
	Course Name: Electric Motors (18EE44)
	At the end of the course student will be able to
1	Able to realize the construction features of motors and the select a suitable drive for specific applications.
2	Analyze and access the performance characteristics of dc motors by conducting suitable tests and control the speed by suitable method.
3	Able to realize the constructional features of 3-phase & 1-phase of Induction Motor and access their performance.
4	Control the speed of induction motor by suitable method.
	Course Name: Electromagnetic Field Theory (18EE45)
	At the end of the course student will be able to
1	Use different coordinate systems to explain the concept of gradient, divergence and curl of a vector.
2	Calculate the energy and potential due to a system of charges.
3	Co relate the behavior of electric field across a boundary between a conductor and dielectric and between two different dielectrics.
4	Explain the behavior of magnetic fields and magnetic materials. Assess time varying fields and propagation of waves in different media.
	Course Name: Operational amps & Linear ICs (18EE46)
	At the end of the course student will be able to

1	Understand the basic concepts of op-amp and its linear applications.
2	Design active filter circuits, voltage regulator circuits and IC based regulator circuits.
3	Implement op-amp based signal generator circuits, signal processing circuits, comparator and converters circuits.
4	Analyze the architecture of specialized ICs (PLL and 555 timer) and its applications

Course Name: Electrical Machines Lab-II (18EEL47)

At the end of the course student will be able to

1	Test dc machines to determine their characteristics and control the speed of DC motors.
2	Pre-determine the performance characteristics of dc machines by conducting suitable tests.
3	Perform load test on single phase and three phase induction motor to assess its performance.
4	Conduct test on induction motor to pre-determine the performance characteristics
5	Conduct test on synchronous motor to draw the performance curves

Course Name: Operational amps & Linear ICs Lab (18EEL48)

At the end of the course student will be able to

1	Analyze the characteristic parameters of OP-Amp
2	Design and analyze the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator.
3	Evaluate the OP-Amp as oscillators and filters.
4	Analyze the Linear IC's as regulators and waveform generators.
5	Design and analyze the Linear IC's as timer and Schmitt trigger circuit

Course Name: Management and Entrepreneurship (18EE51)

At the end of the course student will be able to

1	Demonstrate in-depth knowledge about the concepts of management, planning and decision making.
2	Identify the characteristics of organizing, directing, communicating, coordinating and controlling.
3	Enumerate the features of entrepreneur and demonstrate a clear idea of small scale industries and available institutional supports
4	Apply selection skill to identify project and evaluate different phases of project life cycle.

Course Name: Microcontroller (18EE52)

At the end of the course student will be able to

1	Apply the fundamentals of electronic circuits to differentiate between the different architectures of microcontrollers and processors
2	Be able to analyze and develop programs in assembly language and C to solve engineering problems.
3	Design applications using on chip components
4	Develop solutions to real world problems by interfacing off chip peripherals.

Course Name: Power Electronics (18EE53)

At the end of the course student will be able to

1	Be able to interpret application area of power electronics, different types of power electronic circuits, switches and power diodes.
2	Be able to demonstrate the steady state, switching and characteristics and gate control requirements of different power transistors
3	Be able to discuss about the different types of thyristors and their characteristics to estimate the gate control circuits
4	Be able to compare the operation of controlled AC-DC,DC-AC,DC-DC converters and voltage controllers

Course Name: Signal & Systems (18EE54)

	At the end of the course student will be able to
1	Demonstrate an understanding of signals and systems and will exhibit the ability to analyze and characterize them
2	Be able to represent and describe LTI systems using the time domain techniques.
3	Be familiar with Fourier transform for continuous time and discrete time signals and apply it to solve differential and difference equations
4	Be familiar with Z transforms for discrete time signals and apply it to solve difference equations

Course Name: Electrical Machine Design (18EE55)

	At the end of the course student will be able to
1	Identify the design factors, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines
2	Derive the output equation of DC machine, discuss selection of specific loadings and magnetic circuits of DC machines and design the field windings of DC machine, stator and rotor circuits of a DC machine
3	Derive the output equation of transformer, discuss selection of specific loadings, estimate the number of cooling tubes, no load current and leakage reactance of core type
4	Develop the output equation of induction motor, discuss selection of specific loadings and magnetic circuits of induction motor, design stator and rotor circuits of a induction motor and synchronous machines
5	Formulate the output equation of alternator, discuss short circuit ratio and its effects on performance of synchronous machines and design the field windings, salient pole and non-salient pole alternators for given specifications.

Course Name: High Voltage Engineering (18EE56)

	At the end of the course student will be able to
1	Using the Fundamental knowledge of Electrical Engineering to describe the concept of conduction and breakdown in various dielectrics
2	To design circuits to generate HV AC, HVDC and Impulse high voltages and currents and their Measurement.
3	To identify the causes for over voltages, Lightning Phenomenon, abnormal conditions
4	Using the Basic Fundamental knowledge of Electrical Engineering understand Non-Destructive Testing of Materials and Electrical Apparatus and High voltage Testing of Electrical Apparatus

Course Name: Microcontrollers Laboratory(18EEL57)

	At the end of the course student will be able to
1	Identify and interpret the given data and use the fundamental knowledge of logic design to design to develop codes using data
2	Transfer, arithmetic, Boolean and logical instructions to perform various operations
3	Use the basic knowledge of microcontroller architecture to develop applications and control the working of interfaces like stepper motor, DC motor, LCD display and elevator.
4	Use the basic knowledge of microcontroller architecture to interface a DAC and develop codes to generate different waveforms.

Course Name: Power Electronics Lab (18EEL58)

	At the end of the course student will be able to
1	obtain and explain static characteristics of semiconductor devices and discuss their performance
2	Trigger the SCR by different methods
3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads
4	Control the speed of a dc motor, universal motor and stepper motors

Course Name: Control System (18EE61)

	At the end of the course student will be able to

1	Analyze and model electrical and mechanical system using analogous
2	Formulate transfer function using block diagram and signal flow graph
3	Analyze the stability of control system, ability to determine transient and steady state time response
4	Illustrate the performance of a given system in time and frequency domains, stability Analysis using Root locus and Bode plots
5	Discuss stability analysis using Nyquist plots, Design controller and compensator for a given specification

Course Name: Power System Analysis and Stability (18EE62)

At the end of the course student will be able to

1	Be able to show the understanding of per unit system its advantages and computation. Also explain the concept of one-line diagram and its implementation in problems
2	Be able to examine short circuit analysis on a synchronous machine and simple power system to select a circuit breaker for the system
3	Be able to evaluate symmetrical components of voltages and currents in un-balanced three phase circuits
4	Have the ability to identify and analyze the different types of unsymmetrical faults in the power system
5	Be able to understand the concept of power system stability and also be able to apply the equal area criterion concept for the evaluation of stability under different fault locations

Course Name: Digital Signal Processing (18EE63)

At the end of the course student will be able to

1	use the fundamental knowledge of mathematics to analyze a signal using Discrete Fourier Transform
2	Appraise the need for fast Fourier transform and use the same to analyze a signal.
3	Identify the given filter specifications to design an IIR filter and realize the same using block diagrams.
4	Identify the given filter specifications to design an FIR filter and realize the same using block diagrams.

Course Name: Introduction to Nuclear Power (18EE641)

At the end of the course student will be able to

1	Understand about components of nuclear reactors.
2	Know about different types of coolants, their features and cooling of reactors.
3	Understand how the accidents occurs in cooling reactor and also apply appropriate professional's solutions to reduce accidents occur in cooling reactor for sustainable development.
4	Basic knowledge about postulated severe accidents in reactors and also apply ethical principles on postulated severe accidents in reactors and removal of spent fuel.
5	Apply appropriate tools in cooling and disposing the nuclear waste as engineering practice and also apply reasoning informed by the contextual knowledge to assess prospect of fusion energy in the future for sustainable development.

Course Name: Computer Aided Electrical Drawing(18EE643)

At the end of the course student will be able to

1	Explain the terminologies of DC and AC winding diagram, design and draw the DC and AC winding diagram using computer aided drafting package.
2	Develop the single line diagram of substation using standard symbols using computer aided drafting package.
3	Utilize design data, interpret machine parts data or sketches of DC machines, Transformers and Alternators and develop two dimensional machines drawing using computer aided drafting package.

Course Name: Embedded System(18EE644)

	At the end of the course student will be able to
1	Understand the basic concepts of embedded systems.
2	Apply the fundamentals of electronics to evaluate the technological aspects of embedded systems.
3	Analyze the design trade-offs involved in the design of embedded systems
4	Interpret the software aspects of Embedded systems

Course Name: Object Oriented Programming using C++(18EE645)

	At the end of the course student will be able to
1	Analyze, write, debug and test basic C++ codes using the approaches introduced in the course.
2	Program using objects, constructors, destructors and operator overloading for a defined problem statement.
3	Apply concepts of different inheritance and polymorphism techniques, pointers, virtual functions and managing I/O to solve real-life problems.

Course Name: Electric Vehicles Technologies(18EE646)

	At the end of the course student will be able to
1	Explain the working of electric vehicle and recent trends.
2	Analyze different power converter topology used for electric vehicle applications.
3	Develop the electric propulsion unit and its control for applications of electric vehicles.
4	Design converter for battery charging and explain transformer less topology.

Course Name: Control Systems Laboratory (18EEL66)

	At the end of the course student will be able to
1	Use software package or create components in assessing the time and frequency domain reposes of a given second order system.
2	Design and analyze Lead, Lag and Lag-Lead compensators for given specifications &Determine the performance characteristics of ac and dc servomotors and synchro-transmitter receiver pair used in control systems.
3	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and Lead compensator on the step response of the system.
4	Write a script files to plot root locus, bode plot, Nyquist plots to study the stability of the system using a software package & work with a small team to carryout experiments and prepare reports that present lab work.

Course Name: Digital Signal Processing Lab (18EEL67)

	At the end of the course student will be able to
1	Evaluate and analyze the impulse response of the LTI system, provide solution for difference equation and to give physical interpretation for sampling theorem.
2	Analyze and perform the linear convolution and circular convolution of given sequences to evaluate the response of the system.
3	Compute and analyze DFT and IDFT of the given sequences and apply the same to compute convolution.
4	Analyze the given specification, design, implement and verify the working of IIR and FIR filters.

Course Name: Mini Project (18EEMP68)

	At the end of the course student will be able to
1	Use their fundamental knowledge to generate, develop and evaluate ideas and information and apply the same to the project task.
2	Habituated to critical thinking and use problem solving skills to conduct investigations using modern tools.
3	Use ethical principles to develop sustainable solutions to cater to the needs of the society.

4	Work in a team to achieve common goal, communicate effectively and present ideas clearly and coherently in both written and oral forms.
5	Learn on their own, reflect on their learning and take appropriate actions to improve it.

Course Name: Power Systems Analysis -II (18EE71)

At the end of the course student will be able to

1	Formulate network matrices and models engineering problems for solving load flow problems.
2	Develop and perform steady state power flow analysis of power systems to meet the specified needs using numerical iterative techniques.
3	Solve issues of economic load dispatch based on knowledge and analysis of data and unit commitment problems.
4	Apply short circuit faults in power system networks and analyze using bus impedance matrix. Solve swing equation by apply point by point method and Runge Kutta method.

Course Name: Power System Protection (18EE72))

At the end of the course student will be able to

1	Apply the concept of science and engineering fundamentals to understand the protective schemes of power systems and describe the construction and operating principle of different types of relays and different protective devices like circuit breakers and fuses.
2	Identify and analyze the complex engineering problems to understand the various protective schemes and to develop a proper protective scheme for the practical applications using the different devices of power systems.
3	Understand the challenges of protective schemes used for the power system components and machinery and using the same they will be able design and develop a practical in use protective scheme.

Course Name: Solar and Wind Energy (18EE731)

At the end of the course student will be able to

1	Understand the concepts of energy in human life, increasing role of renewable energy sources and explain the concepts of energy storage.
2	Describe the characteristics of solar radiation, applications of solar energy and solar radiation on horizontal and tilted surface.
3	Discuss fabrication, operation of solar cell, electrical characteristics, sizing and design of solar PV systems and their applications.
4	Describe the basic principles of wind energy conversion, types of wind machines, energy storage and the applications of wind energy and environmental concepts.

Course Name: Micro and Nano Scale Sensors and Transducers(18EE732)

At the end of the course student will be able to

1	Understand the fundamental concepts about the sensors and transducer technology based on nanotechnology and nanofabrication and classical sensor technologies.
2	Illustrate the structure, theory of operation of sensor based on nanotechnology for motion, acceleration, gas and moisture, biological, chemical and smoke detection.
3	Describe optoelectronic and photonic sensors used in optical microphones, fingerprint readers and highly sensitive seismic sensors.
4	Analyze static and dynamic characteristic and experimental results of different types of sensor based on nanotechnology.

Course Name: AI Techniques for Electrical and hybrid Electric Vehicles(18EE743)

At the end of the course student will be able to

1	Relate basic AI techniques to control and monitor, and combine circuit mathematics and characteristics of linear and non-linear devices.
2	Describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits.
3	Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.

4	Formulate and analyze a power electronic design at the system level and assess the performance.
5	Recognize the role power electronics in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

Course Name: Smart Grid(18EE744)

At the end of the course student will be able to

1	Explain the concept of smart grid enables the Electric Net and need of smart grid.
2	Outline the benefits and drivers of DC power delivery system
3	Summarize the Intelligrid Architecture for the smart grid.
4	Explain the Efficient Elective End-use Technology Alternatives. Also able to discuss Demand side planning and Evaluation.

Course Name: Power System Simulation Laboratory (18EEL76)

At the end of the course student will be able to

1	Develop a program in suitable package to assess the performance of medium and long transmission lines, the transient stability under three phase fault at different locations.
2	Develop a program in suitable package to obtain the power angle characteristics of salient and non-salient pole alternator and at the end submit the properly written report in time.
3	Develop programs in suitable package to formulate bus admittance &bus impedance Matrices of interconnected power systems and solve power flow problem for simple power systems using suitable package and at the end submit the properly written report in-time.
4	Use suitable package to study unsymmetrical faults at different locations in radial power systems and optimal generation scheduling problems for thermal power plants and at the end submit the properly written report in-time.

Course Name: Relay & High Voltage Lab (18EEL77)

At the end of the course student will be able to

1	To conduct experiments to verify the characteristics of over current, over voltage under relays both electromagnetic and static type.
2	To conduct experiments to verify the characteristics of microprocessor based over current, over voltage, under voltage relays.
3	To conduct experiments to study the spark over characteristics for both uniform and non-uniform configurations using High AC and DC voltages.
4	To experimentally measures the breakdown strength of transformer coil.
5	To experimentally measure the capacitance of different electrode configuration models using Electrolytic Tank.

Course Name: PROJECT PHASE – I (18 EEP78)

At the end of the course student will be able to

1	Analyze the problem, formulation and solution of the selected project
2	Develop solutions for contemporary problems using modern tools for sustainable development
3	Demonstrate ethical and professional sustainability while working in a team and communicate effectively for the benefit of the society
4	Understand the engineering, finance and management principles.

Course Name: Power System Operation & Control (18EE81)

At the end of the course student will be able to

1	Describe various levels of controls in power systems architecture and configuration of SCADA
2	Develop and analyze mathematical models of Automatic Load Frequency control
3	Develop mathematical model of Automatic Generation control in Interconnected power system
4	Discuss the control the control of voltage, Reactive power and voltage collapse
5	Explain security, contingency analysis, state estimation of power systems

Course Name: Electrical Estimation and costing (18EE822)	
At the end of the course student will be able to	
1	Understanding the purpose of estimation and costing. Market survey, estimate purchase enquiries, preparation of tenders, comparative statements and payment of bills. Indian Electricity act and Indian Electricity rules
2	Distribution of energy in a building, methods of wiring, cables used in internal wiring. Wiring accessories and fittings, types of fuses.
3	Design of lighting points and its number, total load, sub-circuits, size of conductor. Service mains and estimation of service mains and power circuits installation
4	Estimation of overhead transmission and distribution system and its components preparation of a single line diagram of a substation and earthing of a substation and its components.
Course Name: Electrical Power Quality (18EE825)	
At the end of the course student will be able to	
1	Define power quality; evaluate power quality procedures and standards.
2	Estimate voltage sag performance explain principles of protection and sources of transient over voltages.
3	Identify various sources of harmonics, explain effects of harmonic distortion.
4	Evaluate harmonic distortion, control harmonic distortion.
Course Name: Project Work Phase - 2 (18EEP83)	
At the end of the course student will be able to	
1	Analyze the problem, formulation and solution of the selected project
2	Develop solutions for contemporary problems using modern tools for sustainable development
3	Demonstrate ethical and professional sustainability while working in a team and communicate effectively for the benefit of the society.
4	Understand the engineering, finance and management principles.
Course Name: Technical Seminar (18EES84)	
At the end of the course student will be able to	
1	Attain, use and develop knowledge in the field of electrical and electronics engineering and other disciplines through independent learning and collaborative study.
2	Identify, understand and discuss current, real-time issues
3	Improve oral and written communication skills
4	Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
5	Apply principles of ethics and respect in interaction with others.
Course Name: Internship(18EEI85)	
At the end of the course student will be able to	
1	To expand thinking and broaden the knowledge and skills acquired through course work in the field.
2	To relate to interact with and learn from current professionals in the field and gain a greater understanding of the duties and responsibilities of a professional.
3	To understand and adhere to professional standards in the field. And gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas and confidentiality.
4	To identify personal strengths and weakness and develop the initiative and motivation to be a self-starter and work independently.

COMPUTER SCIENCE AND ENGINEERING

Course Outcome - DATA STRUCTURES AND APPLICATIONS (18CS32)	
1	Use different types of data structures, operations and algorithms
2	Apply searching and sorting operations on files
3	Use stack, Queue, Lists, Trees and Graphs in problem solving
4	Implement all data structures in a high-level language for problem solving.

Course Outcome ANALOG AND DIGITAL ELECTRONICS (18CS33)	
1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
3	Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods
4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types
.5	Develop simple HDL programs

Course Outcome - COMPUTER ORGANIZATION (18CS34)	
.1	Explain the basic organization of a computer system.
2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
3	Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.
4	Design and analyse simple arithmetic and logical units.

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Course Outcome - SOFTWARE ENGINEERING (18CS35)	
1	Design a software system, component, or process to meet desired needs within realistic constraints
2	Assess professional and ethical responsibility
3	Function on multi-disciplinary teams
4	Use the techniques, skills, and modern engineering tools necessary for engineering practice
5	Analyse, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

Course Outcome - **SOFTWARE ENGINEERING** (18CS35)	
Course Outcome - DISCRETE MATHEMATICAL STRUCTURES (18CS36)	
1	Use propositional and predicate logic in knowledge representation and truth verification.
2	Demonstrate the application of discrete structures in different fields of computer science
3	Solve problems using recurrence relations and generating functions
4	Application of different mathematical proofs techniques in proving theorems in the courses.
.5	Compare graphs, trees and their applications

Course Outcome - **ANALOG AND DIGITAL ELECTRONICS LABORATORY** (18CSL37)	
1	Use appropriate design equations / methods to design the given circuit.
2	Examine and verify the design of both analog and digital circuits using simulators
3	Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
4	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.

Course Outcome - **DATA STRUCTURES LABORATORY** (18CSL38)	
1	Analyze and Compare various linear and non-linear data structures
2	Code, debug and demonstrate the working nature of different types of data structures and their applications
3	Implement, analyze and evaluate the searching and sorting algorithms
4	Choose the appropriate data structure for solving real world problems

Course Outcome - **COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS – IV** (18MAT41)	
1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory...
2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing
3	Apply discrete and continuous probability distributions in analysing the probability models arising in engineering field.
4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data

Course Outcome - COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS – IV (18MAT41)	
5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Course Outcome - DESIGN AND ANALYSIS OF ALGORITHMS (**18CS42**)

1	Describe computational solution to well-known problems like searching, sorting etc.
2	Estimate the computational complexity of different algorithms.
3	Devise an algorithm using appropriate design strategies for problem solving.

Course Outcome - OPERATING SYSTEMS (18CS43)	
1	Demonstrate need for OS and different types of OS
2	Use processor, memory, storage and file system commands
3	Apply suitable techniques for management of different resources
4	Realize the different concepts of OS in platform of usage through case studies

Course Outcome - MICROCONTROLLER AND EMBEDDED SYSTEMS (18CS44)	
1	Describe the architectural features and instructions of ARM microcontroller
2	Apply the knowledge gained for Programming ARM for different applications.
3	Interface external devices and I/O with ARM microcontroller.
4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
5	Develop the hardware /software co-design and firmware design approaches.
6	Demonstrate the need of real time operating system for embedded system applications

Course Outcome - **OBJECT ORIENTED CONCEPTS** (18CS45)	
1	Explain the object-oriented concepts and JAVA

	Course Outcome - **OBJECT ORIENTED CONCEPTS** (18CS45)
2	Develop computer programs to solve real world problems in Java.
3	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using swings.

	Course Outcome - **DATA COMUNICATION** (18CS46)
1	Explain the various components of data communication.
2	Explain the fundamentals of digital communication and switching.
3	Compare and contrast data link layer protocols.
4	Summarize IEEE 802.xx standard

	Course Outcome - **DESIGN AND ANALYSIS OF ALGORITHM LABORATORY** (18CSL47)
1	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.
2	Implement a variety of algorithms such assorting, graph related, combinatorial, etc., in a high level language.
3	Analyze and compare the performance of algorithms using language features.
4	Apply and implement learned algorithm design techniques and data structures to solve real-world problems

	Course Outcome - MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY (18CSL48)
1	Develop and test program using ARM7TDMI/LPC2148
2	Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

	Course Outcome - **MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY** (18CS51)
1	Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
2	Utilize the resources available effectively through ERP

Course Outcome - MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY (18CS51)	
3	Make use of IPRs and institutional support in entrepreneurship

Course Outcome - COMPUTER NETWORKS AND SECURITY (18CS52)	
1	Explain principles of application layer protocols
2	Recognize transport layer services and infer UDP and TCP protocols
3	Classify routers, IP and Routing Algorithms in network layer
4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
5	Describe Multimedia Networking and Network Management

Course Outcome - DATA BASE MANAGEMENT SYSTEM (18CS53)	
1	Identify, analyse and define database objects, enforce integrity constraints on a database using RDBMS
2	Use Structured Query Language (SQL) for database manipulation
3	Design and build simple database systems
4	Develop application to interact with databases.

Course Outcome - : AUTOMATA THEORY AND COMPUTABILITY (18CS54)	
1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation
2	Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models
3	Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness
5	Classify a problem with respect to different models of Computation

Course Outcome - : APPLICATION DEVELOPMENT USING PYTHON (18CS55)	
1	Demonstrate proficiency in handling of loops and creation of functions.
2	Identify the methods to create and manipulate lists, tuples and dictionaries.
3	Discover the commonly used operations involving regular expressions and file system.
4	Interpret the concepts of Object-Oriented Programming as used in Python.
5	Determine the need for scraping websites and working with CSV, JSON and other file formats

Course Outcome - : UNIX PROGRAMMING (18CS56)	
1	Explain Unix Architecture, File system and use of Basic Commands
2	Illustrate Shell Programming and to write Shell Scripts
3	Categorize, compare and make use of Unix System Calls
4	Build an application/service over a Unix system.

Course Outcome - COMPUTER NETWORK LABORATORY (18CSL57)	
1	Analyze and Compare various networking protocols
2	Demonstrate the working of different concepts of networking.
3	Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language

Course Outcome - DBMS LABORATORY WITH MINI PROJECT (18CSL58)	
1	Create, Update and query on the database.
2	Demonstrate the working of different concepts of DBMS
3	Implement, analyze and evaluate the project developed for an application

Course Outcome - SYSTEM SOFTWARE AND COMPILERS (18CS61)	
1	Explain system software
2	Design and develop lexical analyzers, parsers and code generators
3	Utilize lex and yacc tools for implementing different concepts of system software
Course Outcome - COMPUTER GRAPHICS AND VISUALIZATION (18CS62)	
1	Design and implement algorithms for 2D graphics primitives and attributes.
2	Illustrate Geometric transformations on both 2D and 3D objects..
3	Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
4	Decide suitable hardware and software for developing graphics packages using OpenGL

Course Outcome - WEB TECHNOLOGY AND ITS APPLICATIONS (18CS63)	
1	Adapt HTML and CSS syntax and semantics to build web pages..
2	Construct and visually format tables and forms using HTML and CSS
3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
4	Appraise the principles of object oriented development using PHP
5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features

Course Outcome - SYSTEM SOFTWARE LABORATORY (18CSL66)	
1	Implement and demonstrate Lexar's and Parser's
2	Evaluate different algorithms required for management, scheduling, allocation and communication used in operating system.

Course Outcome - COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT (18CSL67)	
C330.1	Apply the concepts of computer graphics
C330.2	Implement computer graphics applications using OpenGL
C330.3	Animate real world problems using OpenGL

SUBJECT NAME: MOBILE APPLICATION DEVELOPMENT
SUBJECT CODE: 18CSMP68

Course Outcome - MOBILE APPLICATION DEVELOPMENT (18CSMP68)	
C330.1	Create, test and debug Android application by setting up Android development environment
C330.2	Implement adaptive, responsive user interfaces that work across a wide range of devices.
C330.3	Infer long running tasks and background work in Android applications.
C330.4	Demonstrate methods in storing, sharing and retrieving data in Android applications.

Course Outcome - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (18CS71)	
C401.1	Appraise the theory of Artificial intelligence and Machine Learning.
C401.2	Illustrate the working of AI and ML Algorithms.
C401.3	Demonstrate the applications of AI and ML.

Course Outcome - **BIG DATA AND ANALYTICS** (18CS72)	
C402.1	Understand fundamentals of Big Data analytics.
C402.2	Investigate Hadoop framework and Hadoop Distributed File system.
C402.3	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data.
C402.4	Demonstrate the MapReduce programming model to process the big data along with Hadoop tools.
C402.5	Use Machine Learning algorithms for real world big data.
C402.6	Analyze web contents and Social Networks to provide analytics with relevant visualization tools.

Course Outcome - **ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY** (18CSL76)	
C403.1	Implement and demonstrate AI and ML algorithms.
C403.2	Evaluate different algorithms.

MECHANICAL ENGINEERING

Semester - III

Course Name: Mechanics of Materials [18ME32]	
C202.1	Understand the basic types of loads, stresses, strains, & their relations/equations, mechanical properties, types of bars, beams, shafts, columns, and cylinders. And its importance in mechanical problem analysis.
C202.2	Determine stresses, strains and deformations in bars with varying circular and rectangular cross-sections subjected to normal and temperature loads
C202.3	Determine plane stress, principal stress, maximum shear stress and their orientations using analytical method and Mohr's circle
C202.4	Determine the dimensions of structural members including beams, bars and rods using Energy methods and also stress distribution in thick and thin cylinders
C202.5	Draw SFD and BMD for different beams including cantilever beams, simply supported beams and overhanging beams subjected to UDL, UVL, Point loads and couples

Course Name: Basic Thermodynamics [18ME33]	
C203.1	Explain thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions.
C203.2	Determine heat, work, internal energy, enthalpy for flow & non flow process using First and Second Law of Thermodynamics.
C203.3	Interpret behavior of pure substances and its applications to practical problems.
C203.4	Determine change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases.
C203.5	Calculate Thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals

Course Name: Material Science [18ME34]	
C204.1	Apply the knowledge of material science to describe the mechanical properties of metals, their alloys, molecular structure, and various crystal imperfection and modes of failure.
C204.2	Apply the knowledge of material science to discuss the Iron Carbon phase diagram and correlate the microstructure with mechanical properties of ferrous and non-ferrous materials and the applications of ferrous alloys.
C204.3	Apply the knowledge of material science to explain the processes of heat treatment of various alloys to strengthen the mechanical properties and changes in atomic structure and grain size.
C204.4	Apply the concepts of material science to summarize the behavior of materials in engineering and select the materials for various engineering applications
C204.5	Apply the concepts of material science to identify composite materials and their processing as well as applications.

Course Name: Metal cutting and forming [18ME35A]	
C205.1	Acquire the knowledge of foundry basics and materials used.
C205.2	Study and compare the different casting methods.
C205.3	Understand the Solidification process and Casting of Non-Ferrous Metals.
C205.4	Summarize the different welding processes and to know the metallurgical aspect through the inspection methods.

Course Name: Computer Aided Machine Drawing [18ME36A]	
C206.1	Sections of pyramids, prisms, cubes, cones and cylinders resting on their bases in 2D, Orthographic views of machine parts with and without sectioning in 2D, Parallel key, Taper key, and Woodruff Key as per the ISO standards in 2D
C206.2	Sectional views for threads with terminologies of ISO Metric, BSW, square and acme, sellers and American standard threads in 2D, Hexagonal and square headed bolt and nut with washer, stud bolts with nut and lock nut, flanged nut, slotted nut, taper and split pin for locking counter sunk head screw, grub screw, Allen screw assemblies in 2D
C206.3	Single and double riveted lap joints, butt joints with single/double cover straps, cotter and knuckle joint for two rods in 2D, Sketch split muff, protected type flanged, pin type flexible, Oldham's and universal couplings in 2D
C206.4	Assemblies from the part drawings with limits ,fits and tolerance given for Plummer block, Ram bottom safety valve, I.C. Engine connecting rod, Screw Jack, Tailstock of lathe, Machine Vice and Lathe square tool post in 2D and 3D

Course Name: Materials Testing Lab [18MEL37A]	
C207.1	Acquire experimentation skills in the field of material testing.
C207.2	Develop theoretical understanding of the mechanical properties of materials by performing experiments.
C207.3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
C207.4	Apply the knowledge of testing methods in related areas.

Course Name: Workshop and Machine Shop Practice [18MEL38A]	
C208.1	To read working drawings, understand operational symbols and execute machining operations.
C208.2	Prepare fitting models according to drawings using hand tools- V-block, marking gauge, files, hack saw, drills etc.
C208.3	Understand integral parts of lathe, shaping and milling machines and various accessories and attachments used.
C208.4	Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various machining operations.
C208.5	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.
C208.6	Perform machining operations such as plain shaping, inclined shaping, keyway cutting, Indexing

Semester - IV

Course Name: Applied Thermodynamics [18ME42]	
C211.1	Apply thermodynamic concepts to analyze the performance of gas power cycles including propulsion systems, Evaluate the performance of steam turbine components.
C211.2	Understand combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment. · Apply thermodynamic concepts to analyze turbo machines.
C211.3	Determine performance parameters of refrigeration and air-conditioning systems. Understand the principles and applications of refrigeration systems.
C211.4	Analyze air-conditioning processes using the principles of psychometric and Evaluate cooling and heating loads in an air-conditioning system.

Course Name: Fluid Mechanics [18ME43]	
C212.1	Identify and calculate the key fluid properties used in the analysis of fluid behavior and understand and apply the principles of pressure, buoyancy and floatation
C212.2	Apply the knowledge and principles of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.

C212.3	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.
C212.4	Understand the basic concept of compressible flow and CFD

Course Name: Kinematics of Machines [18ME44]	
C213.1	Identify the type of mechanism and visualize the kind of motions with basic understandings of Kinematic links, pairs, joints, chains, degrees of freedom (DoF) and its types.
C213.2	Obtain the relations among distance, time, velocity, & acceleration. Analyze the planar mechanism for specified kinematic conditions. (Both Graphical & Algebraic Method)
C213.3	Able to comprehend the motion analysis of planar mechanisms of gears and gear trains.
C213.4	Able to carry out the motion analysis of gear trains and cams for the given specifications and applications.

Course Name: Metal Casting and Welding [18ME45B]	
C214.1	Acquire the knowledge of various machine tools, different cutting tool materials, tool nomenclature and surface finish.
C214.2	Apply mechanics of machining process to evaluate machining time.
C214.3	Analyze tool wear mechanisms to enhance tool life and minimize machining cost.
C214.4	Understand the concepts of different metal forming processes and concepts of design of sheet metal dies to design different dies for simple sheet metal components.

Course Name: Mechanical Measurements & Metrology [18ME46B]	
C215.1	Use the basic concepts of standards for accurate measurements and their comparison and fit the dimensions and solve typical problems on design of gauges.
C215.2	Apply knowledge of measurements and use appropriate equipment for Linear and Angular measurements and exhibits use of Comparators and Gauges for quicker measurements.
C215.3	Exhibit ability to use specific knowledge for measurement of parameters like force, torque and pressure.
C215.4	Apply knowledge to measure high temperatures and strain measurements using appropriate equipment's.

Course Name: Mechanical Measurements and Metrology Lab [18MEL47B]	
C216.1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer.
C216.2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
C216.3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
C216.4	To measure cutting tool forces using Lathe/Drill tool dynamometer.
C216.5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer.
C216.6	To measure surface roughness using Tally Surf/ Mechanical Comparator.

Course Name: Foundry and Forging Lab [18MEL48B]	
C217.1	Describe the hand tools and their application related to foundry and forging shop.

C217.2	prepare the sand specimens with the aid of desired hand-tools and conduct the experiments using appropriate testing equipment's to investigate the foundry sand properties as a function of clay and moisture content(permeability, tensile-strength, green compression-strength & shear strength) and document the same in a standard lab record following in a systemic procedure. Ability to work in small teams
C217.3	Prepare the green sand moulds using pattern (single-piece pattern and split pattern and with-out pattern with the aid of desired foundry tools and document the same in a standard lab record following in a systemic procedure
C217.4	Able to apply engineering knowledge and hand forging skill to prepare small scaled forged models working in small groups (prepared out of mild steel material) involving operations such as upsetting , drawing & bending with the aid suitable hand tools and safety measures. Document the same in a standard lab record following in a systemic procedure

Semester V

Course Name: Management and Engineering Economics [18ME51]	
C301.1	Explain the development of management and the role it plays at different levels in an organization. Comprehend the process and role of effective planning, organizing and staffing for the development of an organization.
C301.2	Understand the necessity of good leadership, communication and coordination for establishing effective control in an organization.
C301.3	Understand engineering economics demand supply and its importance in economics decision making and problem solving.
C301.4	Calculate present worth, annual worth and IRR for different alternatives in economic decision making.
C301.5	Understand the procedure involved in estimation of cost for a simple component, product costing and depreciation, its methods.

Course Name: Design of Machine Elements - 1 [18ME52]	
C302.1	Able to understand mechanical design procedure, materials, codes and use of standards
C302.2	Able to design machine components for static, impact and fatigue strength.
C302.3	Able to design Shafts, Joints, Couplings, Keys and riveted joints.
C302.4	Able to design welded joints, Threaded joints and power screws.

Course Name: Dynamics of Machines[18ME53]	
C303.1	Apply engineering fundamentals to analyze the forces on various machines.
C303.2	Use the knowledge of mathematics and science to identify, formulate and analyze the mechanical systems to check the balancing.
C303.3	Apply the engineering science to understand the governors and gyroscopic effect in mechanical systems and vehicles
C303.4	Able to use engineering specialization to design solutions for complex engineering problems subjected to vibrations

Course Name: Turbo Machines [18ME54]	
C304.1	Understand the working of turbomachines and apply the concept of model studies, thermodynamic analysis of turbo machines
C304.2	Analyze the energy transfer in turbomachines, draw velocity triangle for different degree of reaction and understand effect of blade discharge angle on performance.
C304.3	Understand the principle of operation of steam turbines and hydraulic turbines, evaluate performance of steam and hydraulic turbines.
C304.4	Understand the concept of power absorbing turbomachines and solve the problems on power absorbing machines.

Course Name: Fluid Mechanics & Machines Lab [18MEL57]	
C307.1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
C307.2	Conduct experiments on hydraulic turbines and pumps to draw characteristics
C307.3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations
C307.4	Determine the energy flow pattern through the hydraulic turbines and pumps

Course Name: Energy Conversion Laboratory [18MEL58]	
C308.1	Perform experiments to determine the properties of fuels and oils.
C308.2	Conduct experiments on engines and draw characteristics, determine the energy flow pattern through the I C Engine
C308.3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
C308.4	Identify exhaust emission, factors affecting them and report the remedies.

Semester - VI

Course Name: Finite Element Methods [18ME61]	
C310.1	Apply the concepts of mathematics and engineering fundamentals in formulation of finite element equation using Potential energy method, Rayleigh Ritz method, and Galerkin's method
C310.2	Apply and interpret the application and characteristics of 1D, 2D, and Iso-parametric elements that represent engineering problems and formulate interpolation polynomials.
C310.3	Develop 1D and 2D element characteristic equation and generation of global equilibrium equation that characterize engineering problems.
C310.4	Apply the knowledge of FEM to a global equation for stress analysis, model analysis, and heat transfer analysis

Course Name: Design of Machine Elements – 2 [18ME62]	
C311.1	Understand the method of selecting a type of drive/transmission system for the given application, based on the strength, and the capacity. Accordingly use of the standard procedures to design the types of belts, ropes, chains, and gear drive systems.
C311.2	Understand, analyze, and design the different types of springs for the given static and dynamic loading conditions. Also, gears for the given conditions and specification.
C311.3	Able to practice the standard procedures, and use of available data's in the designing of machine elements like clutches & breaks.

C311.4	Understand and interpret about types of lubricants and its properties. Analyze the knowledge of hydrostatic and hydrodynamic lubrication. Analyze the pressure distribution and design of Journal Bearing also, Antifriction bearings.

Course Name: Heat transfer [18ME63]	
C312.1	Student will be able to apply the knowledge of heat transfer to solve the engineering problems
C312.2	Student will be able to apply the knowledge of mathematics to solve the heat transfer problems and also analyse the conductive heat transfer equipment's.
C312.3	Student will be able to apply the knowledge of mathematics to solve the heat transfer problems and also analyse the convective heat transfer systems.
C312.4	Student will be able to analyse the heat exchangers and radiative heat transfer devices.

Course Name: Computer Aided Modelling And Analysis Lab [18MEL66]	
C323.1	Use the modern tools to formulate the problem, and able to create geometry, discretize, and apply boundary condition to solve problems of bars, truss, and plate to find stress with different loading conditions.
C323.2	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams.
C323.3	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
C323.4	Apply the various boundary conditions to carry out dynamic analysis to know the natural frequency of different kind of beams.

Course Name: Heat Transfer Lab [18MEL67]	
C324.1	Perform experiments to determine the thermal conductivity and heat transfer Coefficient correlate with theoretical values, Unsteady state heat transfer
C324.2	Perform experiments to determine Emissivity of surface of a test plate and steffen boltzman constant, Boiling and condensation
C324.3	Estimate the performance of a Refrigeration and Air-conditioning system
C324.4	Estimate the performance of a heat exchanger and pin-fin apparatus

Semester - VII

Course Name: Control Engineering [18ME71]	
C401.1	Students will be able to know the concept of control engineering in relation with the importance automatic feedback system and apply this knowledge to solve and analyze the engineering problems that are represented as a linear time invariant control system.
C401.2	Students will be able to apply the knowledge of principles of mathematical modelling of different kind of linear systems to solve and analyze practical engineering problems using various techniques (signal flow graph and block reduction technique)
C401.3	Students will be able to apply knowledge of principles of Time domain and frequency domain analysis of linear invariant control system to solve and analyze the stability of the control system using various techniques such as polar plot, Nyquist plots, Root locus and Bode plots.
C401.4	Students will know the importance of system compensation and fundamentals of concept of state variable method of representation of control system and will be able to apply this knowledge to solve and analyze controllability and observability of the system.

Course Name: Computer Aided Design And Manufacturing [18ME72]	
C402.1	Define Automation, CIM, CAD, and CAM and explain the differences between these concepts. Solve simple problems of transformations of entities on computer screen
C402.2	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines.
C402.3	Analyse the automated flow lines to reduce time and enhance productivity.
C402.4	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.
C402.5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.

Course Name: Computer Aided Manufacturing Lab [18MEL76]	
C417.1	Able to understand and use CAM packages and cut part on virtual CNC machine simulator.
C417.2	Able to use the techniques of CNC programming and cutting tool path generation through CNC simulation software by using G-Codes and M-codes.
C417.3	Able to understand the importance of automation in industries through exposure to FMS, Robotics, and Hydraulics and Pneumatics.

Course Name: Design Lab [18MEL77]	
C418.1	Apply the basic engineering fundamentals to understand the principal stresses and strains.
C418.2	Review the experiments to find vibration parameters for given single freedom systems and speed of shaft.
C418.3	Analyze the system for different forces and couples to balance and for the stability of a governor.
C418.4	Formulate with an appropriate techniques to find the pressure distribution for different types of loading in machine elements.

Course Name: Project Work Phase - 1 [18MEP78]	
C419.1	Student Will be able to apply Engineering Knowledge to the Solution of Engineering Problems
C419.2	Student will analyze engineering problems reaching substantiated conclusions.
C419.3	Student will be able to design solutions for engineering problems
C419.4	Student will be able to synthesis of information to provide valid conclusions.
C419.5	Student will be able to select, create and apply appropriate engineering tools to various engineering problems/ activities
C419.6	Student will be able to apply reasoning inferred by contextual knowledge to assess societal, health and safety issues to engineering practice. Also able to asses impact of engineering solutions in environmental contexts.
C419.7	Student will be able to function effectively as an individual and as a member in team/s. also will be able to communicate effectively on engineering activities.
C419.8	Student will demonstrate knowledge and understanding of engineering and management principles. And also, exhibit the ability to engage in the broadest context of technological change.

Semester - VIII

Course Name: Energy Engineering [18ME81]	
C420.1	Student will be able to use the knowledge of Non-Renewable (Fossil) energy resources to identify different types of non-renewable sources and their utilization.
C420.2	Student will be able to use the knowledge of renewable energy sources to address different types of Renewable energy sources and their utilization.

C420.3	Student will be able to apply the knowledge of solar radiation analysis in the working of solar and thermal systems.
C420.4	Student will be able to understand and apply the knowledge of modern energy systems in identifying different methods of energy applications

Course Name: Project Work [18MEP83]	
C427.1	Student Will be able to apply Engineering Knowledge to the Solution of Engineering Problems
C427.2	Student will analyze engineering problems reaching substantiated conclusions.
C427.3	Student will be able to design solutions for engineering problems
C427.4	Student will be able to synthesis of information to provide valid conclusions.
C427.5	Student will be able to select, create and apply appropriate engineering tools to various engineering problems/ activities
C427.6	Student will be able to apply reasoning inferred by contextual knowledge to assess societal, health and safety issues to engineering practice. Also able to asses impact of engineering solutions in environmental contexts.
C427.7	Student will be able to function effectively as an individual and as a member in team/s. also will be able to communicate effectively on engineering activities.
C427.8	Student will demonstrate knowledge and understanding of engineering and management principles. And also, exhibit the ability to engage in the broadest context of technological change.

Course Name: Technical Seminar [18MES84]	
C428.1	Explore the literatures/research papers/latest technology related to the mechanical engineering and allied fields.
C428.2	Select and apply appropriate computer tools to prepare power point presentation and technical report.
C428.3	Effective delivery of technical content by oral presentation with substantial conclusion in an ethical manner.

Course Name: Internship [18MEI85]	
C429.1	Explore the latest technologies available in industry/institutes, etc., related to the mechanical engineering and allied fields.
C429.2	Select and apply appropriate computer tools to prepare power point presentation and internship report.
C429.3	Effective delivery of technical content by oral presentation with substantial conclusion in an ethical manner.

Course: Strength of Materials   Course Code: C202

	Course Outcomes
	After successful completion of the course, the student will be able to:
C202.1	To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements.
C202.2	To evaluate the development of internal forces and resistance mechanism for one dimensional and two-dimensional structural elements.
C202.3	To analyze different internal forces and stresses induced due to representative loads on structural elements.
C202.4	To evaluate slope and deflections of beams.
C202.5	To evaluate the behavior of torsion members, columns and struts.

Course: Fluid Mechanics   Course Code: C203

	Course Outcomes
	After successful completion of the course, the student will be able to:
C203.1	Apply the knowledge of engineering fundamental to Understand the knowledge of fundamental properties of fluids and fluid continuum.
C203.2	Apply the knowledge of mathematics and science to analyze the problems on hydrostatics including practical applications.
C203.3	Apply principles of mathematics to represent kinematic concepts related to fluid flow.
C203.4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications.
C203.5	Analyze and design the discharge of water flowing through pipes and over notches and weirs.

Course: Building Materials and Construction   Course Code: C204

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C204.1	Choose suitable materials for buildings and adopt suitable construction techniques.

C204.2	Identify suitable type of foundation based on soil parameters
C204.3	Develop the ability to inspect the construction of different building elements based on suitability
C204.4	Apply the knowledge of building finishes and form work requirements

Course: Basic Surveying   Course Code: C205

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C205.1	Apply the knowledge of Engineering fundamentals to understand the Principles of Geodetics.
C205.2	Determine the Measurement of vertical and horizontal plane, linear and angular Measurements by applying the knowledge of engineering fundamentals, mathematics & analyses the engineering problems to arrive at solutions to basic surveying Problems.
C205.3	Apply the knowledge of mathematics & engineering fundamentals and able to analyses the geodetic data to process & give the solution to Survey problems.
C205.4	Apply the knowledge of engineering fundamentals to arrive at the graphical representation of the areas & able to analyses the areas and volumes also represent contours.

Course: Engineering Geology   Course Code: C206

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C206.1	Understand the internal structure, composition of the earth and properties, occurrence and uses of minerals in various industries.
C206.2	Learn about geo-morphological agents and their implications in implementing civil engineering projects and to gain knowledge of rocks and water for their utilization.
C206.3	Learn the application of topographic maps, remote sensing and GIS in Civil Engineering practices and natural resource management.

Course: Computer Aided Building Planning & Drawing   Course Code: C207

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C207.1	Prepare, read and interpret the drawings in a professional set up.
C207.2	Know the procedures of submission of drawings and Develop working and submission drawings for building.
C207.3	Plan and design a residential or public building as per the given requirements.

Course: Building Materials Testing Laboratory   Course Code: C208

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C208.1	Apply the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
C208.2	Identify, formulate and solve engineering problems of structural elements subjected to flexure
C208.3	Analyze the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials

Course: Analysis of Determinate Structures   Course Code: C211

	Course Outcomes
	After studying this course, students will be able to:
C211.1	Identify different forms of structural systems.
C211.2	Construct ILD and analyse the beams and trusses subjected to moving loads
C211.3	Applying knowledge of science and mathematics to understand the energy principles and energy theorems and its applications to determine the deflections of trusses and beams.
C211.4	Determine the stress resultants in arches and cables

Course: Applied Hydraulics   Course Code: C212

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C212.1	Apply dimensional analysis to develop mathematical modelling and compute the parametric values in prototype by analyzing the corresponding model parameters
C212.2	Design the open channels of various cross sections including economical channel sections
C212.3	Apply energy concepts to flow in open channel sections, calculate energy dissipation and also compute water surface profiles at different conditions
C212.4	Apply impulse momentum equation to calculate force exerted by the jet on different types of vanes with different conditions
C212.5	Design turbines and pumps for the given data and to know their operation characteristics under different operation conditions.

Course: Concrete Technology   Course Code: C213

	Course Outcomes
	After studying this course, students will be able to:
C213.1	Apply knowledge to relate material characteristics and their influence on microstructure of concrete.
C213.2	Apply fundamentals to distinguish concrete behavior based on its fresh and hardened properties.
C213.3	Design proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
C213.4	Identify suitable concreting methods to place the concrete based on requirement
C213.5	Identify a suitable type of concrete based on specific application

Course: Advanced Surveying   Course Code: C214

	Course Outcomes
	On the completion of this course students are expected to attain the following outcomes;
C214.1	Apply the knowledge of Engineering fundamentals to understand the trigonometric and Geodetic Survey.
C214.2	Apply the knowledge of mathematics & Science to understand & analyze tachometric & curve Surveying
C214.3	Capture geodetic data to process and perform analysis for survey problems by using aerial survey & Able to create, select & apply appropriate techniques to use modern instruments to obtain the geospatial data.

Course: Water Supply & Treatment Engineering   Course Code: C215

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C215.1	Apply knowledge to Estimate average and peak water demand for a community.
C215.2	Apply knowledge to Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.
C215.3	Apply knowledge to Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
C215.4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

Course: Engineering Geology Laboratory   Course Code: C216

	Course Outcomes
	During the course of study students will develop understanding of:
C216.1	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.
C216.2	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.
C216.3	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.
C216.4	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.
C216.5	The students will be able to identify the different structures in the field.

Course: Fluid Mechanics and Hydraulic Machines Laboratory   Course Code: C217

	Course Outcomes
	During this course, students will develop expertise in
C217.1	Properties of fluids and the use of various instruments for fluid flow measurement
C217.2	Working of hydraulic machines under various conditions of working and their characteristics.

Course: Construction Management & Entrepreneurship   Course Code: C301

	Course Outcomes
	After studying this course, students will be able to:
C301.1	Apply planning and it's scheduling by project tools in construction management process.
C301.2	Analyze the concept of resource and material management, productivity of labour and productivity of construction equipment.
C301.3	apply the knowledge on the quality, safety and human values for the effective construction management process.
C301.4	Calculate the economics of alternatives and evaluate benefits and profits of a construction equipment based on monetary value and time value.
C301.5	Apply the concept of entrepreneurship and its role in infrastructural development.

Course: Analysis of Indeterminate Structures   Course Code: C302

	Course Outcomes
	After studying this course, students will be able to:
C302.1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope defection method
C302.2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.
C302.3	Construct the bending moment diagram for beams and frames by Kani's method.
C302.4	Construct the bending moment diagram for beams and frames using flexibility method
C302.5	Analyze the beams and indeterminate frames by system stiffness method.

Course: Design of RC Structural Elements   Course Code: C303

	Course Outcomes
	On the completion of this course students are expected to attain the following outcomes;
C303.1	Understand the design philosophy and principles
C303.2	Solve engineering problems of RC elements subjected to flexure, shear and torsion.
C303.3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs

Course: Basic Geotechnical Engineering   Course Code: C304

	Course Outcomes
	After studying this course, students will be able to
C304.1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
C304.2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
C304.3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
C304.4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
C304.5	Capable of estimating load carrying capacity of single and group of piles

Course: Municipal Waste Water Engineering   Course Code: C305

	Course Outcomes
	After studying this course, students will be able to:
C305.1	Apply knowledge to select the appropriate sewer appurtenances and materials in sewer network.
C305.2	Design the sewers network and understand the self-purification process in flowing water.
C305.3	Design the various physic- chemical treatment units
C305.4	Design the various biological treatment units
C306.5	Design various AOPs and low-cost treatment units.

Course: Highway Engineering   Course Code: C306

	Course Outcomes
	After studying this course, students will be able to:
C306.1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data
C306.2	Evaluate and analyze the engineering properties of the materials and suggest the suitability of the same for pavement construction.
C306.3	Design road geometrics, structural components of pavement and drainage.
C306.4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.

Course: Surveying Practice   Course Code: C307

	Course Outcomes
	Students will be able to conduct appropriate laboratory/field experiments and interpret the results to determine
C307.1	Apply the basic principles of engineering surveying and for linear and angular measurements.
C307.2	Comprehend effectively field procedures required for a professional surveyor.
C307.3	Use techniques, skills and conventional surveying instruments necessary for engineering Practice

Course: Concrete and Highway Materials Laboratory   Course Code: C308

	Course Outcomes
	During this course, students will develop expertise in;
C308.1	Able to interpret the experimental results of concrete and highway materials based on laboratory tests.
C308.2	Determine the quality and suitability of cement.
C308.3	Design appropriate concrete mix Using Professional codes.
C308.4	Determine strength and quality of concrete.
C308.5	Evaluate the strength of structural elements using NDT techniques.
C308.6	Test the soil for its suitability as sub grade soil for pavements.

Course: Design of Steel Structural Elements   Course Code: C310

	Course Outcomes
	After studying this course, students will be able to:
C310.1	Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behavior of structural steel.
C310.2	Understand the Concept of Bolted and Welded connections.
C310.3	Understand the Concept of Design of compression members, built-up columns and columns splices.
C310.4	Understand the Concept of Design of tension members, simple slab base and gusseted base.
C310.5	Understand the Concept of Design of laterally supported and un-supported steel beams.

Course: Applied Geotechnical Engineering   Course Code: C311

	Course Outcomes
	After studying this course, students will be able to:
C311.1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
C311.2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
C311.3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures

C311.4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
C311.5	Capable of estimating load carrying capacity of single and group of piles

Course: Hydrology and Irrigation Engineering   Course Code: C312

	Course Outcomes
	After studying this course, students will be able to:
C312.1	Apply the concept of hydrology, hydrological cycle, quantify the runoff and concept of unit hydrograph.
C312.2	Learn the methods of irrigation, irrigation procedure, application of water and water requirement for various crops.
C312.3	Learn to design the canal. Its alignment and reservoir capacity.

Course: Alternate Building Materials   Course Code: C315

	Course Outcomes
	After studying this course, students will be able to:
C315.1	Solve the problems of Environmental issues concerned to building materials and cost- effective building technologies;
C315.2	Select appropriate type of masonry unit and mortar for civil engineering constructions; also, they are able to Design Structural Masonry Elements under Axial Compression.
C315.3	Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
C315.4	Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.

Course: Software Application Laboratory   Course Code: C324

	Course Outcomes
	After studying this course, students will be able to:
C324.1	use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work

Course: Environmental Engineering Laboratory   Course Code: C325

	Course Outcomes
	After studying this course, students will be able to:
C325.1	Acquire capability to conduct experiments and estimate the concentration of different

	parameters.
C325.2	Compare the result with standards and discuss based on the purpose of analysis.
C325.3	Determine type of treatment, degree of treatment for water and waste water.
C325.4	Identify the parameter to be analyzed for the student project work in environmental stream.

Course: Extensive Survey Project/Camp   Course Code: C326

	Course Outcomes
	After studying this course, students will be able to:
C326.1	Apply Surveying knowledge and tools effectively for the projects
C326.2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.
C326.3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
C326.4	Professional etiquettes at workplace, meeting and general
C326.5	Establishing trust-based relationships in teams & organizational environment
C326.6	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques

Course: Quantity Surveying and Contracts Management   Course Code: C401

	Course Outcomes
	After studying this course, students will be able to:
C401.1	Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works
C401.2	Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works.
C401.3	Prepare the specifications and analyze the rates for various items of work
C401.4	Assess contract and tender documents for various construction works.
C401.5	Prepare valuation reports of buildings.

Course: Design of RCC and Steel Structures   Course Code: C402

	Course Outcomes
	After studying this course:
C402.1	Students will acquire the basic knowledge in design of RCC and Steel Structures.

C402.2	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members.

Course: Ground Water Hydraulics   Course Code: C406

	Course Outcomes
	After studying this course, students will be able to:
C406.1	Find the characteristics of aquifers.
C406.2	Estimate the quantity of ground water by various methods.
C406.3	Locate the zones of ground water resources.
C406.4	Select particular type of well and augment the ground water storage.

Course: Urban Transport Planning   Course Code: C412

	Course Outcomes
	After studying this course, students will be able to:
C412.1	Design, conduct and administer surveys to provide the data required for transportation planning.
C412.2	Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.
C412.3	Develop and calibrate modal split, trip generation rates for specific types of land use developments.
C412.4	Adopt the steps that are necessary to complete a long-term transportation plan.

Course: Computer Aided Detailing of Structures   Course Code: C416

	Course Outcomes
	After studying this course, students will be able to:
C416.1	Prepare detailed working drawings for RC and Steel Structures

Course: Geotechnical Engineering Laboratory   Course Code: C417

	Course Outcomes
	After studying this course, students will be able to:
C417.1	Physical and index properties of the soil
C417.2	Classify based on index properties and field identification
C417.3	To determine OMC and MDD, plan and assess field compaction program

C417.4	Shear strength and consolidation parameters to assess strength and deformation characteristics
C417.5	In-situ shear strength characteristics (SPT-Demonstration)

Course: Design of Pre-stressed Concrete   Course Code: C419

	Course Outcomes
	After studying this course, students will be able to:
C419.1	Relate the requirement of PSC members for present scenario by applying engineering fundamentals.
C419.2	Analyse the stresses encountered in PSC element during transfer and at working.
C419.3	Design of PSC beam after studying losses and for different requirements.
C419.4	Capable of analysing the PSC element and finding its efficiency.

Course: Pavement Design   Course Code: C424

	Course Outcomes
	After studying this course, students will be able to:
C424.1	Systematically generate and compile required data's for design of pavement (Highway & Airfield).
C424.2	Analyze stress, strain and deflection by boussinesq's, burmister's and westergaard's theory.
C424.3	Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001.
C424.4	Evaluate the performance of the pavement and also develops maintenance statement based on site specific requirements.

Course: Project Work   Course Code: C425

	Course Outcomes
	After studying this course, students will be able to:
C425.1	Describe the project and be able to defend it.
C425.2	Develop critical thinking and problem-solving skills.
C425.3	Learn to use modern tools and techniques.
C425.4	Communicate effectively and to present ideas clearly and coherently both in written and oral forms.

C425.5	Develop skills to work in a team to achieve common goal.
C425.6	Develop skills of project management and finance.
C425.7	Develop skills of self-learning, evaluate their learning and take appropriate actions to improve it.
C425.8	Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.

Course: Technical Seminar   Course Code: C426

	Course Outcomes
	After studying this course, students will be able to:
C426.1	Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study.
C426.2	Identify and discuss the current, real-time issues and challenges in engineering & technology.
C426.3	Develop written and oral communication skills & Explore concepts in larger diverse social and academic contexts.
C426.4	Apply principles of ethics and respect in interaction with others & Develop the skills to enable life-long learning.

Course: Internship   Course Code: C427

	Course Outcomes
	After studying this course, students will be able to:
C427.1	Explore career alternatives prior to graduation
C427.2	Analyze and integrate theory, practices
C427.3	Develop work habits by using modern tools and attitudes necessary for job success
C427.4	Develop communication, interpersonal and other critical skills in the job interview process

Department of Information Science and Engineering

Course Outcomes for 2018 Scheme Courses		
Subject: C PROGRAMMING FOR PROBLEM SOLVING		**18CPS13/23**
C113.1	Understand the fundamental knowledge of C programming and problem solving skills. PO1-3 , PSO3-3	
C113.2	Apply the branching and looping concepts in C programming. PO1-2, PSO3-3	
C113.3	Implement the concepts of modularization using arrays and strings. PO1-2, PSO3-3	
C113.4	Implement the structures, pointers and file management operations. PO1-2,PSO3-2	
C113.5	Implement an application by applying the concepts of C programming language. PO2-1,PO3-1,PO4-1,PO5-1, PO9-1,PO10-1,PO11-1,PO12-1	
Subject: DATA STRUCTURES AND APPLICATIONS		**18CS32**
C233.1	Acquire knowledge of various types of data structures and its operations. File structures, hashing	
C233.2	Apply the concepts of stacks, queue and recursion linked list,trees,graphs to solve problems	
C233.3	Implements the applications of data structures in high level language	
C233.4	Analyze problems to give efficient solutions	
C233.5	Able to implement various data structures by developing miniprojects	
Subject: ANALOG AND DIGITAL CIRCUITS		**18CS33**
C232.1	Understand the fundamental concepts of Photo diodes, Operational amplifier application circuits, D to A and A to D converter.	
C232.2	Design of BJT biasing circuit and Simplification Techniques using Karnaugh Maps, Quine McClusky Technique.	
C232.3	Understand the Fundamental Operation of Decoders, Encoders, Multiplexers, Latches, Flip-Flops.	
C232.4	Design of Synchronous and Asynchronous counters and registers	

Subject: COMPUTER ORGANIZATION		18CS34
C234.1	Understand basic structure of computers and machine instructions and programs. PO1-3 PSO1 - 3	
C234.2	Demonstrate the input output organization and interrupt handling mechanisms. PO1-3 POS1-3	
C234.3	Understand various types of memory in system and mapping functions. PO1-3 PSO1-3	
C234.4	Design and analyse simple arithmetic and logical units. PO2-2 PSO1-3	
C234.5	Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems. PO1-3 PSO-3	

Subject: SOFTWARE ENGINEERING		18CS35
C235.1	Understanding basic knowledge of UNIX OS and its basic features,architecture. PO1-3, PSO1 (wt -3)	
C235.2	Interpret UNIX Commands, Shell basics, and shell environments PO1-2, PSO1 (wt -3)	
C235.3	identify the unix commands to write shell programming, and analyze communication, System calls and terminology. Po2-3, PSO1 (wt -3)	
C235.4	understand the concepts UNIX File I/O and UNIX Processes. PO1-3, PSO1 (wt -3)	

Subject: DISCRETE MATHEMATICAL STRUCTURES		18CS36
C236.1	Use propositional and predicate logic in knowledge representation and truth verification. Po1/L3-2	
C236.2	Apply the concepts of mathematical induction, permutation and Combination to solve given problem.PO1/L2-3	
C236.3	Solve problems using recurrence relations and generating functions.PO4/L2-2	
C236.4	Solve problems using Principle of inclusion and Ecxlusion method.PO4/L2-2	
C236.5	Understand the concepts of graphs, trees and their applications.PO1/L3-2	

ANALOG AND DIGITAL ELECTRONICS LAB		18CSL37
C237.1	Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit. PO1-3, PO2-2, PO3- 2, PO5-1, PSO1-3	
C237.2	Design and demonstrate various combinational logic circuits and Data processing circuits. PO1-3, PO2-2, PO3- 2, PSO1-3	
C237.3	Design and demonstrate various types of counters and Registers using Flip-flops. PO1-3, PO2-2, PO3- 2, PSO1-3	
C237.4	Make use of simulation package to design analog and digital circuits. PO5-3, PSO1-3	

DATASTRUCTURES LABORATORY		18CSL38
C238.1	Analyze and Compare various linear and non-linear data structures	
C238.2	Code, debug and demonstrate the working nature of different types of data structures and their applications	
C238.3	Implement, analyze and evaluate the searching and sorting algorithms	
C238.4	Choose the appropriate data structure for solving real world problems	

DESIGN AND ANALYSIS OF ALGORITHMS | 18CS42

C242.1	Understand the concepts of different types of designing strategies
C242.2	Choose and apply appropriate algorithm design techniques for solving problems
C242.3	Ability to analyze the performance of algorithms.
C242.4	Design efficient algorithms to solve a particular computational problem
C242.5	Able to develop and demonstrate solutions to the real life problems through mini projects.

OPERATING SYSTEMS | 18CS43

C243.1	Demonstrate need for OS and different types of OS
C243.2	Apply suitable techniques for management of different resources
C243.3	Use processor, memory, storage and file system commands
C243.4	Realize the different concepts of OS in platform of usage through case studies

MICROCONTROLLER AND EMBEDDED SYSTEMS | 18CS44

C244.1	Describe the architectural features and instructions of ARM microcontroller. PO1-3, PSO1-2
C244.2	Apply the knowledge gained for Programming ARM for different applications. PO2-3, PSO1-2
C244.3	Interface external devices and I/O with ARM microcontroller. PO1-3, PSO1-3
C244.4	Design concepts of hardware /software co-design and firmware design approaches. PO2-2, PSO1-3
C244.5	Demonstrate the need of real time operating system for embedded system applications. PO1-2, PSO1-2
C244.6	Group Discussion on different Microprocessor in Mobile

OBJECT ORIENTED CONCEPTS		18CS45
C245.1	understand the object-oriented concepts and JAVA. PO1-2 ,PSO3-3	
C245.2	Apply the classes and objects to embed the data members and member functions. PO1-3 ,PSO3-3	
C245.3	Illustrate the concepts of inheritance and exception handling in java PO1-3 ,PSO3-3	
C245.4	Understand the concepts of interfaces, threading and event handling. PO1-2, PSO3-3	
C245.3	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using java. PO2-2 PO3-2, PO4-1, PO5-2, PO9-1,PO10-1, PO11-1,PO12-1 PSO3-3	
DATA COMMUNICATION		18CS46
C246.1	Enumerate the layers of the OSI model and TCP/IP functions of each layer. PO1/L2-2	
C246.2	Apply the concepts of Analog to digital conversion , Digital to Analog conversion and Switching in physical layer. PO1/L2-3	
C246.3	Apply the concepts of Error detection and correction. PO1/L2	
C246.4	Understand the concepts of Media access control PO1-L1-2	
C246.5	Understand the concepts of network layer protocol PO1-L1-2	
DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY		18CSL47
C247.1	Apply and implement learned algorithm design techniques and data structures to solve real-world Problems.	
C247.2	Analyze and compare the performance of algorithms using language features.	
C247.3	Design algorithms using appropriate design techniques such as brute-force, greedy, dynamic programming, etc.	
C247.4	Implement a variety of algorithms such as sorting, graph related etc in a high level language.	

MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY		18CSL48
C248.1	Understand ARM instruction sets and execution of manipulation of numbers oriented programs using kiel. PO1-3, PO5-3,PSO1-3	
C248.2	Analyze and execute memory oriented porgrams in ARM using kiel PO2-3, PO5-3, PSO1-3	
C248.3	Understand the hardware devices and interface of ARM microcintroller and exectuion of UART, DC motor, Stepper motor, ADC, DAC using keil. PO2-3, PO5-3PSO1-3	
C248.4	Execution of hardware porgrams of LED, LCD, 7-Segment Display using kiel. PO2-3, PO5-3, PSO1-3	
MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY		18CS51
C351.1	Understand the basic concepts of management, planning, Organizing and Staffing. L2, PO1	
C351.2	Summarize the appropriate leadership styles, motivation theories, communications, Coordination and controlling, methods L2, PO1	
C351.3	Interpret the meaning of entrepreneur, entrepreneurship and role in economic development on India. Along with Identification of business opportunities and feasibility study L2 PO1	
C351.4	Inferring the new ideas, Prepare project report based on guidelines of planning commission by utilizing the resources available effectively through ERP L2 PO1	
C351.5	Understand the IPRs and institutional support in Micro and Small Enterprises as per the Indian Industrial Policy 2007. L2 PO1	
COMPUTER NETWORKS AND SECURITY		18CS52
C352.1	Explain principles of application layer protocols	
C352.2	Recognize transport layer services and infer UDP and TCP protocols	
C352.3	Classify routers, IP and Routing Algorithms in network layer	
C352.4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard	
C352.5	Describe Multimedia Networking and Network Management	

DATABASE MANAGEMENT SYSTEM	18CS53
C353.1	Understand the database concepts ER model and data models. PO1-3 PSO2-3
C353.2	Understand Relational Model Concepts and Relational Algebra Operations PO1-3 , PSO2-3
C353.3	Apply the database concepts and Create a database using SQLand SQL queries to interact with databases PO2-2 PSO2-3
C353.4	Design and build simple database using normalization and concurrency control mechanism of database transactions. PO3-2 PSO2-3
C353.5	Design and implement a mini project by using database. PO2,3,4,5,9,10,11,12

AUTOMATA THEORY AND COMPUTABILITY	18CS54
C354.1	Understand the fundamental core concepts in Automata theory and Theory of computation PO1-3
C354.2	Applly the knowledge of Finite State Machines to translate between different models of Computation(e. g. Deterministic and Non deterministic and software models) PO2-3
C354.3	Design Grammers and Automata(recognizers) for different language classes and become knowledgeable about restricted models of Computation(Regular, Context Freee) and their relative powers. PO3-3
C354.4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness. PO3-2
C354.5	Analyse languages of Turing machine PO2-2

APPLICATION DEVELOPMENT USING PYTHON	18CS55
C3553.1	Apply the knowledge of Java like enumerations & collections in developing modular and efficient programs
C3553.2	Develop client server applications and TCP/IP programs
C3553.3	Understand database access and details for managing information using the JDBC API
C3553.4	understand how servlets fit into java based web application architecture
C3553.5	Design and Develop reusable software components using Java .

UNIX PROGRAMMING	18CS56
C3564.1	To Provide Unix Architecture, File system and use of Basic Commands
C3564.2	To gain an understanding of important aspects related to the SHELL and the process
C3564.3	To develop the ability to formulate regular expressions and use them for pattern matching. Categorize, compare and make use of Unix System Calls
C3564.4	Illustrate Shell Programming and to write Shell Scripts
C3564.5	Build an application/service over a Unix system.

COMPUTER NETWORK LABORATORY	18CSL57
C357.1	Analyze and Compare various networking protocols. PO2-3,PSO1-3
C357.2	Demonstrate the working of different concepts of networking. PO3-3, PSO1-3
C357.3	Implement, analyze and evaluate networking protocols in NS2 / NS3. PO5-3, PSO1-3

DBMS LABORATORY WITH MINI PROJECT	18CSL58
C358.1	Design the database schema for a varoius problems. PO3-3, PSO2-3
C358.2	Analyze the various key dependencies and use relevant SQL statements for designing the relations. PO2-2, PSO2-3
C358.3	Execute SQL queries for retrival of data from database. PO4-1, PSO2-3
C358.4	Develop an database Application using SQL and front end tools as a mini project. PO5-2, PO9-1, PO10-1, PO11-1, PO12-1, PSO2-3,PSO3-3

FILE STRUCTURES	18IS61
C361.1	Acquire the knowledge on various ways of organization and manipulation of data on secondary storage.
C361.2	Recall the low-level aspects of file and high-level tools used in file structures.
C361.3	Analyze how File structure design will improve the efficiency of data access.
C361.4	Understand the impact of advanced file structures in web applications and its sustainability.
C361.5	Design and develop programs for solving various File structure management problems.

SOFTWARE TESTING	18IS62
C362.1	Students are able to understand the modern software testing processes in relation to software development and project management.
C362.2	Students are able to analyze the manual test cases for software module with examples.
C362.3	Students are able to classify the problem into suitable testing model
C362.4	Students are able to analyze and use Integration and Component-Based Software Testing
C362.5	Construct the test cases for checking GUI objects by implementing mini project, group discussions, seminars, poster presentations etc..

WEB TECHNOLOGY AND ITS APPLICATIONS	18CS63
C363.1	Understand HTML and CSS syntax and Semantics to build web pages. PO1,PSO3
C363.2	Analyze, Construct and visually format tables and forms using HTML and CSS, PO2,POS3
C363.3	Design and Develop client side Scripts using java script and server side scripts using PHP to generate and display the contents dynamically - PO3,PO4,PSO3
C363.4	Apply the principles of Object oriented development using PHP, PO1, PSO3
C363.5	Understand the Java script frameworks like Jquery and backbone which facilitates developer to focus on core features PO1, PSO3.

DATA MINING AND DATA WAREHOUSING		18CS641
C3641.1	Comprehend the concepts of data mining, data ware housing, classification, association and cluster analysis	
C3641.2	Apply the concepts of pre-processing, association, classification and clustering.	
C3641.3	Design the solutions to real world problems using data mining and data warehousing techniques	
C3641.4	Identify and analyze problems reaching substantiated conclusions using the concepts of data mining and ware housing	
INTRODUCTION TO OPERATING SYSTEMS		**18CS654**
C3654.1	Students can able to understand knowledge need for OS and different types of OS	
C3654.2	Students can able to analyze suitable techniques for management of different resources	
C3654.3	Students can able to Use processor, memory, and storage and file system commands	
C3654.4	Students can able to realize the different concepts of OS in platform of usage through case studies	
C3654.5	students are able to involve in poster making, group discussion on working and implementation of different types of operating systems.	
SOFTWARE TESTING LABORATORY		**18ISL66**
C366.1	Design and implement the solution for given problem in any programming language(C,C++,JAVA) PO3-3 PSO-1	
C366.2	Derive test cases for any given problem PO1-2 PSO-1	
C366.3	Apply the appropriate technique for the design of flow graph PO1-3 , PO3-2,PSO-1	
C366.4	Create appropriate document for the software artefact. PO1-2 PSO-1	

FILE STRUCTURE LABORATORY	18ISL67
C367.1	Operations on files and I/O redirection **PO1,2**
C367.2	Organizing fixed and variable length records in a file. PO1,2
C367.3	Create an index for accessing large files. PO1,2

MOBILE APPLICATION DEVELOPMENT	18CSMP68
C368.1	Create, test and debug Android application by setting up Android development environment
C368.2	Implement adaptive, responsive user interfaces that work across a wide range of device
C368.3	Understand and implement android's User interface functions
C368.4	Demonstrate methods in storing, sharing and retrieving data in android applications
C368.5	Design mini project to Infer the role of permissions and security for Android applications

Artificial Intelligence and Machine Learning	18CS71
C471.1	Understand basic artificial intelligence concepts and machine learning concepts
C471.2	Apply the artificial intelligence and machine learning algorithms such as Find-S , Candidate and Decision Tree algorithms to solve the given problems.
C471.3	Analyse the the given problem and apply appropriate learning techniques for given dataset.
C471.4	Implement the algorithms in a high level langauge
C471.5	Apply the concepts of machine learning and artificial intelligence through mini projects

NETWORK MANAGEMENT	18CS742
C4742.1	Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.
C4742.2	Apply network management standards to manage practical networks
C4742.3	Formulate possible approaches for managing OSI network model.
C4742.4	Use on SNMP for managing the network
C4742.5	Use RMON for monitoring the behavior of the network

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY	18CSL76
C476.1	Apply various algorithms and datasets.(po1-3)
C476.2	Analyze the performance of algorithms. (po2-2)
C476.3	Develop and demonstrate AI and ML algorithms. (po-3-2)
C476.4	Use modern tools to implement AI & ML algorithms(PO5-2)

PROJECT WORK PHASE-I		**18CSP77**
C477.1	Able to apply the fundamentals of information science and engineering concepts (po1,)	
C477.2	Able to review research literature to find solutions to the problems by using research based knowledge(PO2,PO4	
C477.3	Able to design the methodologies for solving engineering problems and follow the ethics (po3,8)	
C477.4	Able to apply project management principles by following Software Development Life Cycle and indulge in life long learning(PO11,12)	
C477.5	Able to communicate effectively, write effective reports and can work individually as well as in team(PO9,10)	
INTERNET OF THINGS AND APPLICATIONS		**18CS81**
C481.1	Interpret the impact and challenges posed by IoT networks leading to new architectural models. PO1-2	
C481.2	Compare and contrast the deployment of smart objects and the technologies to connect them to network. PO1-2	
C481.3	Appraise the role of IoT protocols for efficient network communication. PO1-2	
C481.4	Elaborate the need for Data Analytics and Security in IoT . PO1-2	
C481.5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry. PO1-2	
PROJECT WORK PHASE - II		**18CSP83**
C483.1	Able to find solutions to the problems by using research based knowledge(PO2,PO4)	
C483.2	Able to apply project management principles by following Software Development Life Cycle and indulge in life long learning(PO11,12)	
C483.3	Able to communicate effectively, write effective reports(P10)	
C483.4	Able to apply modern tools in order to find the solutions(PO5)	
C483.5	Able to work individually as well as in team and follow ethics (PO8,PO9)	

TECHNICAL SEMINAR	18CSS84
C484.1	Students Explore to new technologies in the real world prior to graduation PO1,PO2
C484.2	Identify, understand and discuss current, real-world issues PO1, PO2,PO9,PO10
C484.3	To develop skills in presentation and discussion of seminar topic PO1,PO2, PO9, PO10

Internship	18CSI85
C484.1	Students Explore career alternatives prior to graduation PO1, PSO1,2,3
C484.2	Analyze and Integrate theory, practices. PO2, PSO1,2,3
C484.3	Develop work habits by using modern tools and attitudes necessary for job success. PO3, 4 , 5, PSO1,2,3
C484.4	Develop communication, interpersonal and other critical skills in the job interview process. PO9,10,11 12 PSO1,2,3

Course Outcomes (COs) for all courses from 3rd to 8th semester- 2018 Scheme

Semester:3

Subject Name: Biostatistics	
Subject Code:18BT31	
C201.1	Study and design various statistical problems
C201.2	Foundation to tackle live problems in various spheres of bioscience and bioengineering.
C201.3	Demonstrate strong basics in statistics and numerical analysis
Subject Name: Microbiology	
Subject Code: 18BT32	
C202.1	Describe the structure and function of typical prokaryotic and eukaryotic cell structure like bacteria, algae, yeast & molds, protozoa, viruses, etc.
C202.2	Understand the techniques used for the isolation, growth, identification, disinfection and sterilization 5 of microorganisms.
C202.3	Define the role of microorganisms towards environmental protection, industrial applications and infectious diseases.
Subject Name: Unit Operations	
Subject Code:18BT33	
C203.1	State and describe the nature and properties of the fluids.
C203.2	Study the different flow measuring instruments, the principles of various size reductions, conveying equipment's, sedimentation and mixing tanks.
C203.3	Comprehend the laws governing the heat and mass transfer operations to solve the problems.
C203.4	Design the heat transfer equipment suitable for specific requirement.
Subject Name: Introduction to Biomolecules	
Subject Code:18BT34	
C204.1	Present the foundational principles of macromolecular structure and function.
C204.2	Understand the principle of high energy molecules and Photosynthesis.
C204.3	Understand about biological membrane and transport mechanism across the cell membrane and analyse its regulation.
Subject Name: Cell Biology & Genetics	
Subject Code:18BT35	
C205.1	Comprehend the basics of cell biology & genetics.
C205.2	Understand the basis of inherited disorders.
Subject Name: Python Programming	
Subject Code:18BT36	

C206.1	Develop algorithmic solutions to simple computational problems.
C206.2	Read, write, execute by hand simple Python programs.
C206.3	Structure simple Python programs for solving problems.
C206.4	Decompose a Python program into functions.

Subject Name: Microbiology Lab

Subject Code:18BTL37

C207.1	Use different laboratory equipment and instruments such as Microscope, Laminar Air Flow Station, Autoclave, oven, incubators.
C207.2	Prepare the media and use for the cultivation of the microorganisms.
C207.3	Perform laboratory experiments for the isolation, identification and characterization of microorganisms
C207.4	Carry-out experiments for the enumeration, staining and control

Subject Name: Lab

Subject Code:18BTL38

C208.1	Record observations systematically and arrive at required results based on experiments conducted.
C208.2	Study and design different flow measuring instruments.
C208.3	Understand and Estimate the shape and size of irregular particles

Semester:4

Subject Name: Stoichiometry

Subject Code:18BT41

C209.1	Discuss the significance of material and energy balance for bioprocess technology.
C209.2	Solve problems related to material and energy balance to give solutions for bioprocess development.
C209.3	Develop the flow-sheet for general processes operating in bioprocess industry.
C209.4	Apply the stoichiometry of microbial growth and product formation involved in bioprocess technology.

Subject Name: Molecular Biology

Subject Code:18BT42

C210.1	Explain replication, transcription and translation processes with underlying differences in prokaryotic and eukaryotic systems.
C210.2	Elaborate importance of genetic recombination with special reference to bacterial system.
C210.3	Outline DNA damage and repair mechanisms

Subject Name: Immunotechnology

Subject Code:18BT43

C211.1	Outline the molecular and cellular mechanisms involved in the development and regulation of the immune response.

C211.2	Describe the cause, challenges and treatment for Immune System Pathologies and Dysfunctions.
C211.3	Apply the major immunological laboratory techniques and their application to both clinical analysis and experimental research.

Subject Name: Cell Culture Techniques

Subject Code:18BT44

C212.1	Differentiate between the various sources of cells to be used in cell culture techniques.
C212.2	Correlate between different biological samples and understand the importance of different media in tissue culture.
C212.3	Comprehend the applications of plant, animal and microbial cell culture in industry, healthcare and environment.

Subject Name: Biochemical Thermodynamics

Subject Code:18BT45

C213.1	Describe the concepts of system, surrounding, process, laws of thermodynamics & entropy.
C213.2	Explain the PVT behaviour of pure fluids & gases & derive equations of state for real gases.
C213.3	Distinguish between work function, Gibbs free energy.
C213.4	Determine the partial molar properties, activity coefficients of the solution.
C213.5	Illustrate the phase rule for reacting systems and effect of temperature, pressure on equilibrium constants.

Subject Name: Clinical Biochemistry

Subject Code:18BT46

C214.1	Understand the basic metabolic pathways its energetics and regulations of biomolecules.
C214.2	Discuss the biochemistry and pathophysiology associated with metabolism.
C214.3	Apply the theoretical concepts of biochemistry in diagnosis of biological samples.
C214.4	Assess the clinical manifestations of various metabolic disorders.

Subject Name: Biochemistry **Lab**

Subject Code:18BTL47

C215.1	Demonstrate the basic laboratory mathematics necessary to perform tests, make dilutions, and prepare buffer solutions.
C215.2	Compare/contrast Qualitative and quantitative analysis of various Biomolecules.

Subject Name: Immunotechnology Lab

Subject Code:18BTL48

C216.1	Learn and demonstrate the various Immunodiagnostic techniques like agglutination, precipitation, immunoelectrophoresis, qualitative analysis, ELISA, separation of Lymphocytes and Immunoblot.
C216.2	Independently carry out research experiments in immunology and cell biology.

Year:3

Semester:5

Subject Name: Bio-Business and Entrepreneurship	
Subject Code:18BT51	
C301.1	Know the importance of bioethics, biosafety and IPR.
C301.2	Apply for project proposal.
C301.3	Plan a project with a work plan, budget and schedule.

Subject Name: Chemical Reaction Engineering	
Subject Code:18BT52	
C302.1	Understand the mechanism and kinetics ofchemical , enzyme and microbial reactions.
C302.2	Identify and summarize the parameters from range reactions to optimize reactor design and development.
C302.3	Demonstrate the use of various scientific parameters to improve the performance of fermentation process.
C302.4	Develop suitable environment for microbial growth by analysing various parameters.

Subject Name: Enzyme Technology & Biotransformation	
Subject Code:18BT53	
C303.1	Define enzymes and its catalytic action, mechanism & kinetics with few examples.
C303.2	Explain the various techniques involved in the extraction and utilization of enzymes in biotransformation.

Subject Name: Genomics & Proteomics	
Subject Code:18BT54	
C304.1	Define structural, comparative and functional genomics and proteomics and its uses in various research fields.
C304.2	Describe various methods and techniques of Genomics, high throughput DNA sequencing technology, expression profiling, proteome analysis, and its applications.

Subject Name: Bioanalytical Techniques	
Subject Code:18BT55	
C305.1	Define the fundamentals of downstream processing for product recovery.
C305.2	Understand the requirements for successful operations of analytical techniques.
C305.3	Apply principles of various analytical devices used in in research and enhance problem solving techniques.

Subject Name: Genetic Engineering &Applications	
Subject Code:18BT56	

C306.1	Explain & compare the different vectors & enzymes used in the construction of recombinant DNA in Genetic engineering.
C306.2	Choose& explain specific techniques like PCR, Blotting & construction of libraries.
C306.3	Differentiate between & learn the different gene/DNA transfer techniques.
C306.4	Outline the various methods of producing transgenic organisms and sub-divide/summarize the applications of genetic engineering for the welfare of mankind & society.

Subject Name: Biokinetics & Enzyme Technology Lab

Subject Code:18BTL57

C307.1	State and define the nature of the reaction, rate of the reaction, rate constant and enzyme activity.
C307.2	Compare the rate of reaction for different reactors; know the ethical responsibilities that come with conducting experiments and communicating data.
C307.3	Use the design equations for predicting the reactor performance.
C307.4	Compose the RTD data to identify non idealitites in different reactor configuration.

Subject Name: Genetic Engineering and Cell Culture Lab

Subject Code:18BTL58

C308.1	Demonstrate/perform the basic cell culture techniques in vitro.
C308.2	To analyze the effects of physio-chemical factors and growth hormones for the growth and development of the cultures in vitro.

Semester: 6

Subject Name: Process Control & Automation

Subject Code:18BT61

C310.1	Understand the basics of process dynamics principles and instrumentation.
C310.2	Study various types of input functions and its response.
C310.3	Perform computational modelling to study different types of controllers.
C310.4	Analyse different control algorithms.

Subject Name: Bioprocess Equipment Design & CAED

Subject Code:18BT62

C311.1	Differentiate between different types of heat exchangers.
C311.2	Do detailed design and drawing of DPHE, STHE and condenser.
C311.3	Design and draw the fermenter, packed column distillation.

Subject Name: Bioinformatics

Subject Code:18BT63

C312.1	Know the relevant online resources, databases and software tools.
C312.2	Understand the underlying concepts of Bioinformatics.
C312.3	Apply alignment and modelling tools.
C312.4	Analyse biological data using phylogenetic, predictive and comparative methods.

C312.5	Design in silico various biomolecules.

Subject Name: Process Control & Automation Lab	
Subject Code:18BTL66	
C319.1	Understand the basics of instrumentation , classification, various input function of automatic process control system.
C319.2	Classify and characterize the transducers based on critical process parameters.
C319.3	Demonstrate the working of First order systems and controllers.
C319.4	Calculate and Analyze the output obtained from different systems and perform theoretical validation.

Subject Name: Bioinformatics Lab	
Subject Code:18BTL67	
C320.1	Understand fundamental concepts of bioinformatics.
C320.2	Apply online resource tools.
C320.3	Solve sequence alignment problems.
C320.4	Design primers and peptide sequence.

Year:4

Semester:7 and 8

Subject Name: Bioprocess Engineering	
Subject Code:18BT71	
C401.1	Study and design various statistical problems.
C401.2	Describe the factors affecting secondary metabolite production and its industrial importance.
C401.3	Identify and summarize the effect of change in unit's operations and its impact on the process.
C401.4	Illustrate how emerging technologies would benefit the bio chemical product recovery and show the likely benefits it would have over the traditional operations.
C401.5	Analyzing both analytical and process validation issues that are critical to successful manufacturing.

Subject Name: Clinical & Pharmaceutical Biotechnology	
Subject Code:18BT72	
C402.1	Explain the significance of pharmaco-kinetic models, pharmaco-dynamic principles, various dosage forms and formulation.
C402.2	Understand the specific techniques used in biotherapy & clinical Biotechnology.
C402.3	Comprehend specific applications of pharmaceutical & clinical Biotechnology.

Subject Name: Bioprocess Engineering Lab	
Subject Code:18BTL76	

C409.1	Describe the factors affecting secondary metabolite production and its industrial importance.
C409.2	Describe the basic requirements of downstream processing for biochemical product recovery.
C409.3	DIdentify and summarize the effect of change in unit's operations and its impact on the process.

Subject Name: Project Work Phase – 1

Subject Code:18BTP77

C410.1	Understanding the diverse aspects of identification of gaps in literature, Planning of project objectives, working with Time Schedules, performing Team activities and coordinating as a group.
C410.2	Appreciate the meticulous maintenance of records and data, at every stage of activity analysis.
C410.3	Apply the diverse aspects of proper experimentation, trouble shooting, validations, repeatability studies, statistical analysis, etc.
C410.4	Recognize the significance of Report Writing, Referencing and Presentation Skills.

Semester: 8

Subject Name: Regulatory Affairs in Biotech Industry

Subject Code:18BT81

C411.1	Outline the importance of the quality and compliance in the biotech industry.
C411.2	Comprehend the various regulatory guidelines and rules as well as the organizations governing the same.

Subject Name: Project Work Phase - 2

Subject Code:18BTP83

C415.1	Understanding the diverse aspects of Project Planning, execution of defined objectives, working with Time Schedules, performing Team activities and coordinating as a group.
C415.2	Appreciate the meticulous maintenance of records and data, at every stage of activity analysis.
C415.3	Apply the diverse aspects of proper experimentation, trouble shooting, validations, repeatability studies, statistical analysis, etc.
C415.4	Recognize the significance of Report Writing, Referencing and Presentation Skills.

Subject Name: Technical Seminar

Subject Code:18BTS84

C416.1	Understand the significance of Literature Survey, gathering of data related to specific topics and compilation of relevant points.
C416.2	Appreciate the art of meticulous reading of details and interpretation of literature data.
C416.3	Familiarize the experimental methodologies, trouble shooting, validations, repeatability studies, statistical analysis, etc., from literature survey.
C416.4	Recognize the significance of Seminar Presentations, Referencing, Justification and Report Writing Skills.

Subject Name: Internship	
Subject Code:18BTI85	
C417.1	An understanding of Internship activity and learning key skills related to specific domains.
C417.2	Enables with an appreciation of the meticulous details of tools and techniques used in specific domains.
C417.3	Familiarize with the aspects of experimental methodologies, trouble shooting, validations, repeatability studies, statistical analysis, etc.
C417.4	Recognize the relevance of Presentations, Referencing, Justification and Report Writing Skills.

Department of Mathematics

Course Outcomes (COs) - 2018 Scheme

Semester: 1	
Subject Name: CALCULUS AND LINEAR ALGEBRA	
Subject Code: 18MAT11	
CO.1	Apply the knowledge of calculus to solve problems related to polar, curves and its applications in determining the bentness of a curve.
CO.2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems. Related to composite function and Jacobians.
CO.3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
CO.4	Solve first order linear/nonlinear differential equation analytically using standard methods
CO.5	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.
Semester: 2	
Subject Name: ADVANCED CALCULUS AND NUMERICAL METHODS	
Subject Code: 18MAT21	
CO.1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
CO.2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CO.3	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.
CO.4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
CO.5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
Semester: 3	
Subject Name: TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES	
Subject Code: 18MAT31	
CO.1	Use Laplace transform and inverse Laplace transform in solving differential / integral equation arising in network analysis, control systems and other fields of engineering.
CO.2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.

CO.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO.5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Semester: 4

Subject Name: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS

Subject Code: 18MAT41

CO.1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

DEPARTMENT OF PHYSICS

COs FOR 2018 Scheme

SUB CODE: 18PHY 12/22

SUB NAME: Engg. Physics

At the end of the course the student will able to:

CO's	Course Outcomes (COs)
CO1	Remember the various types of oscillations and understand their implications in various domains and also interpret the role of shock waves and its applications.
CO2	Recognize the importance of elastic properties of materials and apply them in engineering applications.
CO3	Realize the interrelation between time varying electric and magnetic fields, concept of transvers nature of EM waves and their role in optical fiber communication with the basic understanding of ray optics and types of optical fibers.
CO4	Compute Eigen values, Eigen functions of atomic and subatomic particles using time independent 1-D Schrodinger's wave equation.
CO5	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
CO6	Understand the electrical and thermal properties of materials like conductors, semiconductors and dielectrics using the theoretical models.

DEPARTMENT OF CHEMISTRY

COS FOR 2018 Scheme

SUB CODE: 18CHE12 / 22

SUB NAME: Engg. Chemistry

At the end of the course the student will able to:

CO's	Course Outcomes (COs)
CO1	Understand working principle and construction of electrochemical cell, Concentration cell, batteries and fuel cells.
CO2	Understand causes and effects on corrosion in metals and protection against corrosion using Electroplating and electro less plating techniques.
CO3	Understand generation of energy from renewable and their utilization for Domestic and industrial purposes.
CO4	Understand preparation of Industrially important polymers, adhesives, elastomer and conducting Polymers and their utilization.
CO5	Understand the impact of water pollution and methods and analyze Water, Sewage & Industrial effluent and treatment system.
CO6	Understand the synthesis, Properties of nanomaterials.

Course Outcomes for different Subjects 2021-Scheme

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course Outcomes (COs) for all courses from 3rd to 8th semester- 2021 Scheme

Semester: 3	
Subject Name: Mathematics	
Subject Code: 21MAT31	
C201.1	To solve ordinary differential equations using Laplace transform.
C201.2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
C201.4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations
C201.5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
Subject Name: Digital System Design using Verilog	
Subject Code: 21EC32	
C202.1	Simplify Boolean functions using K-map and Quine-McCluskey minimization technique.
C202.2	Analyze and design for combinational logic circuits.
C202.3	Analyze the concepts of Flip Flops (SR, D, T and JK) and to design the synchronous sequential circuits using Flip Flops.
C202.4	Model Combinational circuits (adders, subtractors, multiplexers) and sequential circuits using Verilog descriptions.
Subject Name: Basic Signal Processing	
Subject Code: 21EC33	
C203.1	Understand the basics of Linear Algebra
C203.2	Analyse different types of signals and systems
C203.3	Analyse the properties of discrete-time signals & systems
C203.4	Analyse discrete time signals & systems using Z transforms
Subject Name: Analog Electronic Circuits	
Subject Code: 21EC34	
C204.1	Understand the characteristics of BJTs and FETs for switching and amplifier circuits.
C204.2	Design and analyze FET amplifiers and oscillatorswith different circuit configurations and biasing conditions.
C204.3	Understand the feedback topologies and approximations in the design of amplifiers and oscillators.

C204.4	Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers.
C204.5	Understand the power electronic device components and its functions for basic power electronic circuits.

Subject Name: Analog and Digital Electronics Lab

Subject Code: 21ECL35

C205.1	Design and analyze the BJT/FET amplifier and oscillator circuits.
C205.2	Design and test Opamp circuits to realize the mathematical computations, DAC and precision rectifiers
C205.3	Design and test the combinational logic circuits for the given specifications.
C205.4	Test the sequential logic circuits for the given functionality.
C205.5	Demonstrate the basic electronic circuit experiments using SCR and 555 timer.

Subject Name: Constitution of India and Professional Ethics

Subject Code: 21CIP37/47

C209.1	Analyse the basic structure of Indian Constitution.
C209.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
C209.3	Know about our Union Government, political structure & codes, procedures.
C209.4	Understand our State Executive & Elections system of India.
C209.5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Subject Name: LD (Logic Design) Lab using Pspice / Multisim

Subject Code: 21EC381

C210.1	Demonstrate the truth table of various expressions and combinational circuits using logic gates
C210.2	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and code converters
C210.3	Construct flips-flops, counters and shift registers.
C210.4	Design and implement synchronous counters

Semester:4

Subject Name: Digital Signal Processing

Subject Code: 21EC42

C215.1	Determine response of LTI systems using time domain and DFT techniques 2
C215.2	Compute DFT of real and complex discrete time signals
C215.3	Compute DFT using FFT algorithms
C215.4	Design FIR and IIR Digital Filters
C215.5	Design of Digital Filters using DSP processor

Subject Name: Circuits & Controls	
Subject Code: 21EC43	
C216.1	Analyse and solve Electric circuit, by applying, loop analysis, Nodal analysis and by applying network Theorems
C216.2	Evaluate two port parameters of a network and Apply Laplace transforms to solve electric networks
C216.3	Deduce transfer function of a given physical system, from differential equation representation or Block Diagram representation and SFG representation.
C216.4	Calculate time response specifications and analyse the stability of the system.
C216.5	Draw and analyse the effect of gain on system behaviour using root loci.
C216.6	Perform frequency response Analysis and find the stability of the system.
C216.7	Represent State model of the system and find the time response of the system.
Subject Name: Communication Theory	
Subject Code: 21EC44	
C217.1	Understand the amplitude and frequency modulation techniques and perform time and frequency domain transformations.
C217.2	Identify the schemes for amplitude and frequency modulation and demodulation of analog signals and compare the performance
C217.3	Characterize the influence of channel noise on analog modulated signals
C217.4	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems
C217.5	Illustration of digital formatting representations used for Multiplexers, Vocoders and Video transmission
Subject Name: Communication Laboratory I	
Subject Code: 21ECL46	
C219.1	Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain.
C219.2	Design and test the sampling, Multiplexing and PAM with relevant circuits
C219.3	Demonstrate the basic circuitry and operations used in AM and FM receivers.
C219.4	Illustrate the operation of PCM and delta modulations for different input conditions.
Subject Name: Embedded C Basics	
Subject Code: 21EC481	
C220.1	Write C programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051 C.
C220.2	Develop testing and experimental procedures on 8051 Microcontroller, analyze their operation under different cases.
C220.3	Develop programs for 8051 Microcontroller to implement real world problems.
C220.4	Design and Develop Mini projects
Subject Name: Universal Human Values	
Subject Code: 21UH49	

C224.1	Holistic vision of life
C224.2	Socially responsible behaviour
C224.3	Environmentally responsible work
C224.4	Ethical human conduct
C224.5	Having Competence and Capabilities for Maintaining Health and Hygiene
C224.6	Appreciation and aspiration for excellence (merit) and gratitude for all

Year: 3

Semester:5

Subject Name: Digital Communication

Subject Code: 21EC51	
C301.1	Analyze different digital modulation techniques and choose the appropriate modulation technique for the given specifications.
C301.2	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
C301.3	Differentiate various spread spectrum schemes and compute the performance parameters of communication system.
C301.4	Apply the fundamentals of information theory and perform source coding for given message
C301.5	Apply different encoding and decoding techniques with error Detection and Correction.

Subject Name: Computer Organization and ARM Microcontroller

Subject Code: 21EC52	
C302.1	Explain the basic organization of a computer system.
C302.2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
C302.3	Describe the architectural features and instructions of 32-bit microcontroller ARM Cortex M3.
C302.4	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.

Subject Name: Computer Communication Networks

Subject Code: 21EC53	
C303.1	Understand the concepts of networking thoroughly.
C303.2	Identify the protocols and services of different layers.
C303.3	Distinguish the basic network configurations and standards associated with each network.
C303.4	Discuss and analyse the various applications that can be implemented on networks.

Subject Name: Electromagnetic Waves

Subject Code: 21EC54	
C304.1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.

C304.2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem.
C304.3	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
C304.4	Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits.
C304.5	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

Subject Name: Communication Lab II

Subject Code: 21ECL55

C305.1	Design and test the digital modulation circuits and display the waveforms.
C305.2	To Implement the source coding algorithm using C/C++/ MATLAB code.
C305.3	To Implement the Error Control coding algorithms using C/C++/ MATLAB code.
C305.4	Illustrate the operations of networking concepts and protocols using C programming and network simulators

Subject Name: Research Methodology & Intellectual Property Rights

Subject Code: 21EC56

C306.1	To know the meaning of engineering research
C306.2	To know the procedure of Literature Review and Technical Reading
C306.3	To know the fundamentals of patent laws and drafting procedure.
C306.4	Understanding the copyright laws and subject matters of copyrights and designs
C306.5	Understanding the basic principles of design rights.

Subject Name: Environmental Studies

Subject Code: 21CIV57

C307.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale
C307.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C307.3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.
C307.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

Subject Name: IoT (Internet of Things) Lab

Subject Code: 21EC581

C308.1	Understand internet of Things and its hardware and software components
C308.2	Interface I/O devices, sensors & communication modules
C308.3	Remotely monitor data and control devices
C308.4	Develop real life IoT based projects

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Name: Transform Calculus, Fourier Series and Numerical Techniques (21MAT31)
At the end of the course student will be able to

1	To solve ordinary differential equations using Laplace transform.
2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
3	To analyze problems involving continuous-time signals and to apply Z Transform techniques to solve difference equations.
4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations.
5	Determine the extremals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Course Name: Analog Electronic Circuits and Op - Amps (21EE32)
At the end of the course student will be able to

1	Obtain the output characteristics of clipper and clamper circuits and Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
2	Explain the concept of feedback, its types and design of feedback circuits.
3	Design and analyse the power amplifier circuits and oscillators for different frequencies.
4	Design and analysis of FET and MOSFET amplifiers.
5	Demonstrate the application of Op-amps.

Course Name: Electric Circuit Analysis (21EE33)
At the end of the course student will be able to

1	Understand the basic concepts, basic laws and methods of analysis of DC and AC networks and reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
2	Solve complex electric circuits using network theorems.
3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
4	Synthesize typical waveforms using Laplace transformation.
5	Solve unbalanced three phase systems and also evaluate the performance of two port networks.

Course Name: Transformers and Generators (21EE34)
At the end of the course student will be able to

1	Understand the construction and operation of 1-phase, 3-Phase transformers, and Autotransformer.
2	Analyze the performance of transformers by polarity test, Sumpner's Test, phase conversion, 3-phase connection, and parallel operation.
3	Understand the construction and working of AC and DC Generators.
4	Analyze the performance of the AC Generators on infinite bus and parallel operation.
5	Determine the regulation of AC Generator by Slip test, EMF, MMF, and ZPF Methods.

Course Name: Electrical Machines Laboratory - 1(21EEL35)
At the end of the course student will be able to

1	Conducting of different tests on transformers and synchronous machines and evaluation of their performance.
2	Verify the parallel operation of two single phase transformers.
3	Study the connection of single phase transformers for three phase operation and phase conversion.
4	Study of synchronous generator connected to infinite bus.

Course Name: 555 IC Laboratory (21EE383)	
At the end of the course student will be able to	
1	Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
2	Provide unhindered access to perform whenever the students wish.
3	Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/device or injuring themselves.

Course Name: Complex Analysis, Probability and Statistical Methods (21EE41)	
At the end of the course student will be able to	
1	Use the concepts of an analytic function and complex potentials to solve the problems arising in electromagnetic field theory. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
2	Obtain Series Solutions of Ordinary Differential Equation.
3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
4	Apply discrete and continuous probability distributions in analysing the probability models arising in the engineering field.
5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Course Name: Digital System Design (21EE42)	
At the end of the course student will be able to	
1	Develop simplified switching equation using Karnaugh Maps and Quine McClusky techniques and Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits.
2	Design flip flops, counters, shift registers as sequential control circuits and Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits.
3	Explain the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory.
4	Realize Boolean expressions, adders and Subtractors using gates.
5	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters.

Course Name: Microcontroller (21EE43)	
At the end of the course student will be able to	
1	Outline the 8051 architecture, registers, internal memory organization, addressing modes.
2	Discuss 8051 addressing modes, instruction set of 8051, accessing data and I/O port programming.
3	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counter programming.

4	Summarize the basics of serial communication and interrupts, also develop 8051 programs for serial data communication and interrupt programming.
5	Program 8051to work with external devices for ADC, DAC, Stepper motor control, DC motor control.

Course Name: Electric Motors (21EE44)	
At the end of the course student will be able to	
1	Explain the construction, operation and classification of DC Motor, AC motor and special purpose motors.
2	Describe the performance characteristics and applications of Electric motors.
3	Demonstrate and explain the methods of testing of DC machines and determine losses and efficiency.
4	Control the speed of DC motor and induction motor.
5	Explain the starting methods, equivalent circuit and phasor diagrams, torque angle, effect of change in excitation and change in load, hunting and damping of synchronous motors.

Course Name: Electrical Machines Laboratory – 2 (21EEL46)	
At the end of the course student will be able to	
1	Test DC machines to determine their characteristics and also to control the speed of DC motor.
2	Pre-determine the performance characteristics of DC machines by conducting suitable tests.
3	Perform load test on single phase and three phase induction motor to assess its performance.
4	Conduct test on induction motor to pre-determine the performance characteristics.
5	Conduct test on synchronous motor to draw the performance curves.

Course Name: Simulation of Op-Amp Circuits (21EEL484)	
At the end of the course student will be able to	
1	Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
2	Provide unhindered access to perform whenever the students wish.
3	Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/device or injuring themselves.

Course Name: Transmission and Distribution (21EE51)	
At the end of the course student will be able to	
1	Explain transmission and distribution scheme, identify the importance of different transmission systems and types of insulators.
2	Analyze and compute the parameters of the transmission line for different configurations.
3	Assess the performance of overhead lines.
4	Interpret corona, explain the use of underground cables.
5	Classify different types of distribution systems; examine its quality & reliability.

Course Name: Control Systems (21EE52)	
At the end of the course student will be able to	

1	Analyze and model electrical and mechanical system using analogous and Formulate transfer functions using block diagram and signal flow graphs.
2	Analyze the stability of control system, ability to determine transient and steady state time response and Illustrate the performance of a given system in time and frequency domains, stability analysis using Root locus and Bode plots.
3	Discuss stability analysis using Nyquist plots, Design controller and compensator for a given Specification and Utilize software package and discrete components in assessing the time and frequency domain response of a given second order system.
4	Design, analyze and simulate Lead, Lag and Lag – Lead compensators for given specifications and Determine the performance characteristics of ac and DC servomotors and synchro-transmitter receiver pair used in control systems.
5	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and Lead compensator on the step response of the system and Develop a script files to plot Root locus, Bode plot and Nyquist plot to study the stability of a system using software package.

Course Name: Power System Analysis – 1 (21EE53)	
At the end of the course student will be able to	
1	Model the power system components & construct per unit impedance diagram of power system.
2	Analyze three phase symmetrical faults on power system.
3	Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks.
4	Analyze various unsymmetrical faults on power system.
5	Examine dynamics of synchronous machine and determine the power system stability.

Course Name: Power Electronics (21EE54)	
At the end of the course student will be able to	
1	To give an overview of applications power electronics, different types of power semiconductor devices, their switching characteristics, power diode characteristics, types, their operation and the effects of power diodes on RL circuits.
2	To explain the techniques for design and analysis of single phase diode rectifier circuits.
3	To explain different power transistors, their steady state and switching characteristics and limitations.
4	To explain different types of Thyristors, their gate characteristics and gate control requirements.
5	To explain the design, analysis techniques, performance parameters and characteristics of controlled rectifiers, DC- DC, DC -AC converters and Voltage controllers.
Course Name: Power Electronics Laboratory (21EEL55)	
At the end of the course student will be able to	
1	Obtain static characteristics of semiconductor devices to discuss their performance.
2	Trigger the SCR by different methods.
3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads.
4	Control the speed of a DC motor, universal motor and stepper motors.
5	Verify the performance of single phase full bridge inverter connected to resistive load.

Course Name: Scilab for Power Electronics (21EEL582)	
At the end of the course student will be able to	
1	Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
2	Provide unhindered access to perform whenever the students wish.
3	Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/ device or injuring themselves.

DEPARTMENT OF MECHANICAL ENGINEERING

Semester - III

Course Name: Transform Calculus, Fourier Series and Numerical Techniques [21MAT 31]	
CO1	To solve ordinary differential equations using Laplace transform
CO2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory
CO3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
CO4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations
CO5	Determine the extremes of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Course Name: Metal Casting Forming & Joining Process (IPCC) [21ME32]	
CO1	Select appropriate primary manufacturing process and related parameters for obtaining initial shape and size of components.
CO2	Design and develop adequate tooling linked with casting, welding and forming operations.
CO3	Appreciate the effect of process parameters on quality of manufactured components
CO4	Demonstrate various skills in preparation of molding sand for conducting tensile, shear and compression tests using Universal sand testing machine.
CO 5	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations.
CO6	Demonstrate skills in preparation of Welding models

Course Name: Material Science and Engineering (IPCC) [21ME33]	
CO1	Apply knowledge of science and engineering to appreciate the concept of atomic arrangement, geometrical crystallography and imperfections in crystalline materials and correlate material properties with crystal structure.
CO2	Apply knowledge of science and engineering to understand the importance of phase diagrams and the phase transformations
CO3	Use the knowledge of science, and engineering to identify various heat treatment methods for controlling the microstructure and hence material properties.
CO4	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials and correlate between material properties with component design

Course Name: Thermodynamics [21ME34]	
CO1	Describe the fundamental concepts and principles of engineering thermodynamics.
CO2	Apply the governing laws of thermodynamics for different engineering applications.
CO3	Analyze the various thermodynamic processes, cycles and results.
CO4	Interpret and relate the impact of thermal engineering practices to real life problems.

Course Name: Machine Drawing and GD & T [21MEL35]	
CO1	Interpret the Machining and surface finish symbols on the component drawings.
CO2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
CO3	Illustrate various machine components through drawings
CO4	Create assembly drawings as per the conventions

Semester - IV

Course Name: Complex Analysis, Probability and Linear Programming [21ME41]	
CO1	Use the concepts of an analytic function and complex potentials to solve the problems arising in fluid flow.
CO2	Utilize conformal transformation and complex integral arising in aero foil theory, fluid flow visualization and image processing
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.

CO4	Analyze and solve linear programming models of real-life situations and solve LPP by the simplex method
CO5	Analyze and solve linear programming models of real-life situations and solve LPP by the simplex method

Course Name: Machining Science and Jigs & Fixtures (IPCC) [21ME42]	
CO1	Demonstrate the Conventional CNC machines and advanced manufacturing process operations
CO2	Determine tool life, cutting force, and economy of the machining process
CO3	Analyze the influence of various parameters on machine tools' performance.
CO4	Select the appropriate machine tools and process, the Jigs, and fixtures for various applications

Course Name: Fluid Mechanics (IPCC) [21ME43]	
CO1	Understand the basic principles of fluid mechanics and fluid kinematics
CO2	Acquire the basic knowledge of fluid dynamics and flow measuring instruments.
CO3	Understand the nature of flow and flow over bodies and the dimensionless analysis.
CO4	Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis.
CO5	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.

Course Name: Mechanics of Materials [21ME44]	
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.

Course Name: Mechanical Measurements and Metrology Laboratory [21ME45]	
CO1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer
CO2	Apply concepts of Measurement of angle
CO3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
CO4	Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer
CO5	Understand the concepts of measurement of surface roughness.
CO6	Demonstrate the use of Coordinate Measuring Machine (CMM) / Laser Scanner.

Semester - V

Course Name: Theory of Machines [21ME51]	
CO1	Knowledge of mechanisms and their motion and the inversions of mechanisms
CO2	Analyse the velocity, acceleration of links and joints of mechanisms.
CO3	Analyse the mechanisms for static and dynamic equilibrium.
CO4	Carry out the balancing of rotating and reciprocating masses.
CO5	Analyse different types of governors used in real life situation.
CO6	Analyze the free and forced vibration phenomenon.

Course Name: Thermo-Fluids Engineering (IPCC) [21ME52]	
CO1	Apply the concepts of testing of I. C. Engines and evaluate their performance, and evaluate the performance of Reciprocating compressor.
CO2	Apply and analyse the concepts related to Refrigeration and Air conditioning, and get conversant with Psychrometric Charts, Psychrometric processes, human comfort conditions.
CO3	Explain the construction, classification and working principle of the Turbo machines and apply of Euler's turbine equation to evaluate the energy transfer and other related parameters. Compare and evaluate the performance of positive displacement pumps.
CO4	Classify, explain and analyse the various types of hydraulic turbines and centrifugal pumps.
CO5	Classify, explain and analyse various types of steam turbines and centrifugal compressor.

Course Name: Finite Element Analysis [21ME53]	
CO1	Identify the application and characteristics of FEA elements such as bars, beams, and plane and isoparametric 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, and fluid flow, axi-symmetric and dynamic problems.

Course Name: Modern Mobility & Automotive Mechanics [21ME54]	
CO1	Understand the working of different systems employed in automobile.
CO2	Analyse the limitation of present day automobiles.
CO3	Evaluate the energy sources suitability.
CO4	Apply the knowledge for selection of automobiles based on their suitability.

Course Name: Design Lab [21ME55]	
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 and gyroscope phenomenon.
CO3	Analyse the governor characteristics
CO4	Determine stresses in disk, beams and plates 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
CO7	To realize different mechanisms and cam motions.

Semester - VI

Course Name: Production and Operations Management [21ME61]	
CO1	Apply the necessary tools for decision making in operations management.
CO2	Examinevariousapproachesforforecastingthesalesdemandforanorganization.
CO3	Listvariouscapacityandlocationplanstodeterminethesuitablecapacityrequiredformeetingtheforecastdemand ofan organization.
CO4	Analyse the aggregate plan and master production schedule for an organization, given its periodic demand.
CO5	Apply MRP, purchasing and SCM techniques into practice

Course Name: Heat Transfer (IPCC) [21ME62]	
CO1	Solve steady state heat transfer problems in conduction.
CO2	Solve transient heat transfer problems
CO3	Solve convection heat transfer problems using correlations
CO4	Solve radiation heat transfer problems
CO5	Explain the mechanisms of boiling and condensation and determine performance parameters of heat exchangers.

Course Name: Machine Design [21ME63]	
CO1	Apply codes and standards in the design of machine elements and select an element based on the Manufacturer's catalogue.
CO2	Analyse the performance and failure modes of mechanical components subjected to combined loading and fatigue loading using the concepts of theories of failure.
CO3	Demonstrate the application of engineering design tools to the design of machine components like shafts, springs, couplings, fasteners, welded and riveted joints, brakes and clutches
CO4	Design different types of gears and simple gear boxes for relevant applications
CO5	Apply design concepts of hydrodynamic bearings for different applications and select Anti friction bearings for different applications using the manufacturers, catalogue.

Course Name: Supply Chain Management & Introduction to SAP [21ME641]

CO1	Understand the framework and scope of supply chain management.
CO2	Build and manage a competitive supply chain using strategies, models, techniques and information technology.
CO3	Plan the demand, inventory and supply and optimize supply chain network.
CO4	Understand the emerging trends and impact of IT on Supply chain.
CO5	Understand the basics of SAP material management system

Course Name: Mechatronics System Design [21ME642]

CO1	Discuss about Mechatronics design process and select the sensor and Actuator for a Mechatronics application
CO2	Explain Modeling and Simulation of mechanical Elements, electrical Elements and fluid system the sensors in mechatronics systems and Fault detection techniques in Mechatronics.
CO3	Understand the elements of Data Acquisition and Control System, Convert the data in real time interfacing
CO4	Model the dynamic response of first order and second order systems.

Course Name: Autonomous Vehicles [21ME643]

CO1	Describe the evolution of Automotive Electronics and the operation of ECUs.
CO2	Compare the different type of sensing mechanisms involved in Autonomous Vehicles.
CO3	Discuss about the use of computer vision and learning algorithms in vehicles.
CO4	Summarize the aspects of connectivity fundamentals existing in a driverless car.
CO5	Identify the different levels of automation involved in an Autonomous Vehicle.
CO6	Outline the various controllers employed in vehicle actuation.

Course Name: Economics for Engineers [21ME644]

CO1	Understand the selection, prioritization and initiation of individual projects and strategic role of project management.
CO2	Understand the work breakdown structure by integrating it with organization.
CO3	Understand the scheduling and uncertainty in projects
CO4	Understand risk management planning using project quality tools.
CO5	Understand the activities like purchasing, acquisitions, contracting, partnering and collaborations related to performing projects
CO6	Determine project progress and results through balanced scorecard approach
CO7	Draw the network diagram to calculate the duration of the project and reduce it using crashing

Course Name: Project Management [21ME651]

CO1	Understand the selection, prioritization and initiation of individual projects and strategic role of project management.
CO2	Understand the work breakdown structure by integrating it with organization.
CO3	Understand the scheduling and uncertainty in projects.
CO4	Understand risk management planning using project quality tools.
CO5	Understand the activities like purchasing, acquisitions, contracting, partnering and collaborations related to performing projects.
CO6	Determine project progress and results through balanced scorecard approach
CO7	Draw the network diagram to calculate the duration of the project and reduce it using crashing.

Course Name: Project Management [21ME652]

CO1	Describe the various forms of non-conventional energy resources.
CO2	Apply the fundamental knowledge of mechanical engineering to design various renewable energy systems
CO3	Analyze the implications of renewable energy forms for selecting an appropriate system for a specific application
CO4	Discuss on the environmental aspects and impact of non-conventional energy resources, in comparison with various conventional energy systems, their prospects and limitations.

Course Name: Mechatronics [21ME653]	
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.

Course Name: Modern Mobility [21ME654]	
CO1	Understand the working of different systems employed in automobile.
CO2	Analyse the limitation of present day automobiles.
CO3	Evaluate the energy sources suitability.
CO4	Apply the knowledge for selection of automobiles based on their suitability.

Course Name: CNC Programming and 3-D Printing Lab [21MEL66]	
CO1	Students will have knowledge of G-code and M-code for machining operations.
CO2	Students will able to perform CNC programming for turning, drilling, milling and threading operation.
CO3	Students will able to visualize the 3D models using CAD software's
CO4	Students will able to use 3D printing technology
CO5	Students are able to understand robotic programming and FMS.

Semester -VII

Course Name: Automation and Robotics (PCC) [21ME71]	
CO1	Translate and simulate a real time activity using modern tools and discuss the Benefits of automation.
CO2	Identify suitable automation hardware for the given application.
CO3	Recommend appropriate modelling and simulation tool for the given manufacturing Application.
CO4	Explain the basic principles of Robotic technology, configurations, control and Programming of Robots.
CO5	Explain the basic principles of programming and apply it for typical Pick & place, Loading & unloading and palletizing applications

Course Name: Control Engineering [21ME72]	
CO1	Identify the type of control and control actions and develop the mathematical model of the physical systems.
CO2	Estimate the response and error in response of first and second order systems subjected standard input signals.
CO3	Represent the complex physical system using block diagram and signal flow graph and obtain transfer function.
CO4	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain
CO5	Analyse the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.

Course Name: Additive Manufacturing [21ME731]	
CO1	Demonstrate the knowledge of the broad range of AM processes, devices, capabilities and materials that are available.
CO2	Demonstrate the knowledge of the broad range of AM processes, devices, capabilities and materials that are available.
CO3	Understand the various software tools, processes and techniques that enable advanced/additive manufacturing.
CO4	Apply the concepts of additive manufacturing to design and create components that satisfy product development/prototyping requirements, using advanced/additive manufacturing devices and processes
CO5	Understand characterization techniques in additive manufacturing.
CO6	Understand the latest trends and business opportunities in additive manufacturing.

Course Name: Total Quality Management [21ME732]	
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.

Course Name: Refrigeration and Air-Conditioning [21ME733]	
CO1	Illustrate the principles, nomenclature and applications of refrigeration systems.
CO2	Explain vapour compression refrigeration system and identify methods for performance improvement
CO3	Study the working principles of air, vapour absorption, thermoelectric and steam-jet and thermo acoustic refrigeration systems.
CO4	Estimate the performance of air-conditioning systems using the principles of psychrometry.
CO5	Compute and Interpret cooling and heating loads in an air-conditioning system.
CO6	Identify suitable refrigerant for various refrigerating systems.

Course Name: MEMS and Microsystem Technology [21ME734]	
CO1	Explain MEMS Technology, Present, Future, and Challenges.
CO2	Explain micro-sensors, micro-actuators, their types, and applications.
CO3	Explain fabrication processes for producing micro-sensors and actuators.
CO4	Apply Reliability and Failure Analysis Testing.
CO5	Understand the operation of micro devices, microsystems, and their applications.
CO6	Design the micro devices and microsystems using the MEMS fabrication process.

Course Name: Design for Manufacturing & Assembly [21ME735]	
CO1	Have knowledge on design principles for manufacturability
CO2	Have knowledge Influencing factors on Design.
CO3	Have knowledge on Machining consideration while design.
CO4	Have knowledge on casting consideration while design.
CO5	Have knowledge on environment consideration while design
CO6	Have ability to understand contemporary issues and their impact on design for manufacturing and assembly.

Course Name: Advanced Vibrations and Condition Monitoring [21ME741]	
CO1	Identify & classify the vibration systems
CO2	Analyse the vibration parameters through different theoretical methods
CO3	Apply the knowledge of vibration measurement instruments and control system
CO4	Understand the sound generation and propagation arising through vibration.

Course Name: Theory and Design of IC Engines [21ME742]	
CO1	Understand various types of I.C. Engines, Cycles of operation and Identify fuel metering, fuel supply systems for different types of engines.
CO2	Understand combustion phenomena in SI and CI engines and Analyze the effect of various operating variables on engine performance.
CO3	Evaluate performance Analysis of IC Engine and Justify the suitability for different applications.
CO4	Understand the conventional and non-conventional fuels and effects of emission formation of IC engines, its effects, and the legislation standards.

Course Name: Advanced Turbomachines [21ME743]

CO1	Explain the various thermodynamic processes involved in turbomachines with the application of 1st and 2nd law of Thermodynamics and also apply of the concept of law of conservation of energy for the flow through nozzle and diffuse
CO2	Demonstrate the concept of two-dimensional cascading and evaluating the cascade performance in compressor and turbines.
CO3	Explain the thermodynamics of axial flow turbines and analyse its performance and characteristics.
CO4	Explain the thermodynamics of axial flow compressor and fans and analyse its performance and characteristics.
CO5	Explain and apply the various vortex flow concepts for designing the blades and describe the process of control and maintenance aspects of turbomachines.

Course Name: Product Design & Ergonomics [21ME744]	
CO1	To learn the concept of product design and the ergonomics.
CO2	Design the various controls and displays by knowing the anthropometric data's.
CO3	To learn the psychology of visuals effects.
CO4	Learning the different colour combinations for optimal design of engineering equipment.
CO5	Realize the importance of environmental factors and aesthetics in industrial design.

Course Name: Non-Traditional Machining [21ME751]	
CO1	Understand the compare traditional and non-traditional machining process and recognize the need for Nontraditional 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.

Course Name: Hydraulics and Pneumatics [21ME752]	
CO1	Have knowledge of hydraulic and pneumatic system and its components.
CO2	Understand the working principle of various hydraulic and pneumatic components.
CO3	Apply working principles of Hydraulic and Pneumatic Systems for various applications.
CO4	Determine cause for hydraulic and pneumatic system break down and performance of hydraulic pumps, motors.

Course Name: Operations Research [21ME753]	
CO1	Understand the meaning, definitions, scope, need, phases and techniques of operations research.
CO2	Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method.
CO3	Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems
CO4	Solve problems on game theory for pure and mixed strategy under competitive environment. Solve waiting line problems for M/M/1 and M/M/K queuing models.
CO5	Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks
CO6	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3 machines, n jobs-m machines and 2 jobs-n machines using Johnson's algorithm.

DEPARTMENT OF CIVIL ENGINEERING

Course: Geodetic Engineering   **Course Code: C202**

	Course Outcomes
	After successful completion of the course, the student will be able to:
C202.1	Execute survey using compass and plane table.
C202.2	Find the level of ground surface and Calculation of area and volumes
C202.3	Operate theodolite for field execution
C202.4	Estimate the capacity of reservoir
C202.5	Interpret satellite imageries

Course: Strength of Materials   **Course Code: C203**

	Course Outcomes
	After successful completion of the course, the student will be able to:
C203.1	Evaluate the behaviour when a solid material is subjected to various types of forces (namely Compressive, Tensile, Thermal, Shear, flexure, Torque, internal fluid pressure) and estimate stresses and corresponding strain developed. (L3)
C203.2	Estimate the forces developed and draw schematic diagram for stresses, forces, moments for simple beams with different types of support and are subjected to various types of loads (L3).
C203.3	Evaluate the behaviour when a solid material is subjected to Torque and internal fluid pressure and estimate stresses and corresponding strain developed. (L3)
C203.4	Distinguish the behaviour of short and long column and calculate load at failure & explain the behaviour of spring to estimate deflection and stiffness (L3)
C203.5	Examine and Evaluate the mechanical properties of various materials under different loading conditions

Course: Earth Resources and Engineering   **Course Code: C204**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C204.1	Apply geological knowledge in different civil engineering practice.
C204.2	Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials.
C204.3	Competent enough to provide services for the safety, stability, economy and life of the structures that they construct.
C204.4	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems.
C204.5	Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering for safe and solid construction.

Course: Computer Aided Building Planning and Drawing   **Course Code: C205**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C205.1	Prepare, read and interpret the drawings in a professional set up.

C205.2	Know the procedures of submission of drawings and Develop working and submission drawings for building.
C205.3	Plan and design of residential or public building as per the given requirements.

Course: Engineering Geology   **Course Code: C206**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C206.1	Apply geological knowledge in different civil engineering practice.
C206.2	Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials.
C206.3	Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct.
C206.4	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems.
C206.5	Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering construction.

Course: Computer Aided Building Planning & Drawing   **Course Code: C207**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C207.1	Prepare, read and interpret the drawings in a professional set up.
C207.2	Know the procedures of submission of drawings and Develop working and submission drawings for building.
C207.3	Plan and design a residential or public building as per the given requirements.

Course: Building Materials Testing Laboratory   **Course Code: C208**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C208.1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
C208.2	Identify, formulate and solve engineering problems of structural elements Courseed to flexure.
C208.3	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.

Course: Analysis of Determinate Structures   **Course Code: C211**

	Course Outcomes
	After studying this course, students will be able to:
C211.1	Identify different forms of structural systems.
C211.2	Construct ILD and analyse the beams and trusses subjected to moving loads
C211.3	Applying knowledge of science and mathematics to understand the energy principles and energy theorems and its applications to determine the deflections of trusses and beams.

C211.4	Determine the stress resultants in arches and cables

Course: Applied Hydraulics   **Course Code: C212**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C212.1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters
C212.2	Design the open channels of various cross sections including economical channel sections
C212.3	Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,
C212.4	Compute water surface profiles at different conditions
C212.5	Design turbines for the given data, and to know their operation characteristics under different operating conditions

Course: Concrete Technology   **Course Code: C213**

	Course Outcomes
	After studying this course, students will be able to:
C213.1	Relate material characteristics and their influence on microstructure of concrete.
C213.2	Distinguish concrete behavior based on its fresh and hardened properties.
C213.3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
C213.4	Adopt suitable concreting methods to place the concrete based on requirement.
C213.5	Select a suitable type of concrete based on specific application

Course: Advanced Surveying   **Course Code: C214**

	Course Outcomes
	On the completion of this course students are expected to attain the following outcomes;
C214.1	Apply the knowledge of geometric principles to arrive at surveying problems
C214.2	Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems.
C214.3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments;
C214.4	Design and implement the different types of curves for deviating type of alignments.

Course: Water Supply & Treatment Engineering   **Course Code: C215**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C215.1	Estimate average and peak water demand for a community.
C215.2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.

C215.3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
C215.4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

Course: Engineering Geology Laboratory   **Course Code: C216**

	Course Outcomes
	During the course of study students will develop understanding of:
C216.1	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.
C216.2	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.
C216.3	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.
C216.4	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.
C216.5	The students will be able to identify the different structures in the field.

Course: Fluid Mechanics and Hydraulic Machines Laboratory   **Course Code: C217**

	Course Outcomes
	During this course, students will develop expertise in
C217.1	Properties of fluids and the use of various instruments for fluid flow measurement
C217.2	Working of hydraulic machines under various conditions of working and their characteristics.

Course: Construction Management & Entrepreneurship   **Course Code: C301**

	Course Outcomes
	After studying this course, students will be able to:
C301.1	Apply planning and it's scheduling by project tools in construction management process.
C301.2	Analyze the concept of resource and material management, productivity of labour and productivity of construction equipment.
C301.3	apply the knowledge on the quality, safety and human values for the effective construction management process.
C301.4	Calculate the economics of alternatives and evaluate benefits and profits of a construction equipment based on monetary value and time value.
C301.5	Apply the concept of entrepreneurship and its role in infrastructural development.

Course: Analysis of Indeterminate Structures Course Code: C302

	Course Outcomes
	After studying this course, students will be able to:
C302.1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope defection method
C302.2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.
C302.3	Construct the bending moment diagram for beams and frames by Kani's method.
C302.4	Construct the bending moment diagram for beams and frames using flexibility method
C302.5	Analyze the beams and indeterminate frames by system stiffness method.

Course: Design of RC Structural Elements Course Code: C303

	Course Outcomes
	On the completion of this course students are expected to attain the following outcomes;
C303.1	Apply the design philosophy and principles in design
C303.2	Solve engineering problems of RC elements Courseed to flexure, shear and torsion.
C303.3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings.

Course: Basic Geotechnical Engineering Course Code: C304

	Course Outcomes
	After studying this course, students will be able to
C304.1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
C304.2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
C304.3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
C304.4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
C304.5	Capable of estimating load carrying capacity of single and group of piles

Course: Municipal Waste Water Engineering Course Code: C305

	Course Outcomes
	After studying this course, students will be able to:
C305.1	Select the appropriate sewer appurtenances and materials in sewer network.
C305.2	Design the sewers network and understand the self-purification process in flowing water.
C305.3	Design the varies physic- chemical treatment units

C305.4	Design the various biological treatment units 5. Design various AOPs and low-cost treatment units.

Course: Highway Engineering   **Course Code: C306**

	Course Outcomes
	After studying this course, students will be able to:
C306.1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data
C306.2	Evaluate and analyze the engineering properties of the materials and suggest the suitability of the same for pavement construction.
C306.3	Design road geometrics, structural components of pavement and drainage.
C306.4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.

Course: Surveying Practice   **Course Code: C307**

	Course Outcomes
	Students will be able to conduct appropriate laboratory/field experiments and interpret the results to determine
C307.1	Apply the basic principles of engineering surveying and for linear and angular measurements.
C307.2	Comprehend effectively field procedures required for a professional surveyor.
C307.3	Use techniques, skills and conventional surveying instruments necessary for engineering Practice

Course: Concrete and Highway Materials Laboratory   **Course Code: C308**

	Course Outcomes
	During this course, students will develop expertise in;
C308.1	Able to interpret the experimental results of concrete and highway materials based on laboratory tests.
C308.2	Determine the quality and suitability of cement.
C308.3	Design appropriate concrete mix Using Professional codes.
C308.4	Determine strength and quality of concrete.
C308.5	Evaluate the strength of structural elements using NDT techniques.
C308.6	Test the soil for its suitability as sub grade soil for pavements.

Course: Design of Steel Structural Elements   **Course Code: C310**

	Course Outcomes
	After studying this course, students will be able to:
C310.1	**Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behavior of structural steel.**
C310.2	**Understand the Concept of Bolted and Welded connections.**
C310.3	**Understand the Concept of Design of compression members, built-up columns and columns splices.**
C310.4	**Understand the Concept of Design of tension members, simple slab base and gusseted base.**
C310.5	**Understand the Concept of Design of laterally supported and un-supported steel beams.**

Course: Applied Geotechnical Engineering   **Course Code: C311**

	Course Outcomes
	After studying this course, students will be able to:
C311.1	**Ability to plan and execute geotechnical site investigation program for different civil engineering projects**
C311.2	**Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils**
C311.3	**Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures**
C311.4	**Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure**
C311.5	**Capable of estimating load carrying capacity of single and group of piles**

Course: Hydrology and Irrigation Engineering   **Course Code: C312**

	Course Outcomes
	After studying this course, students will be able to:
C312.1	**Apply the concept of hydrology, hydrological cycle, quantify the runoff and concept of unit hydrograph.**
C312.2	**Learn the methods of irrigation, irrigation procedure, application of water and water requirement for various crops.**
C312.3	**Learn to design the canal. Its alignment and reservoir capacity.**

Course: Alternate Building Materials   **Course Code: C315**

	Course Outcomes
	After studying this course, students will be able to:
C315.1	**Solve the problems of Environmental issues concerned to building materials and cost-effective building technologies;**
C315.2	**Select appropriate type of masonry unit and mortar for civil engineering constructions; also, they are able to Design Structural Masonry Elements under Axial Compression.**
C315.3	**Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.**
C315.4	**Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.**

Course: Software Application Laboratory   **Course Code: C324**

	Course Outcomes
	After studying this course, students will be able to:
C324.1	use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work

Course: Environmental Engineering Laboratory   **Course Code: C325**

	Course Outcomes
	After studying this course, students will be able to:
C325.1	Acquire capability to conduct experiments and estimate the concentration of different parameters.
C325.2	Compare the result with standards and discuss based on the purpose of analysis.
C325.3	Determine type of treatment, degree of treatment for water and waste water.
C325.4	Identify the parameter to be analyzed for the student project work in environmental stream.

Course: Extensive Survey Project/Camp   **Course Code: C326**

	Course Outcomes
	After studying this course, students will be able to:
C326.1	Apply Surveying knowledge and tools effectively for the projects
C326.2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.
C326.3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
C326.4	Professional etiquettes at workplace, meeting and general
C326.5	Establishing trust-based relationships in teams & organizational environment
C326.6	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques

Course: Quantity Surveying and Contracts Management   **Course Code: C401**

	Course Outcomes
	After studying this course, students will be able to:
C401.1	Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works
C401.2	Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works.
C401.3	Prepare the specifications and analyze the rates for various items of work
C401.4	Assess contract and tender documents for various construction works.
C401.5	Prepare valuation reports of buildings.

Course: Design of RCC and Steel Structures   **Course Code: C402**

	Course Outcomes
	After studying this course:
C402.1	Students will acquire the basic knowledge in design of RCC and Steel Structures.

C402.2	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members.

Course: Ground Water Hydraulics   **Course Code: C406**

	Course Outcomes
	After studying this course, students will be able to:
C406.1	Find the characteristics of aquifers.
C406.2	Estimate the quantity of ground water by various methods.
C406.3	Locate the zones of ground water resources.
C406.4	Select particular type of well and augment the ground water storage.

Course: Urban Transport Planning   **Course Code: C412**

	Course Outcomes
	After studying this course, students will be able to:
C412.1	Design, conduct and administer surveys to provide the data required for transportation planning.
C412.2	Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.
C412.3	Develop and calibrate modal split, trip generation rates for specific types of land use developments.
C412.4	Adopt the steps that are necessary to complete a long-term transportation plan.

Course: Computer Aided Detailing of Structures   **Course Code: C416**

	Course Outcomes
	After studying this course, students will be able to:
C416.1	Prepare detailed working drawings for RC and Steel Structures

Course: Geotechnical Engineering Laboratory   **Course Code: C417**

	Course Outcomes
	After studying this course, students will be able to:
C417.1	Physical and index properties of the soil
C417.2	Classify based on index properties and field identification
C417.3	To determine OMC and MDD, plan and assess field compaction program
C417.4	Shear strength and consolidation parameters to assess strength and deformation characteristics
C417.5	In-situ shear strength characteristics (SPT-Demonstration)

Course: Design of Pre-stressed Concrete   **Course Code: C419**

	Course Outcomes
	After studying this course, students will be able to:

C419.1	Relate the requirement of PSC members for present scenario by applying engineering fundamentals.
C419.2	Analyse the stresses encountered in PSC element during transfer and at working.
C419.3	Design of PSC beam after studying losses and for different requirements.
C419.4	Capable of analysing the PSC element and finding its efficiency.

Course: Pavement Design   **Course Code: C424**

	Course Outcomes
	After studying this course, students will be able to:
C424.1	Systematically generate and compile required data's for design of pavement (Highway & Airfield).
C424.2	Analyze stress, strain and deflection by boussinesq's, burmister's and westergaard's theory.
C424.3	Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001.
C424.4	Evaluate the performance of the pavement and also develops maintenance statement based on site specific requirements.

Course: Project Work   **Course Code: C425**

	Course Outcomes
	After studying this course, students will be able to:
C425.1	Describe the project and be able to defend it.
C425.2	Develop critical thinking and problem-solving skills.
C425.3	Learn to use modern tools and techniques.
C425.4	Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
C425.5	Develop skills to work in a team to achieve common goal.
C425.6	Develop skills of project management and finance.
C425.7	Develop skills of self-learning, evaluate their learning and take appropriate actions to improve it.
C425.8	Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.

Course: Technical Seminar   **Course Code: C426**

	Course Outcomes
	After studying this course, students will be able to:
C426.1	Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study.
C426.2	Identify and discuss the current, real-time issues and challenges in engineering & technology.
C426.3	Develop written and oral communication skills & Explore concepts in larger diverse social and academic contexts.
C426.4	Apply principles of ethics and respect in interaction with others & Develop the skills to enable life-long learning.

Course: Internship   **Course Code: C427**

	Course Outcomes
	After studying this course, students will be able to:
C427.1	**Explore career alternatives prior to graduation**
C427.2	**Analyze and integrate theory, practices**
C427.3	**Develop work habits by using modern tools and attitudes necessary for job success**
C427.4	**Develop communication, interpersonal and other critical skills in the job interview process**

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Course Outcomes for 2021 Scheme Courses	
Subject: PROBLEM-SOLVING THROUGH PROGRAMMING	**21PSP23/13**
1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
2	Apply programming constructs of C language to solve the real world problem
3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
5	Design and Develop Solutions to problems using modular programming constructs using functions
Subject: COMPUTER PROGRAMMING LABORATORY	**21CPL27/17**
1	Define the problem statement and identify the need for computer programming
2	Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming
3	Develop algorithm, flowchart and write programs to solve the given problem
4	Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.
5	5. Document the inference and observations made from the implementation
Subject: DATA STRUCTURES AND APPLICATIONS	**21CS32**
1	Identify different data structures and their applications.
2	Apply stack and queues in solving problems.
3	Demonstrate applications of linked list
4	Explore the applications of trees and graphs to model and solve the real-world problem.
5	Make use of Hashing techniques and resolve collisions during mapping of key value pairs
Subject: ANALOG AND DIGITAL ELECTRONICS	**21CS33**
1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
2	Explain the basic principles of A/D and D/A conversion circuits and develop the same
3	Simplify digital circuits using Karnaugh Map, and Quine-McClusky Methods
4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types
5	Develop simple HDL programs
Subject: COMPUTER ORGANIZATION AND ARCHITECTURE	**21CS34**
1	Explain the organization and architecture of computer systems with machine instructions and programs
2	Analyze the input/output devices communicating with computer system
3	Demonstrate the functions of different types of memory devices
4	Apply different data types on simple arithmetic and logical unit
5	Analyze the functions of basic processing unit, Parallel processing and pipelining
Subject: OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY	**21CSL35**
1	Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.
2	Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP
3	Demonstrate the ability to design and develop java programs, analyze, and interpret object-oriented data and document results
4	Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs
5	Develop user friendly applications using File I/O and GUI concepts
Subject: C++ PROGRAMMING	**21CS382**
1	Able to understand and design the solution to a problem using object-oriented programming concepts.
2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.
3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism

4	Identify and explore the Performance analysis of I/O Streams.
5	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

Subject: DESIGN AND ANALYSIS OF ALGORITHMS — 21CS42

1	Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm.
2	Apply divide and conquer approaches and decrease and conquer approaches in solving the problems analyze the same
3	Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem.
4	Apply and analyze dynamic programming approaches to solve some problems. and improve an algorithm time efficiency by sacrificing space.
5	Apply and analyze backtracking, branch and bound methods and to describe P, NP and NP-Complete problems

Subject :MICROCONTROLLER AND EMBEDDED SYSTEMS — 21CS43

1	Explain C-Compilers and optimization
2	Describe the ARM microcontroller's architectural features and program module.
3	Apply the knowledge gained from programming on ARM to different applications.
4	Program the basic hardware components and their application selection method.
5	Demonstrate the need for a real-time operating system for embedded system applications

Subject :OPERATING SYSTEMS — 21CS44

1	Identify the structure of an operating system and its scheduling mechanism.
2	Demonstrate the allocation of resources for a process using scheduling algorithm.
3	Identify root causes of deadlock and provide the solution for deadlock elimination
4	Explore about the storage structures and learn about the Linux Operating system.
5	Analyze Storage Structures and Implement Customized Case study

Subject : PYTHON PROGRAMMING LABORATORY — 21CSL46

1	Demonstrate proficiency in handling of loops and creation of functions.
2	Identify the methods to create and manipulate lists, tuples and dictionaries.
3	Discover the commonly used operations involving regular expressions and file system.
4	Interpret the concepts of Object-Oriented Programming as used in Python.
5	Determine the need for scraping websites and working with PDF, JSON and other file formats.

Subject : WEB PROGRAMMING — 21CSL481

1	Describe the fundamentals of web and concept of HTML.
2	Use the concepts of HTML, XHTML to construct the web pages.
3	Interpret CSS for dynamic documents.
4	Evaluate different concepts of JavaScript & Construct dynamic documents.
5	Design a small project with JavaScript and XHTML

Subject :UNIX SHELL PROGRAMMING — 21CS482

Course Outcomes for 2021 Scheme Courses	
1	Know the basics of Unix concepts and commands.
2	Evaluate the UNIX file system.
3	Apply Changes in file system.
4	Understand scripts and programs.
5	Analyze Facility with UNIX system process

Subject : AUTOMATA THEORY AND COMPILER DESIGN	21CS51	
1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation	
2	Design and develop lexical analyzers, parsers and code generators	
3	Design Grammars and Automata (recognizers) for different language classes and become Knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.	
4	Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers	
5	Design computations models for problems in Automata theory and adaptation of such model in the field of compilers	

Subject : COMPUTER NETWORKS	21CS52	
1	Learn the basic needs of communication system.	
2	Interpret the communication challenges and its solution.	
3	Identify and organize the communication system network components	
4	Design communication networks for user requirements.	

Subject : DATABASE MANAGEMENT SYSTEMS	21CS53	
1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS	
2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation	
3	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database	
4	Develop application to interact with databases, relational algebra expression	
5	Develop applications using tuple and domain relation expression from queries.	

Subject : ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	21CS54	
1	Apply the knowledge of searching and reasoning techniques for different applications.	
2	Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning.	
3	Apply the knowledge of classification algorithms on various dataset and compare results	
4	Model the neuron and Neural Network, and to analyze ANN learning and its applications.	
5	Identifying the suitable clustering algorithm for different pattern	

Subject : DATABASE MANAGEMENT SYSTEMS LABORATORY WITH MINI PROJECT	21CSL55	
1	Create, Update and query on the database.	
2	Demonstrate the working of different concepts of DBMS	
3	Implement, analyze and evaluate the project developed for an application	

Course Outcomes for 2021 Scheme Courses		
Subject : C# AND .NET FRAMEWORK		**21CS582**
1	Able to explain how C# fits into the .NET platform.	
2	Describe the utilization of variables and constants of C#	
3	Use the implementation of object-oriented aspects in applications.	
4	Analyze and Set up Environment of .NET Core.	
5	Evaluate and create a simple project application.	
Subject : SOFTWARE ENGINEERING & PROJECT MANAGEMENT		**21CS61**
1	Understand the activities involved in software engineering and analyze the role of various process models	
2	Explain the basics of object-oriented concepts and build a suitable class model using modeling techniques	
3	Describe various software testing methods and to understand the importance of agile methodology and DevOps	
4	Illustrate the role of project planning and quality management in software development	
5	Understand the importance of activity planning and different planning models	
Subject : FULLSTACK DEVELOPMENT		**21CS62**
1	Understand the working of MVT based full stack web development with Django.	
2	Designing of Models and Forms for rapid development of web pages.	
3	Analyze the role of Template Inheritance and Generic views for developing full stack web applications.	
4	Apply the Django framework libraries to render nonHTML contents like CSV and PDF.	
5	Perform jQuery based AJAX integration to Django Apps to build responsive full stack webapplications	
Subject : COMPUTER GRAPHICS AND FUNDAMENTALS OF IMAGE PROCESSING		**21IS63**
1	Construct geometric objects using Computer Graphics principles and OpenGL APIs.	
2	Use OpenGL APIs and related mathematics for 2D and 3D geometric Operations on the objects.	
3	Design GUI with necessary techniques required to animate the created objects	
4	Apply OpenCV for developing Image processing applications	
5	Apply Image segmentation techniques along with programming, using OpenCV, for developing simple applications.	
Subject : INTRODUCTION TO DATA STRUCTURES		**21IS651**
1	Express the fundamentals of static and dynamic data structure.	
2	Summarize the various types of data structure with their operations.	
3	Interpret various searching and sorting techniques.	
4	Choose appropriate data structure in problem solving.	
5	Develop all data structures in a high level language for problem solving.	
Subject : PROGRAMMING IN JAVA		**21CS654**
1	Develop JAVA programs using OOP principles and proper program structuring.	
2	Develop JAVA program using packages, inheritance and interface.	

	Course Outcomes for 2021 Scheme Courses	
3	Develop JAVA programs to implement error handling techniques using exception handling	
4	Demonstrate string handling concepts using JAVA	
Subject : COMPUTER GRAPHICS AND IMAGE PROCESSING LABORATORY		**21ISL66**
1	CO 1: Use openGL /OpenCV for the development of mini Projects.	
2	CO 2: Analyze the necessity mathematics and design required to demonstrate basic geometric transformation techniques.	
3	C0 3: Demonstrate the ability to design and develop input interactive techniques.	
4	C0 4: Apply the concepts to Develop user friendly applications using Graphics and IP concepts	
Subject : BIG DATA ANALYTICS		**21CS71**
1	Understand fundamentals and applications of Big Data analytics.	
2	CO 2. Investigate Hadoop framework, Hadoop Distributed File system and essential Hadoop tools.	
3	CO 3. Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data.	
4	CO 4. Demonstrate the MapReduce programming model to process the big data along with Hadoop Tools	
Subject : CLOUD COMPUTING		**21CS72**
1	Understand and analyze various cloud computing platforms and service provider.	
2	Illustrate various virtualization concepts.	
3	Identify the architecture, infrastructure and delivery models of cloud computing.	
4	Understand the Security aspects of CLOUD.	
5	Define platforms for development of cloud applications	
Subject : OBJECT ORIENTED MODELING AND DESIGN		**21CS731**
1	Describe the concepts of object-oriented and basic class modelling.	
2	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems..	
3	Choose and apply a befitting design pattern for the given problem.	
Subject : SOFTWARE ARCHITECTURE AND DESIGN PATTERNS		**21CS741**
1	Design and implement codes with higher performance and lower complexity	
2	Be aware of code qualities needed to keep code flexible	
3	Experience core design principles and be able to assess the quality of a design with respect to these principles.	
4	Capable of applying these principles in the design of object oriented systems.	
5	Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary.	
6	Be able to select and apply suitable patterns in specific contexts	
Subject : PROJECT		**21CSP76**
1	Able to find solutions to the problems by using research based knowledge	
2	Able to apply project management principles by following Software Development Life Cycle and indulge in life long learning	
3	Able to communicate effectively, write effective reports	

	Course Outcomes for 2021 Scheme Courses	
4	Able to apply modern tools in order to find the solutions	
5	Able to work individually as well as in team and follow ethics	

Subject : SEMINAR	21CS81
1	Students Explore to new technologies in the real world prior to graduation	
2	Identify, understand and discuss current, real-world issues	
3	To develop skills in presentation and discussion of seminar topic	

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Outcomes for 2021 Scheme Courses	
Subject: PROBLEM-SOLVING THROUGH PROGRAMMING	**21PSP23/13**
1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
2	Apply programming constructs of C language to solve the real world problem
3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
5	Design and Develop Solutions to problems using modular programming constructs using functions
Subject: COMPUTER PROGRAMMING LABORATORY	**21CPL27/17**
1	Define the problem statement and identify the need for computer programming
2	Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming
3	Develop algorithm, flowchart and write programs to solve the given problem
4	Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.
5	5. Document the inference and observations made from the implementation
Subject: DATA STRUCTURES AND APPLICATIONS	**21CS32**
1	Identify different data structures and their applications.
2	Apply stack and queues in solving problems.
3	Demonstrate applications of linked list
4	Explore the applications of trees and graphs to model and solve the real-world problem.
5	Make use of Hashing techniques and resolve collisions during mapping of key value pairs
Subject: ANALOG AND DIGITAL ELECTRONICS	**21CS33**
1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
2	Explain the basic principles of A/D and D/A conversion circuits and develop the same
3	Simplify digital circuits using Karnaugh Map, and Quine-McClusky Methods
4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types
5	Develop simple HDL programs
Subject: COMPUTER ORGANIZATION AND ARCHITECTURE	**21CS34**
1	Explain the organization and architecture of computer systems with machine instructions and programs
2	Analyze the input/output devices communicating with computer system
3	Demonstrate the functions of different types of memory devices
4	Apply different data types on simple arithmetic and logical unit
5	Analyze the functions of basic processing unit, Parallel processing and pipelining
Subject: OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY	**21CSL35**
1	Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.
2	Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP
3	Demonstrate the ability to design and develop java programs, analyze, and interpret object-

	oriented data and document results
4	Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs
5	Develop user friendly applications using File I/O and GUI concepts

Subject: C++ PROGRAMMING		**21CS382**
1	Able to understand and design the solution to a problem using object-oriented programming concepts.	
2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.	
3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism	
4	Identify and explore the Performance analysis of I/O Streams.	
5	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems	

Subject: DESIGN AND ANALYSIS OF ALGORITHMS		**21CS42**
1	Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm.	
2	Apply divide and conquer approaches and decrease and conquer approaches in solving the problems analyze the same	
3	Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem.	
4	Apply and analyze dynamic programming approaches to solve some problems. and improve an algorithm time efficiency by sacrificing space.	
5	Apply and analyze backtracking, branch and bound methods and to describe P, NP and NP-Complete problems	

Subject :MICROCONTROLLER AND EMBEDDED SYSTEMS		**21CS43**
1	Explain C-Compilers and optimization	
2	Describe the ARM microcontroller's architectural features and program module.	
3	Apply the knowledge gained from programming on ARM to different applications.	
4	Program the basic hardware components and their application selection method.	
5	Demonstrate the need for a real-time operating system for embedded system applications	

Subject :OPERATING SYSTEMS		**21CS44**
1	Identify the structure of an operating system and its scheduling mechanism.	
2	Demonstrate the allocation of resources for a process using scheduling algorithm.	
3	Identify root causes of deadlock and provide the solution for deadlock elimination	
4	Explore about the storage structures and learn about the Linux Operating system.	
5	Analyze Storage Structures and Implement Customized Case study	

Subject : PYTHON PROGRAMMING LABORATORY		**21CSL46**
1	Demonstrate proficiency in handling of loops and creation of functions.	
2	Identify the methods to create and manipulate lists, tuples and dictionaries.	
3	Discover the commonly used operations involving regular expressions and file system.	
4	Interpret the concepts of Object-Oriented Programming as used in Python.	
5	Determine the need for scraping websites and working with PDF, JSON and other file formats.	

Subject : WEB PROGRAMMING		**21CSL481**

Course Outcomes for 2021 Scheme Courses	
1	Describe the fundamentals of web and concept of HTML.
2	Use the concepts of HTML, XHTML to construct the web pages.
3	Interpret CSS for dynamic documents.
4	Evaluate different concepts of JavaScript & Construct dynamic documents.
5	Design a small project with JavaScript and XHTML

Subject : AUTOMATA THEORY AND COMPILER DESIGN	21CS51

1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation
2	Design and develop lexical analyzers, parsers and code generators
3	Design Grammars and Automata (recognizers) for different language classes and become Knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
4	Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers
5	Design computations models for problems in Automata theory and adaptation of such model in the field of compilers

Subject : COMPUTER NETWORKS	21CS52

1	Learn the basic needs of communication system.
2	Interpret the communication challenges and its solution.
3	Identify and organize the communication system network components
4	Design communication networks for user requirements.

Subject : DATABASE MANAGEMENT SYSTEMS	21CS53

1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation
3	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database
4	Develop application to interact with databases, relational algebra expression
5	Develop applications using tuple and domain relation expression from queries.

Subject : ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	21CS54

1	Apply the knowledge of searching and reasoning techniques for different applications.
2	Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning.
3	Apply the knowledge of classification algorithms on various dataset and compare results
4	Model the neuron and Neural Network, and to analyze ANN learning and its applications.
5	Identifying the suitable clustering algorithm for different pattern

Subject : DATABASE MANAGEMENT SYSTEMS LABORATORY WITH MINI PROJECT	21CSL55

1	Create, Update and query on the database.
2	Demonstrate the working of different concepts of DBMS
3	Implement, analyze and evaluate the project developed for an application

Subject : C# AND .NET FRAMEWORK	21CS582

1	Able to explain how C# fits into the .NET platform.

Course Outcomes for 2021 Scheme Courses	
2	Describe the utilization of variables and constants of C#
3	Use the implementation of object-oriented aspects in applications.
4	Analyze and Set up Environment of .NET Core.
5	Evaluate and create a simple project application.

Subject : SOFTWARE ENGINEERING & PROJECT MANAGEMENT	21CS61
1	Understand the activities involved in software engineering and analyze the role of various process models
2	Explain the basics of object-oriented concepts and build a suitable class model using modeling techniques
3	Describe various software testing methods and to understand the importance of agile methodology and DevOps
4	Illustrate the role of project planning and quality management in software development
5	Understand the importance of activity planning and different planning models

Subject : FULLSTACK DEVELOPMENT	21CS62
1	Understand the working of MVT based full stack web development with Django.
2	Designing of Models and Forms for rapid development of web pages.
3	Analyze the role of Template Inheritance and Generic views for developing full stack web applications.
4	Apply the Django framework libraries to render nonHTML contents like CSV and PDF.
5	Perform jQuery based AJAX integration to Django Apps to build responsive full stack webapplications

Subject : SOFTWARE TESTING	21IS63
1	Explain the significance of software testing and quality assurance in software development
2	Apply the concepts of software testing to assess the most appropriate testing method.
3	Analyze the importance of testing in software development.
4	Evaluate the suitable testing model to derive test cases for any given software
5	Develop appropriate document for the software artifact

Subject : DATA MINING AND DATA WAREHOUSING	21IS643
1	Understand warehousing architectures and tools for systematically organizing large database and use their data to make strategic decisions.
2	Apply KDD process for finding interesting pattern from warehouse
3	Analyze the kinds of patterns that can be discovered by association rule mining.
4	Evaluate interesting patterns from large amounts of data to analyze for predictions and classification.
5	Design select suitable methods for data mining and analysis

Subject : PROGRAMMING IN JAVA	21CS654
1	Develop JAVA programs using OOP principles and proper program structuring.
2	Develop JAVA program using packages, inheritance and interface.
3	Develop JAVA programs to implement error handling techniques using exception handling
4	Demonstrate string handling concepts using JAVA

Subject : SOFTWARE TESTING LABORATORY	21ISL66

	Course Outcomes for 2021 Scheme Courses
1	List out the requirements for the given problem and develop test cases for any given Problem.
2	Design and implement the solution for given problem and to design flow graph
3	Use Eclipse/NetBeans IDE and testing tools to design, develop, debug the Project and create appropriate document for the software artifact.
4	Use the appropriate functional testing strategies. Compare the different testing techniques.
5	Classify and Compare the problems according to a suitable testing model applying the test coverage metrics.

Subject : CRYPTOGRAPHY AND NETWORK SECURITY	21IS71

1	Understand Cryptography, Network Security theories, algorithms and systems
2	Apply different Cryptography and Network Security operations on different applications
3	Analyse different methods for authentication and access control
4	Evaluate Public and Private key, Key management, distribution and certification
5	Design necessary techniques to build protection mechanisms to secure computer networks

Subject : CLOUD COMPUTING	21CS72

1	Understand and analyze various cloud computing platforms and service provider.
2	Illustrate various virtualization concepts.
3	Identify the architecture, infrastructure and delivery models of cloud computing.
4	Understand the Security aspects of CLOUD.
5	Define platforms for development of cloud applications

Subject : OBJECT ORIENTED MODELING AND DESIGN	21CS731

1	Describe the concepts of object-oriented and basic class modelling.
2	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems..
3	Choose and apply a befitting design pattern for the given problem.

Subject : SOFTWARE ARCHITECTURE AND DESIGN PATTERNS	21CS741

1	Design and implement codes with higher performance and lower complexity
2	Be aware of code qualities needed to keep code flexible
3	Experience core design principles and be able to assess the quality of a design with respect to these principles.
4	Capable of applying these principles in the design of object oriented systems.
5	Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary.
6	Be able to select and apply suitable patterns in specific contexts

Subject : PROJECT	21ISP76

1	Able to find solutions to the problems by using research based knowledge
2	Able to apply project management principles by following Software Development Life Cycle and indulge in life long learning
3	Able to communicate effectively, write effective reports
4	Able to apply modern tools in order to find the solutions
5	Able to work individually as well as in team and follow ethics

Subject : SEMINMAR	21IS81

1	Students Explore to new technologies in the real world prior to graduation

Course Outcomes for 2021 Scheme Courses	
2	Identify, understand and discuss current, real-world issues
3	To develop skills in presentation and discussion of seminar topic

Semester :1/2

Subject Name: Scientific Foundations of Health	
Subject Code: BSFHK158/258	
C104.1	To understand Health and wellness (and its Beliefs).
C104.2	To acquire Good Health & It's balance for positive mindset.
C104.3	To inculcate and develop the healthy lifestyle habits for good health.
C104.4	To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world.
C104.5	To adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.
C104.6	To positively fight against harmful diseases for good health through positive mindset.
Subject Name: Innovation & Design Thinking	
Subject Code: BIDTK158/258	
C104.1	Appreciate various design process procedure.
C104.2	Generate and develop design ideas through different technique.
C104.3	Identify the significance of reverse Engineering to Understand products.
C104.4	Draw technical drawing for design ideas.

Course Outcomes (COs) for all courses from 3rd to 8th semester- 2018 Scheme

Semester :3

Subject Name: Unit Operations + Lab	
Subject Code:21BT32	
C202.1	Describe the nature and properties of fluids.
C202.2	Perform various flow measurements using different instruments.
C202.3	Explain the principles of various mechanicaloperations like size reductions, conveying equipment, sedimentation and mixing tanks.
C202.4	Illustrate the laws governing the heat and mass transfer operations.
C202.5	Analyze the construction details of heat and mass transfer equipment for specific requirements.
Subject Name: Biochemistry + Lab	
Subject Code: 21BT33	
C203.1	Explain the fundamentals of biologically important molecules such as structures, functions and interactions.
C203.2	Understand complex biochemical pathways within living cells and the associated metabolic disorders.
C203.3	Comprehend biochemical principles and apply them to biological systems/samples.
C203.4	Perform basic biochemical experiments, analyse, interpret and present the data.

Subject Name: Microbiology	
Subject Code:21BT34	
C204.1	Correlate the structure, function and metabolic pathways of microorganisms.
C204.2	Apply the principles of microbial culture for identifying the appropriate technique used in culture and characterization of microorganisms under aseptic conditions.
C204.3	Analyze the role of microorganisms in environmental protection, industrial applications and infectious diseases.
Subject Name: Microbiology Lab	
Subject Code: 21BTL35	
C205.1	Apply the theoretical knowledge and execute experiments pertaining to methods of sterilization, microbial identification and characterization.
C205.2	Apply the basic techniques of Microbiology in various experiments related to Agriculture, Food and Environment.
C205.3	Analyze the relationship of microbes with human health.
Semester: 4	
Subject Name: Python programming + Lab	
Subject Code: 21BT42	
C211.1	Develop algorithmic solutions to simple computational problems.
C211.2	Read, write, debug, execute simple Python programs.
C211.3	Structure simple Python programs for solving problems.
C211.4	Decompose a Python program into functions.
Subject Name: Cell Biology & Cell Culture Techniques + Lab	
Subject Code: 21BT43	
C212.1	Understand the cellular structures and their functions with emphasis on the cell cycle events.
C212.2	Apply the concepts of cell- cell signalling, transport of molecules and cell death in cell culture methods.
C212.3	Comprehend the applications of plant tissue culture techniques in Agriculture, Food and Medicine.
C212.4	Analyze the principles of animal cell culture in drug and toxicity testing.
Subject Name: Molecular biology & Genetic Engineering	
Subject Code:21BT44	
C213.1	Understand the basic concepts of genetic engineering for augmentation of traits.
C213.2	Apply and comprehend the principles of gene manipulation, expression and interaction of genes and proteins.
C213.3	Evaluate the screening and interaction studies using classical/conventional and high through put methods.
C213.4	Design the strategies for gene cloning and gene editing.

Subject Name: Molecular Biology & Genetic Engineering Lab	
Subject Code:21BTL46	
C215.1	Apply the principles of molecular biology and genetic engineering.
C215.2	Conduct experiments related to isolation, separation, quantification, digestion and amplification of nucleic acids.
C215.3	Interpret and discuss the outcome of the experiments formally through written reports.
Semester:5	
Subject Name: Biokinetics & Bioreaction Engineering	
Subject Code:21BT51	
C220.1	Detail the mechanism and kinetics of chemical, enzyme and microbial reactions.
C220.2	Identify and summarize the parameters from a range of reactions to optimize reactor design and development.
C220.3	Demonstrate the use of various scientific parameters to improve the performance of fermentation process.
C220.4	Formulate a suitable media for maximized microbial growth and product yields, by analyzing various parameters.
Subject Name: Immunotechnology + Lab	
Subject Code: 21BT52	
C221.1	Outline the molecular and cellular mechanisms involved in the development and regulation of the immune response.
C221.2	Detail the cause, challenges and treatment for Immune System Pathologies and Dysfunctions.
C221.3	Apply the major immunological laboratory techniques and their application to both clinical analysis and experimental research.
Subject Name: Structural Biology & Analytical Techniques	
Subject Code: 21BT53	
C222.1	Describe the structural aspects of macormoleucles like proteins, nucleic acids and biomembranes.
C222.2	Demonstrate their structure function hypothesis via suitable techniques.
C222.3	Apply the specific biophysical, spectroscopic, chromatographic techniques for various case studies.
Subject Name: Genomics, Proteomics And Bioinformatics	
Subject Code: 21BT54	
C223.1	Detail the basic concepts in Genomics, Proteomics and Bioinformatics.
C223.2	Demonstarte the applications of Genomics, Proteomics and Bioinformatics in biotechnology research.

C223.3	Apply various software tools used in Genomics, Proteomics and Bioinformatics for specific case studies.

Subject Name: Bioinformatics Lab	
Subject Code: 21BTL55	
C224.1	Comprehend the underlying concepts of Bioinformatics and their requirements.
C224.2	Detail the utilities of relevant online resources, databases and software tools for case-specific problems.
C224.3	Apply various software tools for diverse case-studies and analyze the results for optimized solutions.

DEPARTMENT OF MATHEMATICS

Course Outcomes (COs) - 2021 Scheme

Semester: 1	
Subject Name: Differential Calculus and Linear Algebra	
Subject Code: 21BS11	
CO.1	Apply the knowledge of nth derivatives, Mean value theorems and power series expansions
CO.2	Apply the knowledge of differentiation to the problems related to polar curves and applications to determine the curvature.
CO.3	Learn the notion of partial differentiation to understand the nature of multivariate functions and to solve the problems related to composite functions and Jacobian.
CO.4	Make use of matrix theory for testing the consistency of the system using rank and solving the system of linear equations.
CO.5	Compute the eigenvalues and eigenvectors required for the matrix diagonalization process.
Semester: 2	
Subject Name: Integral Calculus and Ordinary Differential Equations	
Subject Code: 21BS21	
CO.1	To understand the concept of integration to compute the physical applications in finding the area and volume of curves.
CO.2	Apply the knowledge of beta and gamma functions to evaluate the complicated integrals.
CO.3	To learn the solution techniques for solving first order ordinary differential equations .
CO.4	To learn the solution techniques of solving the higher order differential equations.
CO.5	Compute the eigenvalues and eigenvectors required for the matrix diagonalization process.

DEPARTMENT OF PHYSICS

SUB CODE : 21PHY12/22

SUB NAME: Engg. Physics

At the end of the course the student will able to:

CO's	Course Outcomes (COs)
CO1	Understand various types of oscillations and their implications, the role of Shock waves in various fields.
CO2	Compute Eigenvalues, Eigen functions, the momentum of atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation.
CO3	Apprehend the basics of laser & optical fiber with different types and their applications in various fields.
CO4	Understand electrical conductivity phenomena in solid materials.
CO5	Understand the various measurement techniques.

DEPARTMENT OF CHEMISTRY

SUB CODE : 21CHE12/22

SUB NAME: Engg. Chemistry

At the end of the course the student will able to:

CO's	Course Outcomes (COs)
CO1	Discuss the electrochemical energy systems such as electrodes and batteries
CO2	Explain the fundamental concepts of corrosion, its control and surface modification methods namely electroplating and electroless plating
CO3	Enumerate the importance, synthesis and applications of polymers. Understand properties and application of nanomaterials.
CO4	Describe the principles of green chemistry, understand properties and application alternative fuels.
CO5	Illustrate the fundamental principles of water chemistry, applications of volumetric and analytical instrument

Course Outcomes for different Subjects

2022-Scheme

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course Outcomes (COs) for all courses in 3rd semester - 2022 Scheme

Semester: 3	
Subject Name: AV Mathematics-III	
Subject Code: BMATEC301	
C201.1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory.
C201.2	To use Fourier transforms to analyze problems involving continuous-time signals
C201.3	To apply Z-Transform techniques to solve difference equations
C201.4	Understand that physical systems can be described by differential equations and solve such equations
C201.5	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data
Subject Name: Digital System Design using Verilog	
Subject Code:BEC302	
C202.1	Simplify Boolean functions using K-map and Quine-McCluskey minimization technique.
C202.2	Analyze and design for combinational logic circuits.
C202.3	Analyze the concepts of Flip Flops(SR, D,T and JK) and to design the synchronous sequential circuits using Flip Flops.
C202.4	Model Combinational circuits (adders, subtractors, multiplexers) and sequential circuits using Verilog descriptions.
Subject Name: Electronic Principles and Circuits	
Subject Code: BEC303	
C203.1	Understand the characteristics of BJTs and FETs for switching and amplifier circuits.
C203.2	Design and analyze amplifiers and oscillators with different circuit configurations and biasing conditions.
C203.3	Understand the feedback topologies and approximations in the design of amplifiers and oscillators.
C203.4	Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers.
C203.5	Understand the power electronic device components and its functions for basic power electronic circuits.
Subject Name: Network Analysis	
Subject Code: BEC304	

C204.1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star- delta transformation.
C204.2	Solve problems by applying Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
C204.3	Analyse the circuit parameters during switching transients and apply Laplace transform to solve the given network
C204.4	Evaluate the frequency response for resonant circuits and the network parameters for two port networks

Subject Name: Analog and Digital Systems Design Lab

Subject Code: BECL305

C205.1	Design and analyze the BJT/FET amplifier and oscillator circuits.
C205.2	Design and test opamp circuits to realize the mathematical computations, DAC and precision rectifiers.
C205.3	Design and test the combinational logic circuits for the given specifications.
C205.4	Test the sequential logic circuits for the given functionality.
C205.5	Demonstrate the basic circuit experiments using 555 timer.

Subject Name: Sensors and Instrumentation

Subject Code: BEC306B

C207.1	Understand the material properties required to make sensors
C207.2	Understand the principle of transducers for measuring physical parameters.
C207.3	Describe the manufacturing process of sensors
C207.4	Analyze the instrument characteristics and errors.
C207.5	Describe the principle of operation and develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.

Subject Name: Computer Organization and Architecture

Subject Code: BEC306C

C208.1	Explain the basic organization of a computer system.
C208.2	Describe the addressing modes, instruction formats and program control statement.
C208.3	Explain different ways of accessing an input/ output device including interrupts.
C208.4	Illustrate the organization of different types of semiconductor and other secondary storage memories.
C208.5	Illustrate simple processor organization based on hard wired control and micro-programmed control.

Subject Name: Social Connect & Responsibility

Subject Code: BSCK307

C209.1	Communicate and connect to the surrounding.
C209.2	Create a responsible connection with the society.

C209.3	Involve in the community in general in which they work.
C209.4	Notice the needs and problems of the community and involve them in problem –solving.
C209.5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems
C209.6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Subject Name: LabVIEW programming

Subject Code: BEC358A

C210.1	Use LabVIEW to create data acquisition, analysis and display operations
C210.2	Create user interfaces with charts, graph and buttons
C210.3	Use the programming structures and data types that exist in LabVIEW
C210.4	Use various editing and debugging techniques.

Subject Name: National Service Scheme (NSS)

Subject Code: BNSK359

C211.1	Understand the importance of his / her responsibilities towards society.
C211.2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
C211.3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
C211.4	Implement government or self-driven projects effectively in the field.
C211.5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in

Subject Name: Physical Education (PE) (Sports and Athletics)

Subject Code: BPEK359

C212.1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
C212.2	Familiarization of health-related Exercises, Sports for overall growth and development
C212.3	Create a foundation for the professionals in Physical Education and Sports
C212.4	Participate in the competition at regional/state / national / international levels.
C212.5	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

Subject Name: Yoga

Subject Code: BYOK359

C213.1	Understand the meaning, aim and objectives of Yoga.
C213.2	Perform Suryanamaskar and able to Teach its benefits.

C213.3	Understand and teach different Asanas by name, its importance, methods and benefits.
C213.4	Instruct Kapalabhati and its need and importance.
C213.5	Teach different types of Pranayama by its name, precautions, procedure and uses
C213.6	Coach different types of Kriyas , method to follow and usefulness.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Name: Mathematics-III for EE Engineering (BMATE 301)

At the end of the course student will be able to	
1	Understand that physical systems can be described by differential equations and solve such equations.
2	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data.
3	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing, and field theory.
4	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations.
5	Apply discrete and continuous probability distributions in analysing the probability models arising in the engineering field. Demonstrate the validity of testing the hypothesis.

Course Name: Electric Circuit Analysis (BEE302)

At the end of the course student will be able to	
1	Understand the basic concepts, basic laws and methods of analysis of DC and AC n e t wo r ks and reduce the complexity of network using source shifting, source transformation a n d n e t w o r kreduction u s i n g transformations.
2	Solve complex electric circuits using network theorems.
3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
4	Synthesize typical waveforms using Laplace transformation.
5	Solve unbalanced three phase systems and also evaluate the performance of two port networks.

Course Name: Analog Electronic Circuits (BEE303)

At the end of the course student will be able to	
1	To provide the knowledge for the analysis of transistor biasing and thermal stability circuits.
2	To develop skills to design the electronic circuits like amplifiers, power amplifiers and oscillators.
3	To understand the importance of FET and MOSFET and FET/MOSFET amplifiers.

Course Name: Transformers and Generators (BEE304)

At the end of the course student will be able to	
1	Explain the construction, working and various tests of single phase Transformer.
2	Explain the construction, working and parallel operation of three phase Transformer.
3	Explain the construction, working and analysis of Synchronous Generator.
4	Explain the construction, working of solar and wind power generators.

Course Name: Transformers and Generators Lab (BEEL305)

At the end of the course student will be able to

1	Conduct various tests on transformers and synchronous machines and evaluate their performance.
2	Perform the parallel operation on two single phase transformers.
3	Verify the performance of synchronous generator.
4	Calculate the voltage regulation of an alternator using different methods for comparison.

Course Name: DIGITAL LOGIC CIRCUITS (BEE 306A)	
At the end of the course student will be able to	
1	Explain the concept of combinational and sequential logic circuits and Analyse and design combinational circuits.
2	Describe and characterize flip flops and its applications.
3	Design the sequential circuits using SR, JK, D and T flip-flops and Melay and Moore applications.
4	Design applications of combinational and sequential circuits.
5	Employ the digital circuits for different applications.

Course Name: Electrical Measurements and Instrumentation (BEE 306B)	
At the end of the course student will be able to	
1	Explain the significance and methods of Measurements, elements of generalised measurement system and errors in measurements.
2	Measure resistance, inductance and capacitance by different methods.
3	Explain the construction, working and characteristics of various instrument transformers.
4	Explain the working of different electronic instruments and display devices.

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Course Outcomes for 2022 Scheme Courses	
Subject: Mathematics for Computer Science	**BCS301**

1	Explain the basic concepts of probability, random variables, probability distribution
2	Apply suitable probability distribution models for the given scenario
3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
4	Use statistical methodology and tools in the engineering problem-solving process.
5	Compute the confidence intervals for the mean of the population
6	Apply the ANOVA test related to engineering problems.

Subject: Digital Design and Computer Organization	**BCS302**
1	Apply the K–Map techniques to simplify various Boolean expressions.
2	Design different types of combinational and sequential circuits along with Verilog programs.
3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
4	Explain the approaches involved in achieving communication between processor and I/O devices.
5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

Subject: OPERATING SYSTEMS	**BCS303**
1	Explain the structure and functionality of operating system
2	Apply appropriate CPU scheduling algorithms for the given problem.
3	Analyse the various techniques for process synchronization and deadlock handling.
4	Apply the various techniques for memory management.
5	Explain file and secondary storage management strategies.
6	Describe the need for information protection mechanisms

Subject: DATA STRUCTURES AND APPLICATIONS	**BCS304**
1	Explain different data structures and their applications.
2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
3	Use the concept of linked list in problem solving.

Course Outcomes for 2022 Scheme Courses	
4	Develop solutions using trees and graphs to model the real-world problem.
5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

Subject: DATA STRUCTURES LABORATORY	BCSL305
1	Analyze various linear and non-linear data structures
2	Demonstrate the working nature of different types of data structures and their applications
3	Use appropriate searching and sorting algorithms for the give scenario.
4	Apply the appropriate data structure for solving real world problems

Subject: Object Oriented Programming with JAVA	BCS306A
1	Demonstrate proficiency in writing simple programs involving branching and looping structures.
2	Design a class involving data members and methods for the given scenario.
3	Apply the concepts of inheritance and interfaces in solving real world problems.
4	Use the concept of packages and exception handling in solving complex problem.
5	Apply concepts of multithreading, autoboxing and enumerations in program development.

Subject: Object Oriented Programming with c++	BCS306B

1 Illustrate the basic concepts of object-oriented programming

2 Design appropriate classes for the given real world scenario.

3 Apply the knowledge of compile-time / run-time polymorphism to solve the given problem

4 Use the knowledge of inheritance for developing optimized solutions

5 Apply the concepts of templates and exception handling for the given problem

6 Use the concepts of input output streams for file operations

Subject: Social Connect & Responsibility	BSCK307
1	Communicate and connect to the surrounding.
2	Create a responsible connection with the society.
3	Involve in the community in general in which they work..

Course Outcomes for 2022 Scheme Courses	
4	Notice the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Subject : Project Management with Git		BCS358C
1	Use the basics commands related to git repository	
2	Create and manage the branches	
3	Apply commands related to Collaboration and Remote Repositories	
4	Use the commands related to Git Tags, Releases and advanced git operations	
5	Analyse and change the git history	

DEPARTMENT OF MECHANICAL ENGINEERING

Semester - I

Course Name: Mathematics-I for Mechanical Engineering stream [BMATM101]	
CO1	Apply the knowledge of calculus to solve problems related to polar curves.
CO2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	Analyze the solution of linear and non-linear ordinary differential equations.
CO4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO5	Familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

Course Name: Applied Physics for ME Stream [BPHYM102/202]	
CO1	Elucidate the concepts in oscillations, waves, elasticity and material failures
CO2	Discuss the fundamentals of Thermoelectric materials and their application
CO3	Summarize the low temperature phenomena and generation of low temperature
CO4	Explain the various material characterization techniques
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Course Name: Applied Chemistry for Mechanical Engineering stream [BCHEM102/202]	
CO1	Identify the terms and applications processes involved in scientific and engineering
CO2	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3	Solve the problems in chemistry that are pertinent in engineering applications
CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5	Analyze properties and multi-disciplinary situations

Course Name: Elements of Mechanical Engineering [BEMEM103/203]	
CO1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
CO2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, refrigeration.
CO3	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics
CO4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.

Semester - II

Course Name: Mathematics-II for Mechanical Engineering stream [BMATM201]	
CO1	Apply the knowledge of multiple integrals to compute area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely Mathematica/Mat Lab/Python/Scilab

Course Name: Computer Aided Engineering Drawing [BCEDK103/203]	
CO1	Draw and communicate the objects with definite shape and dimensions
CO2	Recognize and Draw the shape and size of objects through different views
CO3	Develop the lateral surfaces of the object
CO4	Create a Drawing views using CAD software.
CO5	Identify the interdisciplinary engineering components or systems through its graphical representation.

Semester - III

Course Name: Mechanics of Materials [BME301]	
CO1	Understand the concepts of stress and strain in simple and compound bars.
CO2	Explain the importance of principal stresses and principal planes & Analyse cylindrical pressure vessels under various loadings
CO3	Apply the knowledge to understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
CO4	Evaluate stresses induced in different cross-sectional members subjected to shear loads
CO5	Apply basic equation of simple torsion in designing of circular shafts & Columns

Course Name: Manufacturing Process (IPCC) [BME302]	
CO1	Describe the casting process and prepare different types of cast products. Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, and Sand Slinger Moulding machines.
CO2	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces. Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
CO3	Understand the Solidification process and Casting of Non-Ferrous Metals.
CO4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing.
CO 5	Describe the methods of different joining processes and thermal effects in joining process

Course Name: Material Science and Engineering (IPCC) [BME303]	
CO1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
CO2	Understand the importance of phase diagrams and the phase transformations.
CO3	Explain various heat treatment methods for controlling the microstructure.
CO4	Correlate between material properties with component design and identify various kinds of defects.
CO5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.

Course Name: Basic Thermodynamics [BME304]	
CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
CO2	Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers.
CO3	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
CO4	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and Interpret the behaviour 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.

Course Name: Introduction to Modelling and Design for Manufacturing [BMEL305]	
CO1	Demonstrate their visualization skills.
CO2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies. Make component drawings.
CO3	Produce the assembly drawings using part drawings.
CO4	Engage in lifelong learning using sketching and drawing as communication tool.

Course Name: Electric and Hybrid Vehicle Technology [BME306A]	
CO1	Understand the architecture and vehicle dynamics of electric and hybrid vehicles
CO2	Analyze the power management systems for electric and hybrid vehicles
CO3	Understand different motor control strategies for electric and hybrid vehicles
CO4	Analyze various components of electric and hybrid vehicles with environment concern.
CO5	Understand the domain related grid interconnections of electric and hybrid vehicle.

Course Name: Smart Materials & Systems [BME306B]

CO1	Apply the knowledge for materials characterization
CO2	Evaluate the materials based on actuation
CO3	Select and justify appropriate materials for specific application

Course Name: Internet of Things [BME306C]	
CO1	Explain the definition and usage of the term "Internet of Things" in different contexts
CO2	Understand the key components that make up an IoT system
CO3	Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack
CO4	Apply the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis
CO5	Understand where the IoT concept fits within the broader ICT industry and possible future trends and Appreciate the role of big data, cloud computing and data analytics in a typical IoT system

Course Name: Waste Handling & Management [BME306D]	
CO1	Identify & segregate the waste
CO2	Formulate the appropriate waste segregation, collection & disposal system
CO3	Generate a report on waste management challenges
CO4	Select a remedial measure for environmental & living being protection
CO5	Exercise the constitution laws as a citizen

Course Name: Advanced Python Programming [BME358A]	
CO1	Develop algorithmic solutions to simple computational problems.
CO2	Develop and execute simple Python programs.
CO3	Use functions to decompose a Python program.
CO4	Process compound data using Python data structures.
CO5	Utilize Python packages in developing software applications.

Course Name: Introduction to Virtual Reality [BME358B]	
CO1	Describe how VR systems work and list the applications of VR.
CO2	Demonstrate the design and implementation of the hardware that enables VR systems to be built.
CO3	Understand the system of human vision and its implication on perception and rendering.
CO4	Explain the concepts of motion and tracking in VR systems.
CO5	Describe the importance of interaction and audio in VR systems.

Course Name: Spreadsheet for Engineers [BME358C]	
CO1	Create different plots and charts
CO2	Compute different functions, conditional functions and make regression analysis
CO3	Carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis
CO4	Carryout matrix operations
CO5	Understand VBA and UDF, VBA subroutines and Macros
CO6	Carryout numerical integration and solving differential equations using different methods

Course Name: Tools in Scientific Computing [BME358D]	
CO1	Understand the fundamentals of programming in scientific computations.
CO2	Develop programming for curve fitting and solving both linear and nonlinear equations.
CO3	Apply the concept of approximate methods and recognize their significance in computing.
CO4	Apply MATLAB/MATHCAD/FORTRAN/PYTHON tools, etc., for solving engineering problems

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course Outcomes for 2022 Scheme Course	
Subject: Principles of Programming using C	**BPOPS103/203**
1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
2	Apply programming constructs of C language to solve the real world problem
3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
5	Design and Develop Solutions to problems using modular programming constructs using functions
Subject: Introduction to Web Programming	**BPLCK105A/205A**
1	Explain the historical context and justification for HTML over XHTML
2	Develop HTML5 documents and adding various semantic markup tags
3	Analyse various attributes, values and types of CSS
4	Implement core constructs and event handling mechanisms of JavaScript.
Subject: Introduction to Python Programming	**BPLCK105B/205B**
1	Demonstrate proficiency in handling loops and creation of functions.
2	Identify the methods to create and manipulate lists, tuples and dictionaries.
3	Develop programs for string processing and file organization
4	Interpret the concepts of Object-Oriented Programming as used in Python.
Subject: Basics of Java Programming	**BPLCK105C/205C**
1	To explain the features and object oriented concepts in JAVA programming
2	To analyse working of bitwise operators in JAVA
3	To develop simple programs based on polymorphism and inheritance
4	To describe the concepts of importing packages and exception handling mechanism
Subject: Introduction to C++ Programming	**BPLCK105D/205D**
1	Able to understand and design the solution to a problem using object-oriented programming concepts.
2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.
3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism

Course Outcomes for 2022 Scheme Course	
4	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

Subject: Digital Design and Computer Organization	BCS302
1	Apply the K–Map techniques to simplify various Boolean expressions.
2	Design different types of combinational and sequential circuits along with Verilog programs.
3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
4	Explain the approaches involved in achieving communication between processor and I/O devices.
5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

Subject: OPERATING SYSTEMS	BCS303
1	Explain the structure and functionality of operating system
2	Apply appropriate CPU scheduling algorithms for the given problem.
3	Analyse the various techniques for process synchronization and deadlock handling.
4	Apply the various techniques for memory management.
5	Explain file and secondary storage management strategies.
6	Describe the need for information protection mechanisms

Subject: DATA STRUCTURES AND APPLICATIONS	BCS304
1	Explain different data structures and their applications.
2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
3	Use the concept of linked list in problem solving.
4	Develop solutions using trees and graphs to model the real-world problem.
5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

Subject: DATA STRUCTURES LABORATORY	BCSL305
1	Analyze various linear and non-linear data structures
2	Demonstrate the working nature of different types of data structures and their applications
3	Use appropriate searching and sorting algorithms for the give scenario.
4	Apply the appropriate data structure for solving real world problems

Course Outcomes for 2022 Scheme Course	
Subject: Data Analytics with R	**BCS306C**

1	Describe the structures of R Programming.
2	Illustrate the basics of Data Preparation with real world examples.
3	Apply the Graphical Packages of R for visualization.
4	Apply various Statistical Analysis methods for data analytics.

Subject: Social Connect & Responsibility	**BSCK307**

1	Communicate and connect to the surrounding.
2	Create a responsible connection with the society.
3	Involve in the community in general in which they work..
4	Notice the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Subject : Project Management with Git	**BCS358C**

1	Use the basics commands related to git repository
2	Create and manage the branches
3	Apply commands related to Collaboration and Remote Repositories
4	Use the commands related to Git Tags, Releases and advanced git operations
5	Analyse and change the git history

DEPARTMENT OF BIOTECHNOLOGY

Semester :1/2

Subject Name: Scientific Foundations of Health	
Subject Code: 21SFH19/29	
C104.1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
C104.2	Develop the healthy lifestyles for good health for their better future.
C104.3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.
C104.4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
C104.5	Prevent and fight against harmful diseases for good health through positive mindset.
Subject Name: Innovation & Design Thinking	
Subject Code: 21IDT19/29	
C104.1	Appreciate various design process procedure.
C104.2	Generate and develop design ideas through different technique.
C104.3	Identify the significance of reverse Engineering to Understand products.
C104.4	Draw technical drawing for design ideas.

Course Outcomes (COs) for all courses from 3rd to 8th semester- 2022 Scheme

Semester :3

Subject Name: Cell Biology and Genetics	
Subject Code:BBT301	
C201.1	Co-relate cellular structure-function relationship in the context of cell growth and death.
C201.2	Apply the concepts of cell signalling to biofilm formation.
C201.3	Apply the principles of Mendelian Genetics to understand gene interactions, multiple alleles and sexlinked inheritance.
C201.4	Apply principles of Chromosome structure and gene frequencies in the context of inherited disorders and population genetics.
Subject Name: Unit Operations + Lab	
Subject Code: BBT302	
C202.1	Describe the nature and properties of fluids.
C202.2	Perform various flow measurements using different instruments.
C202.3	Explain the Principles of various mechanical operations like size reductions, conveying equipment, sedimentation and mixing tanks
C202.4	Illustrate the laws governing the heat and mass transfer operations.
C202.5	Analyse the construction details of heat and mass transfer equipment for specific requirements.

Subject Name: Biochemistry + Lab	
Subject Code:BBT303	
C203.1	Explain the fundamentals of biologically important molecules such as structures, functions and interactions.
C203.2	Understand complex biochemical pathways within living cells and the associated metabolic disorders.
C203.3	Comprehend biochemical principles and apply them to biological systems/samples.
C203.4	Perform basic biochemical experiments, analyse, interpret and present the data.
Subject Name: Microbiology	
Subject Code:BBT304	
C204.1	Be able to classify microorganism along with their structural and functional roles.
C204.2	Apply learning of microscopy and microbial techniques in identification and enumeration.
C204.3	Identify microbes through use of appropriate culture, characterize them under given conditions and study the microbial growth along with its control.
C204.4	Describe and relate the occurrence of microbes caused diseases.
C204.5	Explain the occurrence and role of general microflora of air, water and soil.
Subject Name: Microbiology Lab	
Subject Code:BBTL305	
C205.1	Learn the basic techniques in Microbiology.
C205.2	Apply the knowledge and execute experiments on methods of sterilization, identification, and characterization of microbes.
C205.3	Observe and deduce conclusion of bacterial growth studies.
C205.4	Design and execute an experiment in basic microbiology.

DEPARTMENT OF CIVIL ENGINEERING

Course: Mathematics-I for Civil Engineering stream   **Course Code: BMATC101**

	Course Outcomes
	After successful completion of the course, the student will be able to:
CO1	apply the knowledge of calculus to solve problems related to polar curves
CO2	learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	analyze the solution of linear and nonlinear ordinary differential equations.
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

Course: Applied Physics for CV   **Course Code: BPHYC102/202**

	Course Outcomes
	After successful completion of the course, the student will be able to:
CO1	Elucidate the concepts in oscillations, waves, elasticity and material failures
CO2	Summarize concepts of acoustics in buildings and explain the concepts in radiation and photometry
CO3	Discuss the principles photonic devices and their application relevant to civil engineering.
CO4	Describe the various natural hazards and safety precautions.
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Course: Applied Chemistry for Civil Engineering stream   **Course Code: BCHEC202 /202**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
CO1	Identify the terms andapplications processes involved in scientific and engineering
CO2	Explainthephenomenaofchemistrytodescribethemethodsofengineeringprocesses
CO3	Solvefortheproblemsinchemistrythatarepertinentinengineeringapplications
CO4	Applythebasicconceptsofchemistrytoexplainthechemicalpropertiesandprocesses
CO5	Analyze properties and multidisciplinary situations processes associated with chemical substances

Course: STRENGTH OF MATERIALS   **Course Code: C202**

	Course Outcomes
	After successful completion of the course, the student will be able to:
C202.1	Evaluate the simple stresses, strains and compound stresses
C202.2	Calculate the Bending moments, shear force and draw BMD, SFD for various types of beams and loadings

C202.3	Analyse the bending stress, shear stress and torsional stress in beams and shafts with different cross sections
C202.4	Evaluate the deflection in beams and determine the stability of the columns.
C202.5	Evaluate the behaviour and strength of structural elements under the action of compound stresses and stresses in thin and thick cylinders.

Course: Engineering Survey   **Course Code: C203**

	Course Outcomes
	After successful completion of the course, the student will be able to:
C203.1	Summarize various types of surveying and carry out distance measurement using various equipment's
C203.2	Illustrate the use and applications of levelling and theodolite
C203.3	lot contours, longitudinal and cross sections for construction projects.
C203.4	Set curves for construction works and carry out estimation of areas and volumes
C203.5	Demonstrate the necessary skills to carry out GPS and DRONE Surveying

Course: ENGINEERING GEOLOGY   **Course Code: C204**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C204.1	Apply geological knowledge in different civil engineering practice
C204.2	Acquire knowledge on durability and competence of foundation rocks, and will be able to use the best building materials.
C204.3	become competent enough for the safety, stability, economy and life of the structures that they construct
C204.4	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems
C204.5	become Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering for safe and solid construction

Course: WATER SUPPLY AND WASTEWATER ENGINEERING   **Course Code: C205**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C205.1	Estimate the average and peak water demand for a community
C205.2	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
C205.3	Design the different units of water treatment plant.
C205.4	Design the various units of wastewater treatment plant
C205.5	Design of various AOPs and low cost treatment units.

Course: COMPUTER AIDED BUILDING PLANNING AND DRAWING
       Course Code: C206

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C206.1	Prepare, read and interpret the drawings in a professional set up.

C206.2	Know the procedures of submission of drawings and Develop working and submission drawings for building
C206.3	Plan of residential or public building as per the given requirements..

Course: Rural, Urban Planning and Architecture　　　　　**Course Code: C207**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C207.1	Understand importance of architecture in rural and urban planning
C207.2	Understand Influence of architecture
C207.3	Design infrastructure for rural and urban region
C207.4	Plan and design rural and urban roads

Course: Geospatial Techniques in Practice　　　　　**Course Code: C208**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C208.1	Comprehend different geospatial techniques in the Construction Industry.
C208.2	Understand the application of geospatial equipment like Total Station, GNSS, LIDAR, UAV (Drones), etc.,
C208.3	Evaluate the various spatial analysis operations by using GIS Environment
C208.4	Create a map layout with all essential cartographic elements in GIS Environment. 5. Illustrate the various geospatial emerging trends of GIS in Industry.

Course: Sustainable Design Concept for Building Services　　　　　**Course Code: C211**

	Course Outcomes
	After studying this course, students will be able to:
C211.1	Comprehend sustainable design, climatology, shading system and analyze heat transfer mechanism in buildings.
C211.2	Assess the design considerations and parameters for thermal comfort, visual comfort, indoor air quality and acoustics.
C211.3	Develop solutions for energy efficiency, water efficiency and waste management in buildings.
C211.4	Adopt green project management methodology and evaluate building life cycle assessment.
C211.5	Implement green practices during construction and operation phase of the buildings for achieving green rating

Course: Fire Safety in Buildings　　　　　**Course Code: C212**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C212.1	Understand types of fire, combustion process and fire resistance

C212.2	Plan for fire safety and design of lifts
C212.3	Design flow network in buildings
C212.4	Design of electrical systems and maintenance
C212.5	Perform health evaluation of buildings and suggest remedies

Course: Data analytics with Excel   **Course Code: C213**

	Course Outcomes
	After studying this course, students will be able to:
C213.1	Prepare the data sets and perform the analysis.
C213.2	Analyse and perform repetitive calculations using several functions
C213.3	Design and apply solutions to verify the data sets

Course: Smart Urban Infrastructure   **Course Code: C214**

	Course Outcomes
	On the completion of this course students are expected to attain the following outcomes;
C214.1	Understand the concept of smart city
C214.2	Play the role of a civil engineer in providing smart infrastructure
C214.3	Design efficient energy system for smart city
C214.4	Analyse and design efficient transport system

CourseProblem **Solving with PYTHON**   **Course Code: C215**

	Course Outcomes
	After a successful completion of the course, the student will be able to:
C215.1	Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
C215.2	Demonstrate proficiency in handling Strings and File Systems
C215.3	Represent compound data using Python lists, tuples, Strings, dictionaries
C215.4	Read and write data from/to files in Python Programs

Course: Personality Development for Civil Engineers   Course Code: C216

	Course Outcomes
	During the course of study students will develop understanding of:
C216.1	Use English as a medium of communication in interviews and in any professional working environment proficiently
C216.2	. Develop necessary skills to Answer common interview questions, express confidence in body language and present with clarity

Course: Personality Development for Civil Engineers
Code: C217

	Course Outcomes
	During the course of study students will develop understanding of:
C217.1	identify the different forms of structural systems and analyse the trusses
C217.2	Evaluate the slope and deflections in beams, frames and trusses by using moment area method and energy principle..
C217.3	Analyse and determine the stress resultants inarches and cables.
C217.4	Analyse the indeterminate structures and construct BMD AND SFD using slope deflection methods.
C217.5	Analyse the indeterminate structures and construct BMD AND SFD using Moment Distribution Method

Course: FLUID MECHANICS AND HYDRAULICS Code: C218

	Course Outcomes
	During the course of study students will develop understanding of:
C218.1	Explain the fundamental properties of fluids and solve problems on fluid pressure and hydrostatics.
C218.2	Apply the principles of kinematics and dynamics of fluid flow to solve problems on velocity and pressure.
C218.3	Compute the discharge through pipes, notches and weirs.
C218.4	Design the turbines and open channels of different sections and to estimate the energy loss in hydraulic jump.
C218.5	Able to interpret the experimental results of discharge, efficiency based on the test conducted in the laboratory

Course: TRANSPORTATION ENGINEERING   Code: C219

	Course Outcomes
	During the course of study students will develop understanding of:
C219.1	Explain the basic principles of geometric design in the context of transportation engineering and planning

C219.2	**Select the appropriate pavement materials for construction and design the pavement as per standard practices**
C219.3	**Conduct traffic studies and analyse traffic data for practical applications. 4**
C219.4	**Identify the Components parts of Railway Track and design the suitable runway for an Airport.**
C219.5	**Able to interpret the experimental results of highway materials based on laboratory tests and design the pavement as per IRC guidelines.**

Course: BUILDING MATERIALS LABORATORY   Code: C220

	Course Outcomes
	During the course of study students will develop understanding of:
C220.1	**Analyze the physical characteristics, and behavior of common building materials.**
C220.2	**Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion for steel**
C220.3	**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.**
C220.4	**Recognize the importance of ethical conduct, integrity, and accuracy in materials testing and reporting..**

Course: Construction Equipment, Plants and Machinery   **Code: C221**

	Course Outcomes
	During the course of study students will develop understanding of:
C221.1	Evaluate equipment and techniques required during construction
C221.2	Understand the operation of a batching plant.
C221.3	Analyse the equipment life cycle management.
C221.4	Comprehend mechanization and digitalisation in construction

Course: Concreting Techniques and Practices **Code: C222**

	Course Outcomes
	During the course of study students will develop understanding of:
C222.1	Evaluate the properties of concrete by conducting test on cement, aggregate and concrete (with & without admixtures) for using the data for Mix design procedures
C222.2	Understand to Select and proportionate different materials used in a concrete mix including admixtures
C222.3	Design a concrete mix as per requirement of construction project
C222.4	Apply the best practices in concrete construction from industry's requirement, thumb rules, mitigation of concreting issues at Sites.

Course: Watershed Management**Code: C223**

	Course Outcomes
	During the course of study students will develop understanding of:
C223.1	Discuss surface and ground water resources system and, human influences
C223.2	Integrate water resources system in arid and semi-arid regions and explain watershed aquifer for management.
C223.3	Analyse water resources related issues for conservation and synthesize augmentation of water resources.
C223.4	Design integrated watershed management system.
C223.5	Apply modern tools in watershed management.

Course: Finance for Professionals

Code: C224

	Course Outcomes
	During the course of study students will develop understanding of:
C224.1	Understand how their work and effort contribute to organizational financial performance
C224.2	2. Comprehend financial acumen and tools to optimize outcomes

GIS with Quantum GIS

	Course Outcomes
	During the course of study students will develop understanding of:
C225.1	Use open source software for civil engineering applications
C225.2	Various tools in QGIS software
C225.3	Create thematic layers with attribute data
C225.4	Generate maps for decision making

Course: Technical Writing Skills**Code: C226**

	Course Outcomes
	During the course of study students will develop understanding of:
C226.1	Effectively communicate in technical matters
C226.2	Practice preparation of gist, abstract and notes from a technical article.
C226.3	Prepare a business proposals and reports.
C226.4	Write and respond in social media and write blogs.

CSE (IOT & CYBERSECURITY INCLUDING BLOCKCHAIN TECTNOLOGY)

Course Outcomes for 2022 Scheme Courses

Subject: Mathematics for Computer Science	BCS301

1	Explain the basic concepts of probability, random variables, probability distribution
2	Apply suitable probability distribution models for the given scenario
3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
4	Use statistical methodology and tools in the engineering problem-solving process.
5	Compute the confidence intervals for the mean of the population
6	Apply the ANOVA test related to engineering problems.

Subject: Digital Design and Computer Organization	BCS302

1	Apply the K–Map techniques to simplify various Boolean expressions.
2	Design different types of combinational and sequential circuits along with Verilog programs.
3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
4	Explain the approaches involved in achieving communication between processor and I/O devices.
5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

Subject: OPERATING SYSTEMS	BCS303

1	Explain the structure and functionality of operating system
2	Apply appropriate CPU scheduling algorithms for the given problem.
3	Analyse the various techniques for process synchronization and deadlock handling.
4	Apply the various techniques for memory management.
5	Explain file and secondary storage management strategies.
6	Describe the need for information protection mechanisms

Subject: DATA STRUCTURES AND APPLICATIONS	BCS304

1	Explain different data structures and their applications.
2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
3	Use the concept of linked list in problem solving.

Course Outcomes for 2022 Scheme Courses	
4	Develop solutions using trees and graphs to model the real-world problem.
5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

Subject: DATA STRUCTURES LABORATORY		BCSL305
1	Analyze various linear and non-linear data structures	
2	Demonstrate the working nature of different types of data structures and their applications	
3	Use appropriate searching and sorting algorithms for the give scenario.	
4	Apply the appropriate data structure for solving real world problems	

Subject: Object Oriented Programming with JAVA		BCS306A
1	Demonstrate proficiency in writing simple programs involving branching and looping structures.	
2	Design a class involving data members and methods for the given scenario.	
3	Apply the concepts of inheritance and interfaces in solving real world problems.	
4	Use the concept of packages and exception handling in solving complex problem.	
5	Apply concepts of multithreading, autoboxing and enumerations in program development.	

Subject: Object Oriented Programming with c++	BCS306B
1 Illustrate the basic concepts of object-oriented programming	
2 Design appropriate classes for the given real world scenario.	
3 Apply the knowledge of compile-time / run-time polymorphism to solve the given problem	
4 Use the knowledge of inheritance for developing optimized solutions	
5 Apply the concepts of templates and exception handling for the given problem	
6 Use the concepts of input output streams for file operations	

Subject: Social Connect & Responsibility		BSCK307
1	Communicate and connect to the surrounding.	
2	Create a responsible connection with the society.	
3	Involve in the community in general in which they work..	

Course Outcomes for 2022 Scheme Courses	
4	Notice the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Subject : Project Management with Git		BCS358C
1	Use the basics commands related to git repository	
2	Create and manage the branches	
3	Apply commands related to Collaboration and Remote Repositories	
4	Use the commands related to Git Tags, Releases and advanced git operations	
5	Analyse and change the git history	

Subject : Cyber Crime & Cyber Laws		BCY358A
1	Describe various types of cyber crimes	
2	Illustrate various applications through which cyber crimes happens	
3	Explain various cyber laws related to the Indian IT Act.	

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Outcomes for 2022 Scheme Courses	
Subject: Principles of Programming using C	**BPOPS103/203**
1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
2	Apply programming constructs of C language to solve the real world problem
3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
5	Design and Develop Solutions to problems using modular programming constructs using functions
Subject: Introduction to Web Programming	**BPLCK105A/205A**
1	Explain the historical context and justification for HTML over XHTML
2	Develop HTML5 documents and adding various semantic markup tags
3	Analyse various attributes, values and types of CSS
4	Implement core constructs and event handling mechanisms of JavaScript.
Subject: Introduction to Python Programming	**BPLCK105B/205B**
1	Demonstrate proficiency in handling loops and creation of functions.
2	Identify the methods to create and manipulate lists, tuples and dictionaries.
3	Develop programs for string processing and file organization
4	Interpret the concepts of Object-Oriented Programming as used in Python.
Subject: Basics of Java Programming	**BPLCK105C/205C**
1	To explain the features and object oriented concepts in JAVA programming
2	To analyse working of bitwise operators in JAVA
3	To develop simple programs based on polymorphism and inheritance
4	To describe the concepts of importing packages and exception handling mechanism
Subject: Introduction to C++ Programming	**BPLCK105D/205D**
1	Able to understand and design the solution to a problem using object-oriented programming concepts.
2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.
3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism
4	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

Course Outcomes for 2022 Scheme Courses	
Subject: Digital Design and Computer Organization	**BCS302**

1	Apply the K–Map techniques to simplify various Boolean expressions.
2	Design different types of combinational and sequential circuits along with Verilog programs.
3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
4	Explain the approaches involved in achieving communication between processor and I/O devices.
5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

Subject: OPERATING SYSTEMS	**BCS303**
1	Explain the structure and functionality of operating system
2	Apply appropriate CPU scheduling algorithms for the given problem.
3	Analyse the various techniques for process synchronization and deadlock handling.
4	Apply the various techniques for memory management.
5	Explain file and secondary storage management strategies.
6	Describe the need for information protection mechanisms

Subject: DATA STRUCTURES AND APPLICATIONS	**BCS304**
1	Explain different data structures and their applications.
2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
3	Use the concept of linked list in problem solving.
4	Develop solutions using trees and graphs to model the real-world problem.
5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

Subject: DATA STRUCTURES LABORATORY	**BCSL305**
1	Analyze various linear and non-linear data structures
2	Demonstrate the working nature of different types of data structures and their applications
3	Use appropriate searching and sorting algorithms for the give scenario.
4	Apply the appropriate data structure for solving real world problems

Subject: Object Oriented Programming with JAVA	**BCS306A**

	Course Outcomes for 2022 Scheme Courses
1	Demonstrate proficiency in writing simple programs involving branching and looping structures.
2	Design a class involving data members and methods for the given scenario.
3	Apply the concepts of inheritance and interfaces in solving real world problems.
4	Use the concept of packages and exception handling in solving complex problem.
5	Apply concepts of multithreading, autoboxing and enumerations in program development.

Subject: Social Connect & Responsibility		**BSCK307**
1	Communicate and connect to the surrounding.	
2	Create a responsible connection with the society.	
3	Involve in the community in general in which they work..	
4	Notice the needs and problems of the community and involve them in problem –solving.	
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.	
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes	

Subject : Project Management with Git		**BCS358C**
1	Use the basics commands related to git repository	
2	Create and manage the branches	
3	Apply commands related to Collaboration and Remote Repositories	
4	Use the commands related to Git Tags, Releases and advanced git operations	
5	Analyse and change the git history	

DEPARTMENT OF MATHEMATICS
Course Outcomes (COs) - 2022 Scheme

Semester: 1	
Subject Name: Mathematics-I for Civil Engineering stream	
Subject Code: BMATC101	
CO.1	Apply the knowledge of calculus to solve problems related to polar coordinates
CO.2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions.
CO.3	Analyze the solution of linear and nonlinear ordinary differential equations.
CO.4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/PYTHON/SCILAB

Semester: 1	
Subject Name: Mathematics-I for Computer Science and Engineering stream	
Subject Code: BMATS101	
CO.1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO.2	Analyze the solution of linear and nonlinear ordinary differential equations.
CO.3	Get acquainted and to apply modular arithmetic to computer algorithms
CO.4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/PYTHON/SCILAB

Semester: 1	
Subject Name: Mathematics-I for Electrical & Electronics Engineering Stream	
Subject Code: BMATE101	
CO.1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO.2	Analyze the solution of linear and nonlinear ordinary differential equations.
CO.3	Apply the concept of change of order of integration and variables to evaluate multiple
CO.4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.

CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/PYTHON/SCILAB

Semester: 1

Subject Name: Mathematics-I for Mechanical Engineering stream

Subject Code: BMATM101

CO.1	Apply the knowledge of calculus to solve problems related to polar curves.
CO.2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO.3	Analyze the solution of linear and non-linear ordinary differential equations.
CO.4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/PYTHON/SCILAB

Semester: 2

Subject Name: Mathematics-II for Civil Engineering stream

Subject Code: BMATC201

CO.1	Apply the knowledge of multiple integrals to compute area and volume.
CO.2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO.3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/PYTHON/SCILAB

Semester: 2

Subject Name: Mathematics-II for Computer Engineering stream

Subject Code: BMATS201

CO.1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.
CO.2	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors. Orthogonal curvilinear coordinates.
CO.3	Demonstrate the idea of Linear dependence and independence of sets in the vector space and linear transformation
CO.4	Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.
CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB

Semester: 2

Subject Name: Mathematics-II for Electrical And Electronics Engineering stream

Subject Code: BMATE201

CO.1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO.2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO.3	To understand the concept of Laplace transform and to solve initial value problems.
CO.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO.5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/PYTHON/ SCILAB

Semester: 2

Subject Name: Mathematics-II for Mechanical Engineering stream

Subject Code: BMATM201

CO.1	Apply the knowledge of multiple integrals to compute area and volume
CO.2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO.3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena
CO.5	Get familiarize with modern mathematical tools namely Mathematica/MatLab/Python/Scilab

Semester: 3	
Subject Name: Mathematics-III for EE Engineering	
Subject Code: BMATE 301	
CO.1	Explain and measure errors in numerical computations
CO.2	Test for consistency and solve a system of linear equations.
CO.3	Construct a function which closely fits given n-points of an unknown function.
CO.4	Understand and apply the basic concepts related to solving problems by numerical differentiation and numerical integration.
CO.5	Use appropriate numerical methods to study phenomena modelled as partial differential equations
Semester: 3	
Subject Name: AV Mathematics-III for EC Engineering	
Subject Code: BMATEC301	
CO.1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory.
CO.2	To use Fourier transforms to analyze problems involving continuous-time signals
CO.3	To apply Z-Transform techniques to solve difference equations
CO.4	Understand that physical systems can be described by differential equations and solve such equations
CO.5	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data
Semester: 3	
Subject Name: Mathematics for Computer Science	
Subject Code: BCS301	
CO.1	Explain the basic concepts of probability, random variables, probability distribution
CO.2	Apply suitable probability distribution models for the given scenario.
CO.3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
CO.4	Use statistical methodology and tools in the engineering problem-solving process.

CO.5	Compute the confidence intervals for the mean of the population.
CO.6	Apply the ANOVA test related to engineering problems.

DEPARTMENT OF PHYSICS

SUB CODE : BPHYS102/202

SUB NAME: Engg. Physics for CSE Stream

At the end of the course the student will able to:

CO's	Course Outcomes (COs)
CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
CO3	Summarize the essential properties of superconductors and its applications in qubits.
CO4	Illustrate the application of physics in design and data analysis.
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

DEPARTMENT OF CHEMISTRY

SUB CODE : BCHEE102/202

SUB NAME: Engg. Chemistry

At the end of the course the student will able to:

CO's	Course Outcomes (COs)
CO1	Identify the terms and applications processes involved in scientific and engineering
CO2	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3	Solve the problems in chemistry that are pertinenting to engineering applications
CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5	Analyze properties and multi disciplinary situations processes associated with chemical substances in inter disciplinary situations.

DEPARTMENT OF MASTER IN BUSINESS ADMINISTRATION
PRINCIPLES OF MANAGEMENT AND ORGANISATIONAL BEHAVIOUR
SEMESTER-1
COURSE CODE: 22MBA11

Sl No.	Description	Blooms Level
CO1	Gain practical experience in the field of Management and Organisational Behaviour.	L1
CO2	Acquire conceptual knowledge of management, various functions of Management and theories in OB.	L3
CO3	Comprehend and apply management and behavioural models to relate attitude, perception and personality.	L2
CO4	Analyse the recent trends in Management and OB models.	L4

STATISTICS FOR MANAGERS
SEMESTER-I
COURSE CODE: 22MBA14

Sl No.	Description	Blooms Level
CO1	Understand how to organize, manage, and present the data	L2
CO2	Use and apply a wide variety of specific statistical tools	L3
CO3	Understand the applications of probability in business	L4
CO4	Effectively interpret the results of statistical analysis	L5
CO5	Develop competence of using computer packages to solve the problems	L6

OPERATIONS RESEARCH

SEMESTER-II

COURSE CODE: 22MBA24

Sl No.	Description	Blooms Level
CO1	Get an insight into the fundamentals of Operations Research and its definition, characteristics and phases	L1
CO2	Use appropriate quantitative techniques to get feasible and optimal solutions	L3
CO3	Understand the usage of game theory , Queuing Theory and Simulation for Solving Business Problems	L2
CO4	Understand and apply the network diagram for project completion	L4

STRATEGIC MANAGEMENT

SEMESTER-II

COURSE CODE: 22MBA25

Sl No.	Description	Blooms Level
CO1	Students should get clear idea about the concept of Strategic Management, its relevance, Characteristics, process nature and purpose.	L1
CO2	Student to acquire an understanding of how firms successfully institutionalize a strategy and create an organizational structure for domestic and overseas operations and gain competitive advantage.	L3
CO3	To give the students an insight on strategy at different levels of an organization to gain competitive advantage.	L2
CO4	To help students understand the strategic drive in multinational firms and their decisions in different markets.	L4

MANAGERIAL ECONOMICS

SEMESTER-II

COURSE CODE: 22MBA26

Sl No.	Description	Blooms Level
CO1	The student will understand the application of Economic Principles in Management decision making.	L2

CO2	The student will earn the microeconomic concepts and apply them for effective functioning of a Firm and Industry.	L3
CO3	The Student will be able to understand, assess and forecast the demand	L5
CO4	The student will apply the concepts of production and cost for optimization of production	L3
CO5	The student will design competitive strategies like pricing, product differentiation etc. and marketing according to the market structure	L6
CO6	The student will be able to understand the impact of macroeconomic concepts.	L2

3 RD SEMESTER MBA MARKETING ELECTIVES

CONSUMER BEHAVIOUR

COURSE CODE: 22MBAMM303

Sl No.	Description	Blooms Level
CO1	The students will be able understand the background and concepts of consumer behaviour	L1
CO2	The students will be able to identify the dynamics of consumer behaviour and the basic factors that influence the consumers decision process	L3
CO3	The students will be able to demonstrate how concepts may be applied to marketing strategy.	L2
CO4	Students will be able to apply and demonstrate theories to real world marketing situations by profiling and identifying marketing segments..	L4

ENTREPRENEURSHIP DEVELOPMENT

22MBA12

Sl. No.	Description	Blooms Level
CO1	Display keen interest and orientation towards entrepreneurship, entrepreneurial opportunity Modules in order to setup a business and to think creatively.	L6
CO2	To know about the various business models and B-Plans across Business sectors.	L3
CO3	Able to understand the importance of marketing and different forms of businesses.	L2
CO4	Become aware about various sources of funding and institutions supporting entrepreneurs.	L4
CO5	Awareness about legal aspects and ways to protect the ideas.	L2
CO6	To understand the ways of starting a business and to know how to foster their ideas.	L3

MARKETING MANAGEMENT

22MBA15

Sl. No.	Description	Blooms Level
CO1	Comprehend the concepts of Marketing Management.	L1
CO2	Gain knowledge on consumer behaviour and buying process	L3
CO3	Understand concept of Product and Brand Management, Branding and Pricing strategies	L2
CO4	Identify marketing channels and the concept of product distribution, techniques of sales promotion	L4
CO5	Simply ideas into a viable marketing plan for various modes of marketing	L4

HUMAN RESOURCE MANAGEMENT

22MBA21

Sl. No.	Description	Blooms Level
CO1	Understand and gain practical experience in the field of Human Resource Concepts, functions and theories.	L1
CO2	Acquire conceptual insight of Human Resource and various functions of HR.	L3
CO3	Apply personnel, managerial and welfare aspects of HR.	L2
CO4	Perceive greater understanding about HR practices.	L5
CO5	Perceive knowledge about the future trends in HRM	L5

MANAGERIAL ECONOMICS

22MBA26

Course outcomes
At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	The student will understand the application of Economic Principles in Management decision making.	L2
CO2	The student will earn the microeconomic concepts and apply them for effective functioning of a Firm and Industry.	L3
CO3	The Student will be able to understand, assess and forecast the demand.	L5
CO4	The student will apply the concepts of production and cost for optimization of production	L3
CO5	The student will design competitive strategies like pricing, product differentiation etc. and marketing according to the market structure.	L6
CO6	The student will be able to understand the impact of macroeconomic concepts.	L2

Information Technology for Managers

22MBA302

Course outcome

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the importance of Information technology for business.	2
CO2	Develop insights into technology and investigate its impact on Business.	3
CO3	Understand Various Measures of Technology available in corporate world.	2
CO4	Understanding how creativity and innovative Technologies help to find a solution to problems.	2

Sales and Retail Management

22MBAMM304

Course outcome

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the selling techniques in an organisation.	L2
CO2	Develop a plan for organizing, staffing & training sales force.	L3
CO3	Organize sales territories to maximize selling effectiveness.	L3
CO4	Evaluate sales management strategies.	L5
CO5	Find out the contemporary retail management issues and strategies.	L1
CO6	Evaluate the recent trends in retailing and its impact in the success of modern business.	L5
CO7	Understand Relate store management and visual merchandising practices for effective retailing.	L2

RECRUITMENT AND SELECTION

22MBAHR303

Sl. No.	Description	Blooms Level
CO1	Gain the practical insight of various principles and practices of recruitment and selection.	L2
CO2	Acquire knowledge of latest conceptual framework used in recruitment and selection process and procedure applied in various industries.	L2
CO3	Illustrate the application of recruitment and selection tools and techniques in various sectors.	L4
CO4	Develop a greater understanding about strategies for workforce planning and assessment, analyse the hiring management system followed in various industries.	L5

BUSINESS COMMUNICATION

Subject Code: 22MBA16

Sl. No.	Description	Blooms Level
CO1	The students will be aware of their communication skills and know their potential to become successful managers.	L1
CO2	The students will get enabled with the mechanics of writing and can compose the business letters in English precisely and effectively.	L3
CO3	The students will be introduced to the managerial communication practices in business those are in vogue.	L2
CO4	Students will get trained in the art of drafting business proposals and business communication with emphasis on analyzing business situations.	L4

Principles of Management and Organisational Behaviour

Subject Code: 22MBA11

Sl. No.	Description	Blooms Level
CO1	Gain practical experience in the field of Management and Organisational Behaviour.	L1
CO2	Acquire conceptual knowledge of management, various functions of Management and theories in OB.	L3
CO3	Comprehend and apply management and behavioural models to relate attitude, perception and personality.	L2
CO4	Analyse the recent trends in Management and OB models.	L4

HUMAN RESOURCE MANAGEMENT

Subject Code: 22MBA21

Sl. No.	Description	Blooms Level
CO1	Understand and gain practical experience in the field of Human Resource Concepts, functions and theories.	L1
CO2	Acquire conceptual insight of Human Resource and various functions of HR.	L3
CO3	Apply personnel, managerial and welfare aspects of HR.	L2
CO4	Perceive greater understanding about HR practices.	L5
CO5	Perceive knowledge about the future trends in HRM	L5

Research Methodology and IPR

Subject Code: 22MBA23

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand various research approaches, techniques and strategies in the appropriate in business.	2
CO2	Apply a range of quantitative / qualitative research techniques to business and day to day management problems.	3
CO3	Demonstrate knowledge and understanding of data analysis, interpretation and report writing.	2
CO4	Develop necessary critical thinking skills in order to evaluate different research approaches in Business.	3
CO5	Discuss various forms of the intellectual property, its relevance and business impact in the changing global business environment and leading International Instruments concerning IPR.	6

Industrial Relations And legislations

Subject Code: 22MBAHR204

Course outcome
At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Gain practical experience related to labour legislations in India across various sectors.	L2
CO2	Acquire conceptual knowledge of Industrial relations and labour laws followed within industries.	L2
CO3	Develop the greater understanding of IR concepts and its application in solving various issues in IR.	L4
CO4	Apply the IR and labour laws concepts in various industries in India.	L5

EXPLORATORY DATA ANALYSIS FOR BUSINESS

Subject Code: 22MBABA304

Course outcome :

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand Data Mining and its importance .	L2
CO2	Apply knowledge of research design for business problems	L3
CO3	Analyze the cause and effect relationship between the variables from the analysis	L4
CO4	Evaluate Regression and decision tree based methodsto solve business problems	L5

MARKETING MANAGEMENT

SEMESTER-1

COURSE CODE: 22MBA15

Sl No.	Description	Blooms Level
CO1	Comprehend the concepts of Marketing Management.	L1
CO2	Gain knowledge on consumer behaviour and buying process	L3
CO3	Understand concept of Product and Brand Management, Branding and Pricing strategies	L2
CO4	Identify marketing channels and the concept of product distribution, techniques of sales promotion	L4
CO5	Simply ideas into a viable marketing plan for various modes of marketing	L4

3 rd Semester MBA syllabus for Affiliated Colleges - Core Papers

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Course Code: 22MBA31

Sl No.	Description	Blooms Level
CO1	Demonstrate knowledge of the functions of logistics and supply chain management	L1/L2
CO2	Relate concepts and activities of the supply chain to actual organizations	L3
CO3	Analyse the role of technology in logistics and supply chain management.	L4
CO4	Evaluate cases for effective supply chain management and its implementation.	L4

3 RD SEMESTER MBA BUSINESS ANALYTICS ELECTIVES

INTRODUCTION TO PYTHON, DATA AND CONTROL SYSTEMS

COURSE CODE: 22MBABA303

Sl No.	Description	Blooms Level

CO1	Understand the concepts of python programming	L1
CO2	Structure a simple Python programs for solving problems.	L2
CO3	Apply the knowledge to decompose a Python program into functions..	L3
CO4	Analyse and Represent compound data using Python lists, tuples, dictionaries..	L4
CO5	Read and write data form/to files in Python Program	

Accounting for Managers: 22MBA13

Course outcome:

Sl. No.	Description	Blooms Level
CO1	Know what and how books of accounts and financial statements are prepared	L1
CO2	How to interpret financial statements of companies for decision making	L1
CO3	Independently undertake financial statement analysis and take decisions	L4,L6

FINANCIAL MANAGEMENT: 22MBA22

Course outcome:

Sl. No.	Description	Blooms Level
CO1	Understand the basic financial concepts	L2
CO2	Apply time value of money	L3
CO3	Evaluate the investment decisions	L5
CO4	Estimate working capital requirements	L4
CO5	Analyze the capital structure and dividend decisions	L3

FINANCE

Strategic Cost Management: 22MBAFM303

Course outcome:

Sl. No.	Description	Blooms Level
CO1	Understand the goals and strategies of business units	L2
CO2	Determine standard costing and variance analysis cost control in Business decision making	L5
CO3	Applications of Management accounting and control systems in Corporate	L3

| CO4 | Critically evaluate all traditional and non-traditional costing methods such as absorption costing; marginal costing and activity based costing | L5 |

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT: 22MBAFM304

Course outcome:

Sl. No.	Description	Blooms Level
CO1	Understand the capital market and various Instruments for Investment	L2
CO2	Assess the risk and return associated with investments and methods to value securities	L5
CO3	Analyze the Economy, Industry and Company framework for Investment	L4
CO4	Learn the theories of Portfolio management and also the tools and techniques for efficient portfolio management	L5

ADVANCED FINANCIAL MANAGEMENT: 22MBAFM305

Course outcome:

Sl. No.	Description	Blooms Level
CO1	Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure	L1
CO2	Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate & Analyse the complexities associated with management of cost of funds in the capital Structure	L3
CO3	Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems	L2
CO4	Be aware of the techniques of cash, inventory and receivables management	L4

Banking & Services Operations: 22MBAFM306

Course outcome:

Sl. No.	Description	Blooms Level
CO1	The Student will be acquainted to various Banking and Non-Banking financial services in India	L1
CO2	The Student will understand the activities of Merchant Banking and credit rating	L3
CO3	The Student will be equipped to understand micro financing and other financial services in India	L2
CO4	The Student will understand how to evaluate and compare leasing & hire purchase	L4

DEPARTMENT OF MCA

1st SEMESTER

Subject: Mathematical Foundation for Computer Applications		**Sub Code: 22MCA11**
	Course outcomes:	
CO1	Apply the fundamentals of set theory and matrices for the given problem.	
CO2	Solve the given problem by applying the Mathematical logic concepts	
CO3	Determine the types of relations and use them in problem solving.	
CO4	Apply the types of distribution, evaluate the mean and variance for the given case study/ problem.	
CO5	Model the given problem by applying the concepts of graph theory.	
Subject: Operating System Concepts		**Sub Code:22MCA12**

	Course outcomes:
CO1	Analyse the basic Operating System Structure and concept of Process Management
CO2	Analyse the given Synchronization/ Deadlock problem to solve and arrive at valid conclusions
CO3	Analyse OS management techniques and identify the possible modifications for the given problem context
CO4	Ability to design and solve synchronization problems.
CO5	Ability to simulate and implement operating system concepts such as scheduling, Deadlock management, file management, and memory management.

Subject: Data Structures with Algorithms   **Sub Code:22MCA13**

	Course outcomes:
CO1	Demonstrate different data structures, its operations using C programming.
CO2	Evaluate the Expressions like postfix, prefix conversions using stack.
CO3	Implement some applications of data structures like queue, linked list in a high-level language such as C
CO4	Understanding various searching & sorting techniques.
CO5	Implementing various data structures Trees and Graphs.

Subject : Computer Networks   **Sub Code: 22MCA14**

	Course outcomes:
CO1	Apply the basic concepts of networks like protocol, internet and OSI layers
CO2	Analyze the Physical Layer of 1 and 2
CO3	Demonstrate the various Switching networks
CO4	Analyze the Data Link Layer of 1 and 2

Subject: Design and Analysis of Algorithms   **Sub Code:22MCA15**

	Course outcomes:
CO1	Describe the basic algorithm design strategies and use them for devising new solutions to various problems
CO2	Analyse algorithms for time/space complexity
CO3	Differentiate between deterministic and probabilistic algorithms and use the probabilistic algorithms in appropriate scenarios

Subject: Data Structures with Algorithms Laboratory   **Sub Code:22MCAL16**

	Course outcomes:
CO1	Implement the techniques for evaluating the given expression.
CO2	Implement sorting / searching techniques, and validate input/output for the given problem.

CO3	Implement data structures (namely Stacks, Queues, Circular Queues, Linked Lists, and Trees), its operations and algorithms.
CO4	Implement the algorithm to find whether the given graph is connected or not and conclude on the performance of the technique implemented.

Subject: Computer Networks Laboratory   Sub Code:22MCAL17

	Course outcomes:
CO1	Implement data link layer farming methods.
CO2	Analyze error detection and error correction codes.
CO3	Implement and analyze routing and congestion issues in network design.
CO4	Implement Encoding and Decoding techniques used in presentation layer.
CO5	To be able to work with different network tools.

Subject: Research Methodology and IPR   Sub Code: 22RMI18

	Course outcomes:
CO1	Identify the suitable research methods and articulate the research steps in a proper sequence for the given problem.
CO2	Carry out literature survey, define the problem statement and suggest suitable solution for the given problem and present in the format of the research paper (IEEE).
CO3	Analyse the problem and conduct experimental design with the samplings.
CO4	Perform the data collection from various sources segregate the primary and secondary data.
CO5	Apply some concepts/section of Copy Right Act /Patent Act /Cyber Law/ Trademark to the given case and develop – conclusions.

Subject: Basics of Programming & CO   Sub Code:22MCA110

	Course outcomes:
CO1	Demonstrate the key concepts introduced in C programming by writing and executing the programs.
CO2	Demonstrate the concepts of structures and pointers for the given application/problem.
CO3	Implement the single/multi-dimensional array for the given problem.
CO4	Demonstrate the application of logic gates in solving some societal/industrial problems.
CO5	Analyse how memory organization, operations, instruction sequencing and interrupts are useful in executing the given program.

Subject: Database Management System   Sub code : 22MCA21

	Course outcomes:
CO1	Analyse the new technologies that provide interactive devices and interfaces.

CO2	Apply the guidelines to develop the UID and evaluate for the given problem.
CO3	Apply the development methodologies with an analysis of the social impact and legal
CO4	Apply normalization techniques to improve the database design to the given problem.
CO5	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database

Subject :Object Oriented Programming using JAVA   Sub Code:22MCA22

	Course outcomes:
CO1:	Explain the concept of class and objects with access control to represent real world entities
CO2:	Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.
CO3:	Understand the abstract class, interface and package.
CO4:	Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally)
CO5:	Understand the process of graphical user interface design and implementation using AWT or swings.

Subject: Software Engineering   Sub Code:22MCA23

	Course outcomes:
CO1	Understand the basics of Professional Software Development, assess professional and ethical responsibility and apply the correct process models for software development.
CO2	Design a software system, component or process to meet desired needs within realistic constraints.

CO3	Use the techniques, skills, and modern engineering tools necessary for engineering Practice.
CO4	Design the static/dynamic models to meet application requirements of the given system and generate code (skeleton) using the modern tool.
CO5	Verify, validate, implement, apply and maintain software systems or parts of software systems.

Subject : WEB TECHNOLOGIES   **Sub Code:22MCA24**

	Course outcomes:
CO1	Apply the features JQuery for the given web based problem
CO2	Demonstrate the development of XHTML documents using JavaScript and CSS.
CO3	Illustrate the use of CGI and Perl programs for different types of server side applications.
CO4	Design and implement user interactive dynamic web based applications.
CO5	Demonstrate applications of Angular JS and JQuery for the given problem.

Subject:Data Mining and Business Intelligence   **Sub Code : 22MCA252**

	Course outcomes:
CO1	Analyse the concept of data warehouse, Business Intelligence and OLAP.
CO2	Demonstrate data pre-processing techniques and application of association rule mining Algorithms.
CO3	Apply various classification algorithms and evaluation of classifiers for the given Problem.
CO4	Analyse data mining for various business intelligence applications for the given problem.
CO5	Apply classification and regression techniques for the given problem.

Subject : User Interface Design   **Sub Code:22MCA254**

	Course outcomes:

CO1	Analyse the new technologies that provide interactive devices and interfaces.

Course Outcomes (COs) for all courses from 1st to 4th semester- 2020 Scheme

Semester : I **Year of study : I** **Subject Code: 20MCA11** **Subject Name: - DATA STRUCTURES WITH ALGORITHMS**	
C101.1	Demonstrate different data structures, its operations using C programming.
C101.2	Analyse the performance of Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques.
C101.3	Implement some applications of data structures in a high-level language such as C/C++
C101.4	Design and apply appropriate data structures for solving computing problems.
C101.5	Compute the efficiency of algorithms in terms of asymptotic notations for the given problem.
Semester : I **Year of study : I** **Subject Code: 20MCA12** **Subject Name: - Operating System with UNIX**	
C102.1	Analyse the basic Operating System Structure and concept of Process Management
C102.2	Analyse the given Synchronization/ Deadlock problem to solve and arrive at valid conclusions.
C102.3	Analyse OS management techniques and identify the possible modifications for the given problem context.
C102.4	Demonstrate the working of basic commands of Unix environment including file processing
C102.5	Demonstrate the usage of different shell commands, variable and AWK filtering to the given problem
Semester : I **Year of study : I** **Subject Code: 20MCA13** **Subject Name: - Computer Networks**	
C103.1	Apply the basic concepts of networking and to analyse different parameters such as bandwidth, delay, throughput of the networks for the given problem.
C103.2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication
C103.3	Analyse the networking concepts of TCP/IP for wired and wireless components
C103.4	Identify the issues of Transport layer to analyse the congestion control mechanism

	Design network topology with different protocols and analyse the performance using NS2
C103.5	

Semester : I **Year of study : I** **Subject Code: 20MCA14** **Subject Name: - Mathematical Foundation for Computer Applications**	
C104.1	Apply the fundamentals of set theory and matrices for the given problem.
C104.2	Solve the given problem by applying the Mathematical logic concepts
C104.3	Determine the types of relations and use them in problem solving.
C104.4	Apply the types of distribution, evaluate the mean and variance for the given case study/ problem.
C104.5	Model the given problem by applying the concepts of graph theory.

Semester : I **Year of study : I** **Subject Code: 20MCA15** **Subject Name: - Research Methodology and IPR**	
C105.1	Identify the suitable research methods and articulate the research steps in a proper sequence for the given problem.
C105.2	Carry out literature survey, define the problem statement and suggest suitable solution for the given problem and present in the format of the research paper (IEEE).
C105.3	Analyse the problem and conduct experimental design with the samplings.
C105.4	Perform the data collection from various sources segregate the primary and secondary data
C105.5	Apply some concepts/section of Copy Right Act /Patent Act /Cyber Law/Trademark to the given case and develop –conclusions

Semester : I **Year of study : I** **Subject Code: 20MCA16** **Subject Name: - Data Structures Laboratory**	
C106.1	Implement sorting / searching techniques, and validate input/output for the given problem.
C106.2	Implement data structures (namely Stacks, Queues, Circular Queues, Linked Lists, and Trees), its operations and algorithms.
C106.3	Implement the algorithm to find whether the given graph is connected or not and conclude on the performance of the technique implemented.
C106.4	Design and apply appropriate data structures for solving computing problems
C106.5	Implement the techniques for evaluating the given expression.

Semester : I **Year of study : I**	

Subject Code: 20MCA17	
Subject Name: - Unix Programming Lab	
C107.1	Demonstrate the working of basic commands of Unix environment including file processing
C107.2	Apply Regular expression to perform pattern matching using utilities like grep,sed and awk.
C107.3	Implement unix commands/ system calls to demonstrate process management
C107.4	Demonstrate the usage of different shell commands, variable and AWK filtering to the given problem.
C107.5	Develop shell scripts for developing the simple applications to the given problem.
Semester : I **Year of study : I** **Subject Code: 20MCA18** **Subject Name: - Computer Networks Lab**	
C108.1	Apply the basic concepts of networking and to analyse different parameters such as bandwidth, delay, throughput of the networks for the given problem.
C108.2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication
C108.3	Analyse the networking concepts of TCP/IP for wired and wireless components
C108.4	Identify the issues of Transport layer to analyse the congestion control mechanism
C108.5	Design network topology with different protocols and analyse the performance using NS2
Semester : I **Year of study : I** **Subject Code: 20MCA19** **Subject Name: - Basics of Programming and Computer Organization**	
C109.1	Demonstrate the key concepts introduced in C programming by writing and executing the programs.
C109.2	Demonstrate the concepts of structures and pointers for the given application/problem.
C109.3	Implement the single/multi-dimensional array for the given problem.
C109.4	Demonstrate the application of logic gates in solving some societal/industrial problems.
C109.5	Analyse how memory organization, operations, instruction sequencing and interrupts are useful in executing the given program.
Semester : II **Year of study : I** **Subject Code: 20MCA21** **Subject Name: - Database Management System**	
C110.1	Apply the basic concepts of database management in designing the database for the given problem.
C110.2	Design entity-relationship diagrams to the given problem to develop database application with appropriate fields and validations.

C110.3	Implement a database schema for the given problem domain.
C110.4	Formulate and execute SQL queries to the given problem.
C110.5	Apply normalization techniques to improve the database design to the given problem.

Semester : II
Year of study : I
Subject Code: 20MCA22
Subject Name: - Object Oriented Programming with Java

C111.1	Demonstrate the basic programming constructs of Java and OOP concepts to develop Java programs for a given scenario.
C111.2	Illustrate the concepts of generalization and run time polymorphism applications to develop reusable components.
C111.3	Demonstrate the usage of Packages, Interfaces, Exceptions and Multithreading in building given applications.
C111.4	Apply Enumerations, Wrappers, Auto boxing, Collection framework and I/O operations for effective coding to the given problem.
C111.5	Implement the concepts of Applets, and networking using Java network classes for developing the distributed applications to the given problem.

Semester : II
Year of study : I
Subject Code: 20MCA23
Subject Name: - Web Technologies

C112.1	Apply the features JQuery for the given web based problem.
C112.2	Demonstrate the development of XHTML documents using JavaScript and CSS.
C112.3	Design and implement user interactive dynamic web based applications.
C112.4	Demonstrate applications of Angular JS and JQuery for the given problem

Semester : II
Year of study : I
Subject Code: 20MCA24
Subject Name: - Software Engineering

C113.1	Identify and define different requirements for the given problem and present in the IEEE format.
C113.2	Use modern tool to create dynamic diagrams to represent the design for the given problem.
C113.3	Draw class diagram , analyse the different types of association that exists as per the given problem and represent them using UML notations.
C113.4	Analyse the given system to identify actors, use cases to design use case diagrams for the given problem using RSA/open source tool.
C113.5	Design the static/dynamic models to meet application requirements of the given system and generate code (skeleton) using the modern tool.

Semester : II
Year of study : I
Subject Code: 20MCA252
Subject Name: - Data Mining with Business Intelligence

C115.1	Analyse the concept of data warehouse, Business Intelligence and OLAP
C115.2	Demonstrate data pre-processing techniques and application of association rule mining algorithms
C115.3	Apply various classification algorithms and evaluation of classifiers for the given problem
C115.4	Analyse data mining for various business intelligence applications for the given problem
C115.5	Apply classification and regression techniques for the given problem.

Semester : II
Year of study : I
Subject Code: 20MCA254
Subject Name: - User Interface Design

C117.1	Analyse the new technologies that provide interactive devices and interfaces.
C117.2	Apply the guidelines to develop the UID and evaluate for the given problem.
C117.3	Apply the development methodologies with an analysis of the social impact and legal issuesUnderstand Direct Manipulation and Virtual Environment
C117.4	Discuss the command, natural languages and issues in design for maintaining QoS
C117.5	Demonstrate techniques for information search and visualization for the given problem.

Semester : II
Year of study : I
Subject Code: 20MCA262
Subject Name: - Artificial Intelligence

C120.1	Identify problems that are amenable to solution by AI methods.
C120.2	Identify appropriate AI methods to solve a given problem.
C120.3	Formalize a given problem in the language/framework of different AI methods.
C120.4	Implement basic AI algorithms for the given problem.
C120.5	Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

Semester : II
Year of study : I
Subject Code: 20MCA263
Subject Name: - Mobile Application Development

C121.1	Develop effective user interfaces that leverage evolving mobile devices
C121.2	Develop applications using software development kits (SDKs), frameworks and toolkits
C121.3	Implement suitable methods to integrate database and server-side technologies

C121.4	Design and develop open source software based mobile application to the given problem.

Semester : II **Year of study : I** **Subject Code: 20MCA27** **Subject Name: - DataBase Management Systems Laboratory**	
C124.1	Design entity-relationship diagrams to solve given database applications
C124.2	Implement a database schema for a given problem.
C124.3	Formulate SQL queries in Oracle for the given problem
C124.4	Apply normalization techniques to improve the database design for the given problem.
C124.5	Build database and verify for its appropriate normalization for any given problem

Semester : II **Year of study : I** **Subject Code: 20MCA28** **Subject Name: - Java Programming Lab**	
C125.1	Demonstrate the fundamental data types and constructs of Java Programming by writing executable/interpretable programs.
C125.2	Illustrate the object oriented principles with the help of java programs.
C125.3	Develop reusable and efficient applications using inheritance and multi-threading concepts of java.
C125.4	Apply client-side programming and networking concepts to develop distributed applications.
C125.5	Write java programs to demonstrate the concepts of interfaces, inner classes and I/O streams.

Semester : II **Year of study : I** **Subject Code: 20MCA29** **Subject Name: - Web Technologies Laboratory**	
C126.1	Apply the concept and usages web based programming techniques.
C126.2	Learning and Developing XHTML documents using JavaScript and CSS.
C126.3	Design and implement user interactive dynamic web based applications.
C126.4	Evaluate the given web application and enhance it using latest web technologies.

Semester : III **Year of study : II** **Subject Code: 20MCA31** **Subject Name: - Data Analytics using Python**	
C201.1	Demonstrate basic data analytics principles and techniques
C201.2	Apply control structures to the given problems
C201.3	Apply the concepts of inheritance and overloading for a given problem.

C201.4	Demonstrate the concepts of learning and decision trees for a given problem
C201.5	Demonstrate the concepts of neural networks and genetic algorithms for a given problem.

Semester : III
Year of study : II
Subject Code: 20MCA32
Subject Name: - Internet of Things

C202.1	Analyse the IoT architecture and design along with functional/compute stack and data management.
C202.2	Apply IOT architecture for a given problem
C202.3	Analyse the application protocol, transport layer methods for the given business case.
C202.4	Analyse the application of data analytics for IOT for a given
C202.5	Analyse the architecture and develop programming using modern tools for the given use case

Semester : III
Year of study : II
Subject Code: 20MCA33
Subject Name: - Advances in Java

C203.1	Apply the concept of Servlet and its life cycle to create web application.
C203.2	Apply JSP tags and its services to web application.
C203.3	Create packages and interfaces in the web application context.
C203.4	Build Database connection for the web applications.
C203.5	Develop enterprise applications using Java Beans concepts for the given problem.

Semester : III
Year of study : II
Subject Code: 20MCA342
Subject Name: - Cloud Computing

C205.1	Demonstrate the system & software models and mechanisms that support cloud computing
C205.2	Classify various cloud services and their providers
C205.3	Compare various cloud deployment models
C205.4	Differentiate various types of computing environments
C205.5	Identify enabling technologies of cloud computing.

Semester : III
Year of study : II
Subject Code: 20MCA352
Subject Name: - Big data Analytics

C210.1	Identify the business problem for a given context and frame the objectives to solve it through data analytics tools.
C210.2	Apply various algorithms for handling large volumes of data.
C210.3	Illustrate the architecture of HDFS and explain functioning of HDFS clusters.
C210.4	Analyse the usage of Map-Reduce techniques for solving big data problems.
C210.5	Conduct experiment with various datasets for analysis / visualization and arrive at valid conclusions.

Semester : III
Year of study : II
Subject Code: 20MCA36
Subject Name: - Data Analytics Lab

C214.1	Develop python program to perform search/sort on a given data set
C214.2	Demonstrate object oriented principles
C214.3	Demonstrate data visualization using Numpy for a given problem
C214.4	Demonstrate regression model for a given problem
C214.5	Design and develop an application for the given problem

Semester : III
Year of study : II
Subject Code: 20MCA37
Subject Name: - Mini project with IOT Lab

C215.1	Demonstrate the IoT architecture design for a given problem
C215.2	Apply IOT techniques for a given problem
C215.3	Analyse the application protocol, transport layer methods for the given business case.
C215.4	Design and develop an application for the given problem for the societal/industrial problems
C215.5	Develop python program by applying suitable feature for the given problem and verify the output

Semester : III
Year of study : II
Subject Code: 20MCA38
Subject Name: - Advances in Java Lab

C216.1	Apply the concept of Servlet and its life cycle to create web application.
C216.2	Apply JSP tags and its services to web application.
C216.3	Create packages and interfaces in the web application context.
C216.4	Build Database connection for the web applications.
C216.5	Develop application programs using beans concept.

Semester : IV Year of study : II Subject Code: 20MCA41 Subject Name: -Advances in Web Technologies	
C217.1	Build the Web Applications using JQuery, PHP, XML for the given problem
C217.2	Design the Web Pages using AJAX for the given problem.
C217.3	Analyse the advances in Web2.0 and demonstrate its usage for the problem considered.
C217.4	Analyse the web services and demonstrate its usage for the problem considered.
C217.5	Design responsive web applications using Bootstrap for the given problem.

Semester : IV Year of study : II Subject Code: 20MCA42 Subject Name: - Programming using C#	
C218.1	Analyse C# and client-server concepts using .NetFrameWork Components.
C218.2	Apply delegates, event and exception handling to incorporate with ASP, WinForm, ADO.NET.
C218.3	Analyze the use of NetComponents depending on the problem statement
C218.4	Implement & develop a web based and Console based application with Database connectivity

Semester : IV Year of study : II Subject Code: 20MCA43 Subject Name: - Industry Internship	
C219.1	Analyse the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.
C219.2	Develop applications using modern tools and technologies.
C219.3	Demonstrate self-learning capabilities with an effective report and detailed presentation.

Semester : IV Year of study : II Subject Code: 20MCA44 Subject Name: - Project Work	
C220.1	Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
C220.2	Work as an individual and team to segregate work and execute/implement projects using appropriate tools.
C220.3	Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills.
C220.4	To conduct testing of application using appropriate techniques and tools.
C220.5	To enhance interpersonal skills and group cohesion among the peers during the project work

CO2	Apply the guidelines to develop the UID and evaluate for the given problem.
CO3	Apply the development methodologies with an analysis of the social impact and legal issues Understand Direct Manipulation and Virtual Environment.
CO4	Discuss the command, natural languages and issues in design for maintaining QoS.
CO5	Demonstrate techniques for information search and visualization for the given problem.

Subject: Mobile Application Development   **Sub Code :22MCA263**

CO1	Understand the various concepts of mobile communication and computing with capabilities, limitations.
CO2	Install and configure Android application development tools.
CO3	Understand the Android components and simple animation
CO4	Design and develop user Interfaces for the Android platform.
CO5	Creating webpages, maps, sms, email and publishing Android Applications

Subject : DBMS Laboratory   **Sub Code : 22MCAL27**

	Course outcomes:
CO1	Design entity-relationship diagrams to solve given database applications
CO2	Implement a database schema for a given problem.
CO3	Formulate SQL queries in Oracle for the given problem.
CO4	Apply normalization techniques to improve the database design for the given problem.
CO5	Build database and verify for its appropriate normalization for any given problem

Subject : JAVA programming Lab   **Sub code: 22MCAL28**

	Course outcomes:
C01	Demonstrate the fundamental data types and constructs of Java Programming by writing executable/interpretable programs.
C02	Illustrate the object oriented principles with the help of java programs.

CO3	Develop reusable and efficient applications using inheritance concepts of java.
CO4	Learn the object oriented concepts and its implementation in Java.