SEM1:

Department	Basic Science & Humanities
Course Code	BS-CH-101 [For EE]
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	CO1:Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. CO2: Rationalise bulk properties and processes using thermodynamic considerations. CO3: **:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities
Course Code	BS-M-102 (For EE)
Title of Course	Mathematics -IB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42

Course Out Come	CO1: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals.
	CO2: Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems.
	CO3: Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines.
	CO4: Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation.
	CO5: Understand the concept of determinant and learn different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems.

Department	EE
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	CO1: To understand and analyze basic electric and magnetic circuits. CO2: To study the working principles of electrical machines and power converters. CO3: To introduce the components of low voltage electrical installations.

Department	Basic Science & Humanities
Course Code	BS-CH-191 [For EE]
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical

Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. **CO2:** Rationalise bulk properties and processes using thermodynamic considerations. **CO3:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. **CO4:** Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electro negativity. **CO5:** List major chemical reactions that are used in the synthesis of molecules.

Department	For all B.Tech 1st year (EE, AEIE, ECE,CSE,IT,CE and ME)
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Laboratory
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: To learn about the operation, calibration and application of different electrical elements, instruments respectively and observe the constructional details of different electrical machines. CO2: To learn about the RLC circuit behaviour under AC and DC excitation. CO3: To learn about the characteristics features of a single-phase transformer CO4: To learn about three phase circuit analysis. CO5: To learn about the characteristic behaviours of different rotating electrical machines. CO6: To learn about the operation of different converters and LT switchgear.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Electrical Engineering
Course Code	ES-ME191
Title of Course	Engineering Graphics & Design
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P+1L
Total Contact Hours	48
Course Out Come	CO1: Introduction to engineering design and its place in society CO2: Exposure to the visual aspects of engineering design CO3: Exposure to engineering graphics standards CO4: Exposure to solid modelling

COURSE OUTCOME (CO)
SESSION: 2020-21

SEM2

Department	Basic Science & Humanities
Course Code	BS-PH-201 [For EE]
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	44
Course Out Come	CO1: Ability to know the basic concepts of mechanics and oscillation.
	CO2: Elaborate the concept of optics and introduction to the principle of laser.
	CO3: Ability to understand electromagnetism, dielectric and magnetic properties of materials.
	CO4: Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation.
	CO5: Understand the basic concept of Statistical mechanics.

Department	Basic Science & Humanities
Course Code	BS-M-202 (For EE)
Title of Course	Mathematics -IIB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Out Come	**CO1**: Learn the methods for evaluating multiple integral and their applications to different physical problems.
	CO2: Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the

modelling of systems and problems of engineering sciences.

CO3: Learn different tools of differentiation and integration of functions of a complex variable and application of different types of transformation between two 2- dimensional planes for analysis of engineering problems.

Department	EE
Course Code	ES-CS201
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	41
Course Out Come	CO1: To recall, recognize and relate the History and different Generations of Computers; Classify the Computers; describe the Basic Anatomy of Computer Systems including Primary & Secondary Memory, Processing Unit and I/O devices. CO2: To define and accordingly apply the Binary & Allied number systems including signed and unsigned numbers; Demonstrate, discriminate and justify the concepts of BCD & ASCII, Binary Arithmetic & logic gates. CO3: To explain the basic concepts of computer programming; Represent real life problems in terms of C programs and accordingly solve them. CO4: To write C programs for developing basic applications viz. inventory management system, billing systems etc. and basic games viz. snakeladder, tick-tack-toe etc. CO5: To illustrate some system level programming like batch programming, registry programming etc.

Department	Basic Science & Humanities
Course Code	HM HU 201 [For EE]

Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	25
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	Basic Science & Humanities
Course Code	BS-PH-291 [For EE]
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2**: Ability to know optical property. **CO3**: Ability to learn electrical property. **CO4**: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. **CO5**: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron.

Department	EE
Course Code	ES-CS291

Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	40
Course Out Come	CO1: To operate on DOS, UNIX with preliminary commands. CO2: To write and execute C programs for solving basic problems viz. prime number generations, computing GCD or LCM etc. CO3: To develop real life applications viz. inventory management system, billing systems etc. through C programming.

Department	Electrical Engineering
Course Code	ES-ME 292
Title of Course	Workshop/Manufacturing Practices
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P+1L
Total Contact Hours	48
Course Out Come	**CO1:**Introduction to manufacturing processes and its application insociety. **CO2:** Applying practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. **CO3**: Exposure of assembling different components.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Basic Science & Humanities (EE)
Course Code	HM HU 291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

COURSE OUTCOME (CO)
SESSION: 2020-21

SEM3

Department	Electrical Engineering
Course Code	PC-EE 301
Title of Course	ELECTRIC CIRCUIT THEORY
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Out Come	CO1: Describe different type of networks, sources and signals with examples.
	CO2: Explain different network theorems, coupled circuit and tools for solution of networks.
	CO3: Apply network theorems and different tools to solve network problems.
	CO4: Select suitable techniques of network analysis for efficient solution.
	CO5: Estimate parameters of two-port networks.
	CO6: Design filters circuits.

Department	EE
Course Code	PC-EE391
Title of Course	Electric Circuit Theory Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: Determine of transient response of different electrical circuit, parameters of two port network, frequency response of filters,

	Laplace transform and inverse Laplace transform.
	CO2: Generate different signals in both discrete and analog form
	CO3:Analyze amplitude and phase spectrum of different signals.
	CO4: Verify network theorems.
	CO5: Construct circuits with appropriate instruments and safety precautions.
	CO6: Simulate electrical circuit experiments using suitable software.

Department	EE
Course Code	PC-EE 302
Title of Course	Analog Electronics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Course Out Come	CO1: Describe analog electronic components and analog electronics circuits.
	CO2: Explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.
	CO3: Compute parameters and operating points of analog electronic circuits.
	CO4: Determine response of analog electronic circuits.
	CO5: Distinguish different types amplifier and different types oscillators based on application.
	CO6: Construct operational amplifier based circuits for different applications.

Department	EE
Course Code	PC-EE392
Title of Course	Analog electronic laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: Determine • characteristics of full wave rectifier with filter and without filter • characteristics of BJT and FET • characteristics of Zener diode as voltage regulator • characteristics of class A, C and push pull amplifiers CO2: Verify function of DAC and ADC CO3. Construct • function generator using IC • R-C coupled amplifier • linear voltage regulator using regulator IC chip. •timer circuit using 555 for monostable, astable and multi stable multi vibrator. • V to I and I to V converter with Op amps. CO4: Work in a team CO5: Validate theoretical learning with practical

Department	EE
Course Code	PC-EE 303
Title of Course	Electrometric field theory

COURSE OUTCOME (CO)
SESSION: 2020-21

Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Course Out Come	CO1: To learn the basic mathematical tools to deal with Electromagnetic field. CO2: To understand properties and application of Electric and magnetic field. CO3: To analyze electromagnetic wave propagation in transmission line. CO4: To acquire problem solving skills related to Electromagnetic field.

Department	Electrical Engineering
Course Code	ES-ME301
Title of Course	Engineering Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Out Come	**CO1**: Understanding and applying the vector and tensor algebra and related topics like coordinate transformation of vectors and tensors for the kinematic and kinetic analysis of motion (both in two dimensions and three dimensions) of rigid bodies in particular and system of particles in general. Gaining knowledge of the fundamentals of linear algebra for further application to related engineering and scientific problems solving. **CO2**: Thorough understanding of the motion of rigid bodies both in plane and space motions. An ability is developed to analyse or solve a given engineering problem or to create/ innovate new engineering objects. **CO3**: Developments of concepts of quantities/ properties like mass/ area moments of inertia, product of inertia, centroid, centre of mass, centre of gravity, their relations, differences etc. Ability to calculate these properties for different standard and non-standard engineering objects about any axis by the application of theorems like perpendicular and/or parallel axes theorems or by applying the

	rotational transformation of axes.
	CO4: Understanding of the kinematic and kinetic constraints of different types of supports in free body diagram and to analyse planar motion, general 3D motions and gyroscopes.
	CO5: Determination of shear force and bending moment and producing shear force and bending moment diagrams of different types of beams and relationship between them.
	CO6: Derivation and application of the torsion equation of solid and hollow circular shaft and understanding of Coulomb's law of friction, angle of repose and coefficient of friction.

Department	Basic Science & Humanities (EE)
Course Code	BS-M 301 (For EE)
Title of Course	Mathematics – III
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Course Out Come	CO1: Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment. CO2:Apply numerical methods to solve engineering problems. CO3: Learn to solve engineering problems using z transform.

Department	Basic Science & Humanities (EE)
Course Code	PC-CS 391 [For EE]
Title of Course	Numerical Methods Lab
Nature of Course	Compulsory
Type of Course	Lecture

Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: Ability to understand numerical computation & Interpolation. CO2: Ability to learn Numerical integration & solution of linear equations. CO3: Ability to solve Numerical solution of Algebraic, transcendental equations & ordinary differential equations.

Department	Basic Science & Humanities (EE)
Course Code	BS-302
Title of Course	Biology for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Course Out Come	CO1: To know Darwinian evolution, molecular perspective and classification, Phylogenetic trees, study of inter- and intra –species relationships. CO2: Highlight Cellular structure and function, cellular assembly and central dogma of molecular Biology. CO3: Convey about Organismal physiology-Energy and energetic constraints. 3-D structure and function of large biological molecules. CO4: Study Techniques in bio physics and bio chemistry and Immunology- Self vs Non-self, pathogens, human immune system, antigen-antibody reactions. CO5: Study Cancer biology, gene regulation, aging, apoptosis and stem cell. CO6: Identify Drug

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Electrical Engineering
Course Code	MC-EE-301
Title of Course	INDIAN CONSTITUTION
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	3 Hours/week
Course Out Come	CO1: Describe • Different features of Indian constitution. • Power and functioning of Union, state and local self-government. • Structure, jurisdiction and function of Indian Judiciary. • Basics of PIL and guideline for admission of PIL. • Functioning of local administration starting from block to Municipal Corporation. CO2: • identify authority to redress a problem in the profession and in the society.

COURSE OUTCOME (CO)
SESSION: 2020-21

SEM4

Department	EE (Electrical Engineering)
Course Code	PC-EE-401
Title of Course	Electrical Machine-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	35
Course Out Come	CO1: describe the function of different components of magnetic circuit, DC machines and transformers CO2:explain the principle of operation of different types of DC machines and transformers CO3: solve numerical problems of DC machines and transformers. CO4: estimate the parameters and efficiency of transformer. CO5: determine the characteristics of DC machines CO6: recommend methods to control output of DC machines.

Department	EE
Course Code	PC-EE-402
Title of Course	DIGITAL ELECTRONICS
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	35

COURSE OUTCOME (CO)

SESSION: 2020-21

Course Out Come	CO1:describe the function of different building blocks of digital electronics, semiconductor memories and programmable logic devices. CO2: explain the principle of operation of combinational and sequential digital circuits, A/D and D/A converter CO3: solve numerical problems of Boolean algebra, number system, combinational & sequential digital circuits and A/D and D/A converter. CO4: specify applications of combinational and sequential digital circuits. CO5: determine specifications of different digital circuits.

	CO6: design combinational and sequential digital circuits

Department	EE
Course Code	PC-EE-403
Title of Course	ELECTRICAL & ELECTRONICS MEASUREMENTS
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	35
Course Out Come	CO1: explain the terms accuracy, precision, resolution, speed of response, errors in measurement, loading effect CO2: describe methods of measurement of power, energy by instruments and resistance, capacitance and inductance by bridges and potentiometer CO3: explain the principle of operation of analog meters, instrument transformer, digital multimeter, digital voltmeter, digital frequency meter, signal generator, strain gauge, LVDT and temperature transducers CO4: explain the different building block, principle of operation oscilloscope and measurement techniques of voltage, current, frequency and phase by oscilloscope CO5: solve numerical problems relating to measurements and instruments mentioned in PCEE403. CO6: specify applications of different measuring instruments, sensors and transducers mentioned inPC-EE403

Department	Electrical Engineering
Course Code	ES-ME401
Title of Course	Thermal Power Engineering
Nature of Course	Compulsory
Type of Course	Theory
Contact Hours	3L
Total Contact Hours	35
Course Out Come	CO1: Exposure to operation of different types of boilers, turbines,

	IC engines and Gas turbines. CO2: To analyze the performance of boilers, engines and turbines. CO3: To acquire problem solving skills to solve problems of boilers, turbines, IC engines and Gas turbines.

Department	EE
Course Code	HM-401
Title of course	VALUES & ETHICS IN PROFESSION
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	35
Course out come	CO1: Ability to know the Effect of Technological Growth, Energy crisis, Environmental degradation and pollution, Eco-friendly Technologies, Environmental Regulations. CO2: Ability to know the problems of man, machine, interaction, Impact of assembly line and automation, Human centered Technology. CO3: Ability to know the Ethics of Profession, Ethical issues in Engineering practice, Conflicts between business demands and professional ideals, codes of professional ethics. CO4: Ability to know the Profession and Human Values, Values Crisis in contemporary society, Nature of values, Psychological values, societal values, Aesthetic values.

Department	Basic Science & Humanities (EE)
Course Code	MC-EE-401
Title of Course	Environmental Science
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	35

Course Out Come	CO1: Ability to understand Basic ideas of environment, Ecology. CO2: Ability to learn Air, Water, Land, & Noise pollution and control. CO3: Ability to gain knowledge about the Environmental Management which includesEnvironmental impact assessment, Environmental Audit, laws and protection act of India, Different international environmental treaty/agreement/ protocol.

Department	EE (Electrical Engineering)
Course Code	PC-EE-491
Title of Course	Electric Machine-I (Lab)
Nature of Course	Compulsory.
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	**CO1:** Ability to examine the characteristics of various DC motors and analyse methods of speed control of DC motors. **CO2:** Ability to analyse characteristics of DC compound generator. **CO3:** Ability to study of equivalent circuit of a single-phase transformerand perform its polarity test and different connection of three phase Transformer. **CO4:** Ability to examine of equivalent circuit of a three-phase induction motor by different methods. **CO5:** Ability to test performance of wound rotor type induction motor under load. **CO6:** Ability to perform characteristics of 3-phase squirrel cage induction motor and determination of iron loss, friction and windage losses.

Department	EE
Course Code	DIGITAL ELECTRONICS LABORATORY
Title of Course	PC-EE492
Nature of Course	Compulsory
Type of Course	Practical

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: identify appropriate equipment and instruments for the experiment
	CO2:test the instruments for application to the experiment
	CO3: construct decoder , multiplexer, adder and subtractor circuits with appropriate instruments and precaution
	CO4: realize RS-JK and D-flip flop, Universal register with gates and multiplexer and flip flops and asynchronous and synchronous up down counters.
	CO5:validate the operation op code conversion circuit-BCD to excess3 and vice versa, 4-bit parity generator and comparator circuits
	CO6: work effectively in a team

Department	EE
Course Code	PC-EE493
Title of Course	ELECTRICAL & ELECTRONICS MEASUREMENT LABORATORY
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: identify appropriate equipment of instruments for the experiment
CO2: test the instrument for application to the experiment
CO3: construct circuit with appropriate instruments and safety precautions
CO4: evaluate and adjust the precision and accuracy of ac energy meter, moving iron and dynamometer type ammeter, voltmeter and wattmeter by potentiometer
CO5: measure voltage , current, power, energy, phase, frequency, resistance, inductance, capacitance
CO6: Work effectively in a team.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Electrical Engineering
Course Code	ES-ME491
Title of Course	Thermal Power Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: To learn about the operation and application of different types of boilers & IC engines. CO2: To test the performance of IC engines. CO3: To find the properties of fuel.

Department	EE
Course Code	PC-EE-501
Title of Course	Electrical Machine-II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	40
Course Out Come	CO1: describe the arrangement of winding of AC machines. CO2: explain the principle of operation of Induction machines, Synchronous machines and special machines. CO3: solve numerical problems of Induction machines, Synchronous machines and Special machines. CO4: estimate the parameters and efficiency of Induction machines and Synchronous machines. CO5: determine the characteristics of Induction machines and Synchronous machines.

	CO6: select appropriate methods for starting , braking and speed control of Induction machines.

Department	EE
Course Code	PC-EE-502
Title of Course	Power system-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	40
Course Out Come	CO1: explain the principle of generation of Electric power from different sources. CO2: determine parameters of transmission lines and its performance. CO3: explain the principle of formation of corona and methods of its reduction. CO4: conduct electrical tests on insulators.. CO5: solve numerical problems related to overhead transmission line, cable, insulators and tariff. CO6: analyze overhead transmission line based on short medium and long lines.

Department	EE
Course Code	PC-EE-503
Title of Course	Control System
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	45
Course Out Come	CO1: Develop mathematical model of mechanical, electrical, thermal, fluid system and different control system components like servomotors, synchros, potentiometer, tacho-generators etc.. CO2: analyse stability of LTI system using routh-hurtwitz (RH) criteria, root locus techniques in time domain and bode plot and nyquist technique in frequency domain. CO3: design different control law or algorithms like proportional control, proportional plus derivative(PD) control, proportional plus

	integration(PI) control, and proportional plus integration plus derivative (PID) control and compensators like lag, lead, lag-lead for LTI systems. CO4: apply state variable techniques for analysis of linear systems. CO5: analyze the stability of linear discrete system. CO6: solve numerical problems on LTI system modelling, responses, error dynamics and stability.

Department	EE
Course Code	PC-EE-504
Title of Course	Power Electronics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	40
Course Out Come	CO1: differentiate between signal level and power level devices. . CO2: construct triggering and commutation circuits of SCR. CO3: explain the principle of operation of AC-DC, DC-DC and DC-AC converters. CO4: analyse the performance of AC-DC, DC-DC and DC-AC converters.. CO5: apply methods of voltage control and harmonic reduction to inverters. CO6: solve numerical problems of switching devices, AC-DC, DC-DC and DC-AC converters. .

Department	EE
Course Code	PC-EE-591
Title of Course	ELECTRIC MACHINE-II LABORATORY
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: identify appropriate equipment and instruments for the experiment.

	CO2: test the instrument for application to the experiment. CO3: construct circuits with appropriate instruments and safety precautions. CO4: validate different characteristics of single phase Induction motor, three phase Induction motor, Induction generator and synchronous motor , methods of speed control of Induction motors and parallel operation of the 3 phase Synchronous generator. CO5:work effectively in a team.

Department	EE
Course Code	PC-EE-592
Title of Course	POWER SYSTEM-I LABORATORY
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: identify appropriate equipment and instruments for the experiment. CO2: test the instrument for application to the experiment. CO3: construct circuits with appropriate instruments and safety precautions. CO4: validate different characteristics of transmission line. CO5: determine earth resistance, dielectric strength of insulating oil, breakdown strength of solid insulating material and dielectric constant of transformer oil. CO6: analyze an electrical transmission line circuit with the help of software. CO7: work effectively in a team.

Department	EE
Course Code	PC-EE-593
Title of Course	CONTROL SYSTEMLABORATORY
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P

Total Contact Hours	20
Course Out Come	CO1: identify appropriate equipment and instruments for the experiment. CO2: test the instrument for application to the experiment. CO3: construct circuits with appropriate instruments and safety precautions. CO4: use MAT-Lab control system tool box, MAT-Lab- simulink tool box & PSPICE for simulation of systems. CO5: determine control system specifications of first and second order systems. CO6: validate step response & impulse response for type-0, type-1 & Type-2 system with unity feedback using MATLAB & PSPICE. . CO7: work effectively in a team.

Department	EE
Course Code	PC-EE-594
Title of Course	POWER ELECTRONICSLABORATORY
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	20
Course Out Come	CO1: identify appropriate equipment and instruments for the experiment. CO2: test the instrument for application to the experiment. CO3: construct circuits with appropriate instruments and safety precautions. . CO4: validate characteristics of SCR, Triac, and performance of phase controlled converter, DC-DC converter, inverters and resonant pulse converters. CO5: demonstrate the relation between the speed and firing angle of Universal motor. CO6: work effectively in a team.

Department	EE
Course Code	OE-EE-501A
Title of Course	DATA STRUCTURE & ALGORITHM
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3 hrs/week
Total Contact Hours	40
Course Out Come	CO1: differentiate how the choices of data structure & algorithm methods enhance the performance of the program. CO2: solve problems based upon different data structure & also write programs. CO3: write programs based on different data structure CO4: identify appropriate data structure & algorithmic methods in solving problem. CO5: discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing CO6: compare the benefits of dynamic and static data structures implementations. .

Department	EE
Course Code	OE-EE-501B
Title of Course	OBJECT ORIENTED PROGRAMMING
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3 hrs/week
Total Contact Hours	40
Course Out Come	CO1: specify simple abstract data types. CO 2: recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity. CO 3: apply common object-oriented design patterns

	CO 4: specify uses of common object oriented design patterns with examples. CO 5: design applications with an event-driven graphical user interface.

Department	EE
Course Code	OE-EE-501C
Title of Course	COMPUTER ORGANISATION
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3 hrs/week
Total Contact Hours	36
Course Out Come	CO1: explain basic structure of digital computer, stored program concept, different arithmetic and control unit operations, operating systems and compiler/assembler, memory and I/O operations. CO 2: differentiate between RISC vs CISC architectures, cache memory, virtual memory. CO 3: perform fixed point multiplication and division. CO 4: apply restoring and non-restoring algorithms, floating point - IEEE 754 standard. CO 5: design adder, memory unit and control unit, data path for read/write access.

Department	EE
Course Code	PE-EE-501A
Title of Course	HIGH VOLTAGE ENGINEERING
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3hrs/week
Total Contact Hours	40
Course Out Come	CO1: explain breakdown phenomenon of gas, liquid and solid and vacuum CO 2: suggest methods for generation and measurement of high voltage and currents. CO 3: determine the basic insulation level of substation equipment.

	CO 4: apply methods for protection of electrical apparatus against over voltage
	CO 5: test insulators, bushings, isolators, circuit breakers, cables and power transformers.
	CO 6: solve numerical problems of breakdown phenomena, generation and measurement of high voltage and currents, over voltage phenomena and high voltage testing.

Department	EE
Course Code	PE-EE-501B
Title of Course	POWER PLANT ENGINEERING
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3 hrs./week
Total Contact Hours	40
Course Out Come	CO1: explain the principle of operational of Steam, Hydroelectric, Diesel, Gas turbine, Nuclear power and non-conventional power plant.
	CO 2: identify the cause of pollution for power generation and its remedy.
	CO3: suggest location to set up Steam, Hydroelectric, Diesel, Gas turbine and Nuclear power plant.
	CO 4: compare Steam, Hydroelectric, Diesel, Gas turbine, Nuclear power and non-conventional power plant.
	CO 5: suggest methods of maintenance of Steam, Gas and Hydroelectric power plants
	CO 6: solve numerical problems of load estimation and economics of power plants.

Department	EE
Course Code	PE-EE-501C
Title of Course	RENEWABLE & NON CONVENTIONAL ENERGY
Nature of Course	Elective
Type of Course	Lecture

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact Hours	3 hrs./week
Total Contact Hours	42
Course Out Come	CO1: explain the principle of conversion of solar energy, wind energy , biomass, Geothermal energy, Ocean energy and Hydrogen energy to other form of energy. CO 2: explain the principle of operation of magneto hydrodynamic power generation: CO 3: use Solar energy, Wind energy , Biomass, Geothermal energy, Ocean energy, Hydrogen energy and fuel cell for different applications. CO 4: suggest location to set up wind mill and biogas generation plant CO 5: estimate conversion efficiency of fuel cell.

Course Outcome of E.C.E Department

[New Syllabus]

Department	ECE
Course Code	BS-CH-101
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	CO1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. CO2: Rationalise bulk properties and processes using thermodynamic considerations. CO3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	ECE
Course Code	BS-M-102
Title of Course	Mathematics -IB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	42
Course Out Come	**CO1**: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals. **CO2:** Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems. **CO3:** Learn the tools of power series and Fourier series to analyse

	engineering problems and apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines. **CO4:** Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation. **CO5:** Understand the concept of determinant and learn different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems.

Department	ECE
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	40
Course Out Come	CO1: To understand and analyze basic electric and magnetic circuits CO2: To study the working principles of electrical machines and power converters. CO3: To introduce the components of low voltage electrical installations

Department	ECE
Course Code	BS-CH-191
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	P 3
Total Contact Hours	30
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

	CO2: Rationalise bulk properties and processes using thermodynamic considerations. **CO3:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. **CO4:** Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. **CO5:** List major chemical reactions that are used in the synthesis of molecules.

Department	ECE
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Laboratory
Contact Hours	P3
Total Contact Hours	20
Course Out Come	CO1: To learn about the operation, calibration and application of different electrical elements, instruments respectively and observe the constructional details of different electrical machines. CO2: To learn about the RLC circuit behaviour under AC and DC excitation. CO3: To learn about the characteristics features of a single-phase transformer CO4: To learn about three phase circuitanalysis. CO5: To learn about the characteristic behaviours of different rotating electrical machines. CO6: To learn about the operation of different converters and LT switchgear.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	ECE
Course Code	ES-ME191
Title of Course	Engineering Graphics & Design Lecture
Nature of Course	Compulsory (Engineering Science Courses Course)
Type of Course	Practical
Contact Hours	L + T 3 + 1
Total Contact Hours	52
Course Out Come	CO1: Introduction to engineering design and its place in society CO2: Exposure to the visual aspects of engineering design CO3: Exposure to engineering graphics standards CO4: Exposure to solid modelling

Department	ECE
Course Code	BS-PH-201
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	44
Course Out Come	**CO1:** Ability to know the basic concepts of mechanics and oscillation. **CO2:** Elaborate the concept of optics and introduction to the principle of laser. **CO3:** Ability to understand electromagnetism, dielectric and magnetic properties of materials. **CO4:** Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation. **CO5:** Understand the basic concept of Statistical mechanics.

Department	ECE
Course Code	BS-M-202
Title of Course	Mathematics -IIB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	40
Course Out Come	**CO1**: Learn the methods for evaluating multiple integral and their applications to different physical problems. **CO2:** Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences. **CO3:** Learn different tools of differentiation and integration of functions of a complex variable and application of different types of transformation between two 2- dimensional planes for analysis of engineering problems.

Department	ECE
Course Code	ES-CS201
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 0
Total Contact Hours	44
Course Out Come	CO1: To formulate simple algorithms for arithmetic and logical problems CO2: To translate the algorithms to programs (in C language). CO3: To test and execute the programs and correct syntax and logical errors. CO4: To implement conditional branching, iteration and recursion. CO5: To decompose a problem into functions and synthesize a complete program using divide and conquer approach. CO6: To use arrays, pointers and structures to formulate algorithms and

	programs. CO7: To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. CO8: To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Department	ECE
Course Code	HM HU 201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	25
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	ECE
Course Code	BS-PH-291
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2**: Ability to know optical property. **CO3**: Ability to learn electrical property.

	CO4: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. **CO5**: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	ECE
Course Code	ES-CS291
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 0 + 4
Total Contact Hours	48
Course Out Come	CO1: To formulate the algorithms for simple problems To translate given algorithms to a working and correct program CO2: To be able to correct syntax errors as reported by the compilers CO3: To be able to identify and correct logical errors encountered at run time CO4: To be able to write iterative as well as recursive programs CO5: To be able to represent data in arrays, strings and structures and manipulate them through a program CO6: To be able to declare pointers of different types and use them in defining self-referential structures. CO7: To be able to create, read and write to and from simple text files.

Department	ECE
Course Code	ES-ME 292
Title of Course	Workshop/ Manufacturing Practices
Nature of Course	Compulsory (Engineering Science Courses Course)

COURSE OUTCOME (CO)
SESSION: 2020-21

Type of Course	Lecture
Contact Hours	L + T+ P 1 + 0+ 4
Total Contact Hours	56
Course Out Come	CO1: Upon completion of this laboratory course, students will be able to fabricate components with their own hands. CO2: They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. CO3: By assembling different components, they will be able to produce small devices of their interest

Department	ECE
Course Code	HM HU 291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Course Outcome of ECE Department

[New Syllabus]

Department	ECE
Course Code	EC301
Title of Course	Electronic Devices
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T+0P
Total Contact Hours	32 Hours
Course Outcomes	CO1: Differentiate the conduction techniques in semi-conductor materials. CO2: Analyze characteristics of Semi-conductor diodes and solve problems. CO3: Analyze characteristics of Bi-polar Transistors and solve problems. CO4: Analyze characteristics of MOS Transistors and solve problems. CO5: Differentiate between different Opto-electronic devices.

Department	ECE
Course Code	EC302
Title of Course	Digital System Design
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T+0P
Total Contact Hours	32 Hours

Course Outcomes	CO1: Design and analyze combinational logic circuits CO2: Design & analyze modular combinational circuits with UX/DEMUX, Decoder, Encoder CO3: Design & analyze synchronous sequential logic circuits

Department	ECE
Course Code	EC303
Title of Course	Signals and System
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T+0P
Total Contact Hours	32 Hours
Course Outcomes	CO1: Analyze different types of signals CO2: Represent continuous and discrete systems in time and requency domain using different transforms CO3: Investigate whether the system is stable CO4: Sampling and reconstruction of a signal

Department	ECE
Course Code	EC304
Title of Course	Network Theory
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T+0P
Total Contact Hours	32 Hours

Course Outcomes	CO1: Understand basics electrical circuits with nodal and mesh analysis.
	CO2: Appreciate electrical network theorems.
	CO3: Apply Laplace Transform for steady state and transient analysis.
	CO4: Determine different network functions.
	CO5: Appreciate the frequency domain techniques.

Department	ECE
Course Code	ES-CS301
Title of Course	Data Structure & Algorithms
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T+0P
Total Contact Hours	30 Hours
Course Outcomes	CO1: For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
	CO2: For a given Search problem (Linear Search and Binary Search) student will able to implement it.
	CO3: For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
	CO4: Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
	CO5: Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	ECE
Course Code	BSM-301
Title of Course	Probability and Statistics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3
Total Contact Hours	32
Course Out Come	**CO1:** Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment. **CO2:** Understand the basic ideas of statistics with different characterisation of a univariate and bivariate data set. **CO3:** Apply statistical tools for analysing data samples and drawing inference on a given data set.

Department	ECE
Course Code	EC391
Title of Course	Electronics Devices Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L+0T+2P
Total Contact Hours	20
Course Outcomes	CO1: An ability to verify the working of different diodes, transistors, CRO probes and measuring instruments. Identifying the procedure of doing the experiment. CO2: Ability to understand the characteristics of BJT and FET and how to Determine different parameters for designing purpose. CO3: Ability to understand properties of photoelectric devices. CO4: Ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.

Department	ECE
Course Code	EC392
Title of Course	Digital System Design Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L+0T+2P
Total Contact Hours	26
Course Outcomes	CO1: Ability to know the basic principles of Digital Electronics and digital design techniques. CO2: Ability to develop Combinational and sequential circuits design using

	logic gates
	CO3: Ability to develop Combinational and sequential circuits design using PSPICE software and VHDL\Verilog

Department	ECE
Course Code	ES-CS391
Title of Course	Data Structure & Algorithm Lab.
Nature of Course	Compulsor
Type of Course	Practicals
Contact Hours	0L+0T+2P
Total Contact Hours	20
Course Outcomes	CO1: Ability to implement the concept of searching, sorting, data structures, stacks, queues etc. CO2: Ability to implement above concepts in c, c++ using concepts of pointers, structures, arrays and dynamic allocation of memory.

Department	ECE
Course Code	MC381
Title of Course	Environmental Science
Nature of Course	Compulsory
Type of Course	Sassional
Contact Hours	0L+0T+2P
Total Contact Hours	20

Course Outcomes	CO1: Ability to sensitize on environment protection through Awareness Activities such as Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste, Slogan making event, Poster making event, Cycle rally, Lectures from experts CO2: Ability to sensitize on environment protection through Actual Activities such as Plantation, Gifting a tree to see its full growth, Cleanliness drive, Drive for segregation of waste, To live some big environmentalist for a week or so to understand his work, to work in kitchen garden for mess, shutting down the fans and ACs of the campus for an hour or so.

4th Semester from Academic Year 2018-19	
Department	ECE
Course Code	EC401
Title of Course	Analog Communication
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Outcomes	CO1: Ability to learn concept of analog modulation and its classification.
	CO2: Ability to identify the type of modulation & know different types of associated the calculation.
	CO3: Ability to learn the importance of Multiplexing, find out their application areas.
	CO4:Ability to study random signals and noise in communication system.

Department	ECE
Course Code	EC402
Title of Course	Analog circuits
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the characteristics of diode and transistors.
	CO2: Design and analyze various rectifier and amplifier circuits.
	CO3: Design sinusoidal and non-sinusoidal oscillators.
	CO4: Understand the functioning of OP-AMP based circuit.

Department	ECE
Course Code	EC403
Title of Course	Microprocessor & Microcontroller
Nature of Course	Compulsory
Type of Course	Lectures

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Do assembly language programming CO2: Do interfacing design of peripherals likes I/O, A/D, D/A, Timer etc. CO3: Develop system using different microprocessors. CO4: Understand RSIC processors and design ARM microcontroller-based systems

Department	ECE
Course Code	ES-CS401
Title of Course	Design and Analysis of Algorithm
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and

develop the dynamic programming algorithms, and analyze it to determine its computational complexity.

CO5: For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.

CO6: Explain the ways to analyze randomized algorithms (expected running time, probability of error).

CO7: Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

Department	ECE
Course Code	BS-M401
Title of Course	Numerical Methods (BS)
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	2L+0T
Total Contact Hours	22
Course Outcomes	CO1: Ability to understand numerical computation & Interpolation. CO2:Ability to learn Numerical integration & solution of linear equations. CO3:Ability to solve Numerical solution of Algebraic & differential equation.

Department	ECE
Course Code	BS-B401
Title of Course	Biology for Engineers

COURSE OUTCOME (CO)
SESSION: 2020-21

Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	2L+1T
Total Contact Hours	33
Course Outcomes	CO1: Describe how biological observations of 18th Century that lead to major discoveries.
	CO2: Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
	CO3: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
	CO4: Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
	CO5: Classify enzymes and distinguish between different mechanisms of enzyme action
	CO6: Identify DNA as a genetic material in the molecular basis of information transfer.
	CO7:Analyse biological processes at the reductionistic level
	CO8:Apply thermodynamic principles to biological systems.
	CO9: Identify and classify microorganisms.

LAB	LAB
Department	ECE
Course Code	EC491
Title of Course	Analog Communication Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L+0T+2P
Total Contact Hours	18
Course Outcomes	CO1: Ability to learn concept of analog modulation and Demodulation technique.
	CO2:Ability to know different types of associated the calculation.
	CO3:Ability to learn different application areas of analog communication.

Department	ECE
Course Code	EC492
Title of Course	Analog Electronic Circuits Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L+0T+2P
Total Contact Hours	18

Course Outcomes	CO1: Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators.
	CO2: Compute the parameters from the characteristics of JFET and MOSFET devices
	CO3: Design, test and evaluate BJT amplifiers in CE configuration.
	CO4: Design and test JFET/MOSFET amplifiers.
	CO5: Design and test a power amplifier.
	CO6: Design and test various types of oscillators.

Department	ECE
Course Code	EC493
Title of Course	Microprocessor & Microcontroller Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L+0T+2P
Total Contact Hours	16
Course Outcomes	CO1: Ability to develop an in depth understanding on operation of microprocessors and microcontrollers.
	CO2:Ability to understand assembly language program for 8051.
	CO3:Ability to comparative study of higher versions of microcontroller.

Department	ECE
Course Code	BS-M(CS)491
Title of Course	Numerical Methods Lab (BS)

Nature of Course	Compulsory
Type of Course	Practicals
Contact Hours	0L+0T+2P
Total Contact Hours	12
Course Outcomes	CO1: Ability to understand numerical computation & Interpolation. CO2:Ability to learn Numerical integration & solution of linear equations. CO3:Ability to get Numerical solution of Algebraic & differential equation.

Department	ECE
Course Code	HS-HU48
Title of Course	Soft Skill Development Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L+0T+2P
Total Contact Hours	20
Course Outcomes	**CO1: Ability to develop skills of technical communication in English through Language Lab practice sessions.** **CO2: Ability to Communicate confidently and competently in English in all spheres.**

5th and 6th SEMESTER NEW SYLLABUS

Department	ECE
Course Code	EC501
Title of Course	Electromagnetic Waves
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	34
Course Outcomes	CO1: Understand characteristics and wave propagation on high frequency transmission lines. CO2: Carryout impedance transformation on TL. CO3: Use sections of transmission line sections for realizing circuit elements. CO4: Characterize uniform plane wave. CO5: Calculate reflection and transmission of waves at media interface. CO6: Analyze wave propagation on metallic waveguides in modal form. CO7: Understand principle of radiation and radiation characteristics of an antenna.

Department	ECE
Course Code	EC502
Title of Course	Computer Architecture
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	34
Course Outcomes	CO1: Learn how computers work. CO2: Know basic principles of computer's working. CO3: Analyze the performance of computers. CO4: Know how computers are designed and built. CO 5: Understand issues affecting modern processors (caches, pipelines etc.).

Department	ECE
Course Code	EC503
Title of Course	Digital Communication and Stochastic Process
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the concept of Stochastic Process in Communication System. CO2: Represent various signals in different mathematical forms. CO3: Analyze baseband transmission mode of digital data. CO 4: Analyze different career modulation techniques considering noise aspects.

Department	ECE
Course Code	EC504
Title of Course	Digital Signal Processing
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	34
Course Outcomes	CO1: Represent signals mathematically in continuous and discrete time and frequency domain. CO2: Get the response of an LSI system to different signals. CO3: Design of different types of digital filters for various applications.

Department	ECE
Course Code	PE-EC505A
Title of Course	Information Theory and Coding
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32

Course Outcomes	CO1: Understand the concept of information and entropy CO2: Understand Shannon's theorem for coding CO3: Calculation of channel capacity CO4: Apply coding techniques

Department	ECE
Course Code	PE-EC505B
Title of Course	Speech and Audio Processing
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Ability to know production and transmission of acoustic signals. CO2: Ability to understand the time domain methods for Speech processing. CO3: Ability to have the knowledge of Speech Codec standards and applications.

Department	ECE
Course Code	PE-EC505C
Title of Course	Power Electronics
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Build and test circuits using power devices such as SCR CO2: Analyze and design-controlled rectifier, DC to DC converters, DC to AC inverters. CO3: Learn how to analyze these inverters and some basic applications. CO4: Design SMPS.

Department	ECE
Course Code	PE-EC505D
Title of Course	Scientific Computing
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the significance of computing methods, their strengths and application areas. CO2: Perform the computations on various data using appropriate computation tools.

Department	ECE
Course Code	OE-EC506A
Title of Course	Soft Skill and Interpersonal Communication
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T

Total Contact Hours	32
Course Outcomes	CO1: Recognise the importance of interpersonal skills CO2: Describe how good communication with other can influence our working relationships CO3: Outline the roles we play in our work groups and teams.

Department	ECE
Course Code	OE-EC506B
Title of Course	Cyber Law & Intellectual Property Rights
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the role of intellectual property rights. CO2: Identify the main types of intellectual property rights. CO3: Understand the steps for successful registration and protection of intellectual property rights at national, regional and international levels. CO4: Search patent and trademark databases. CO5: Understand the legal aspects for intellectual property protection.

Department	ECE
Course Code	OE-EC506C
Title of Course	Human Resource Management
Nature of Course	Elective
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact	32

Hours	
Course Outcomes	CO1: Know the professional and personal qualities of a HR manager. CO2: Learn different methods of selecting human resources through recruitment, training and performance appraisal system. CO3: Know how to develop a favourable working environment in an organisation through participation in management and maintain a good industrial relation for benefit of the society. CO4: Know about consequence of industrial dispute and employee indiscipline of an organization.

Department	ECE
Course Code	MC-HU501
Title of Course	Effective Technical Communication
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:3P
Total Contact Hours	32
Course Outcomes	CO1: Build confidence in listening, speaking, reading and writing English professionally. CO2: Enable the students to think and speak effectively on everyday topics, including topics related to technical concepts. CO3: Equip students with the basics of Academic writing. CO4: Developing industry-ready attitude towards professional communication. CO5: Prepare for competitive exams like TOEFL, IELTS.

Department	ECE
Course Code	EC591
Title of Course	Electromagnetic Wave Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:2P
Total Contact	18

Hours	
Course Outcomes	**CO1:** Ability to plot of standing wave pattern along a transmission line when the lines open circuited, short circuited and terminated by a resistive load at the load end. **CO2:** Ability to study of smith chart on MATLAB platform. **CO3:** Ability to study the radiation pattern of different type of linear Antenna.

Department	ECE
Course Code	EC592
Title of Course	Digital Communication Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:2P
Total Contact Hours	24
Course Outcomes	**CO1:** Ability to develop fundamental understanding of Digital Communication system. **CO2:** Ability to develop concept of analog digitization using techniques as PCM, digital modulation and demodulation. **CO3:** Ability to develop the design of digital modulation and de modulation technique such as ASK, PSK and FSK.

Department	ECE
Course Code	EC593
Title of Course	Digital Signal Processing Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:2P
Total Contact Hours	24
Course Outcomes	**CO1:** Ability to analysis in signal processing using mathematical tools such as Z transform and Discrete Fourier transforms. **CO2:** Ability to design FIR filter. **CO3:** Ability to design Butterworth filter with different set of parameters **CO4:** Ability to know the verification of different algorithm associated with filtering.

6th SEMESTER

Department	ECE
Course Code	EC601
Title of Course	Control System and Instrumentation
Nature of Course	Compulsory
Type of Course	Lectures

Contact Hours	3L+0T
Total Contact Hours	34
Course Outcomes	CO1: Characterize a system and find its steady state behavior. CO2: Investigate stability of a system using different tests. CO3: Design various controllers. CO4: Solve linear, non-linear and optimal control problems. CO5: Study with CRO, Wave analyzer, Spectrum analyzer knowing their functional details.

Department	ECE
Course Code	EC602
Title of Course	Computer Network
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: learn how computers work. CO2: know basic principles of computer's working. CO3: analyze the performance of computers. CO4: know how computers are designed and built. CO5: Understand issues affecting modern processors (caches, pipelines etc.).

Department	ECE
Course Code	PE-EC603A
Title of Course	Introduction to MEMS
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Appreciate the underlying working principles of MEMS and NEMS devices. CO2: Design and model MEM devices.

Department	ECE
Course Code	PE-EC603B
Title of Course	Bio-Medical Electronics
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the application of the electronic systems in biological and medical applications. CO2: Understand the practical limitations on the electronic components while handling bio substances. CO3: Understand and analyze the biological processes like other electronic processes.

Department	ECE
Course Code	PE-EC603C
Title of Course	CMOS VLSI Design
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand ASIC Design Flow and Design Styles. CO2: Understand Electrical Characters of MOSFET. CO3: Understand Steps of IC Fabrication Process. CO3: Understand different Methods of Digital ASIC design using CMOS Technology: Static, Transmission Gate, Dynamic etc. CO4: Understand different Performance aspects of Digital ASIC: Transfer Character, Power, Delay etc. CO5: Understand Physical Design aspects of Digital ASIC.

Department	ECE
Course Code	PE-EC603D
Title of Course	Nano Electronics
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand various aspects of nano-technology and the processes involved in making nano components and material. CO2: Leverage advantages of the nano-materials and appropriate use in solving practical problems. CO3: Understand various aspects of nano-technology and

	the processes involved in making nano components and material. CO4: Leverage advantages of the nano-materials and appropriate use in solving practical problems.

Department	ECE
Course Code	OE-EC604A
Title of Course	Electronic Measurement & Measuring Instruments
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Describe the fundamental concepts and principles of instrumentation CO2: Explain the operation of various instruments required in measurements CO 3: Apply the measurement techniques for different types of tests CO4: To select specific instruments for specific measurement function. CO5: Understand principle of operation and working of different electronic instruments Students will understand functioning, specification and application of signal analyzing instruments

Department	ECE
Course Code	OE-EC604B
Title of Course	Operating System
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications. CO2: understand the difference between process & thread, issues of scheduling of user-level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs. CO3: understand the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system. CO4: understand the design and management concepts along with issues and challenges of main memory, virtual memory and file system. CO5: understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

Department	ECE
Course Code	OE-EC604C
Title of Course	Object Oriented Programming
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32

Course Outcomes	CO1: differentiate between structures-oriented programming and object-oriented programming. CO2: use object-oriented programming language like C++ and associated libraries to develop object-oriented programs. CO3: understand and apply various object-oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language. CO4: apply concepts of operator-overloading, constructors and destructors. 5. apply exception handling and use built-in classes from STL.

Department	ECE
Course Code	HS-HU601
Title of Course	Economics for Engineers
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	**CO1:** Ability to understand Economic Decisions Making and considering that students will learn to find out Engineering Costs & Estimation. **CO2:** Ability to learn Cash Flow and also able to calculate Rate of Return Analysis. **CO3:** Ability to know Inflation and Price Change, Present worth Analysis. **CO4:** Ability to learn depreciation and able to analysis the requirement of replacement.

Department	ECE

Course Code	EC691
Title of Course	Computer Network Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:2P
Total Contact Hours	14
Course Outcomes	CO1: Ability to understand the basics of Networking. CO2: Ability to understand the various protocols used in the current networking system. CO3: Ability to understand the different physical devices used in the networking. CO4: Ability to study the different heuristics for networking.

Department	ECE
Course Code	EC692
Title of Course	Control and Instrumentation Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:2P
Total Contact Hours	18

Course Outcomes	**CO1:** Ability to learn basic concept of control system and familiarization with MATLAB. **CO2:** Ability to learn how to determine step response for first order and second order system and step and impulse response for type -I & type-II system using MATLAB. **CO3:** Ability to evaluate of steady- state-error, setting time, percentage peak overshoots, gain margin, phase margin using MATLAB & PSPICE.

Department	ECE
Course Code	EC681
Title of Course	Mini Project/ Electronic Design Workshop
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0L:0T:4P
Total Contact Hours	40
Course Outcomes	CO1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis. CO2. Design, implement and test the prototype/algorithm in order to solve the conceived problem. CO3. Write comprehensive report on mini project work

	ECE
Course Code	MC681
Title of Course	Universal Human Values
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	2L+0T
Total Contact Hours	32

Course Outcomes	1. Understand the significance of value inputs in a classroom and start applying them in their life and profession 2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. 3. Understand the value of harmonious relationships based on trust and respect in their life and profession 4. Understand the role of a human being in ensuring harmony in society and nature. 5. Distinguish between ethical and unethical practices, and start identifying a strategy to actualize a harmonious environment wherever they work.

4th Year from Academic Year 2018-19	
Department	ECE
Course Code	HS-**HU701**
Title of Course	Principles of Management
Nature of Course	Compulsory
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32

Course Outcomes	CO1: Recognize the role of a manager and how it relates to the organization's mission.
	CO2: Define management, its four basic functions and skills.
	CO3: Know critical management theories and philosophies and how to apply them.
	CO4: Recognize the concept of social responsiveness and its benefits.
Department	ECE
Course Code	**PE-EC701A**
Title of Course	**Microwave Theory and Technique**
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand various microwave system components their properties.
	CO2: Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis.
	CO3: Design microwave systems for different practical application.
Department	ECE
Course Code	**PE-EC701B**
Title of Course	**Satellite Communication**
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Visualize the architecture of satellite systems as a means of high speed, high range communication system.
	CO2: State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
	CO3: Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.
Department	ECE
Course Code	**PE-EC701C**
Title of Course	**Mobile Communication and Networks**
Nature of Course	Optional
Type of Course	Lectures

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the working principles of the mobile communication systems.
	CO2: Understand the relation between the user features and underlying technology.
	CO4 Analyze mobile communication systems for improved performance.
Department	ECE
Course Code	**PE-EC702A**
Title of Course	**Adaptive Signal Processing**
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the non-linear control and the need and significance of changing the control parameters w.r.t. real-time situation.
	CO2: Mathematically represent the 'adaptability requirement'.
	CO3: Understand the mathematical treatment for the modeling and design of the signal processing systems.
Department	ECE
Course Code	**PE-EC702B**
Title of Course	**Digital Image and Video Processing**
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Mathematically represent the various types of images and analyze them.
	CO2: Process these images for the enhancement of certain properties or for optimized use of there sources.
	CO3: Develop algorithms for image compression and coding.
Department	ECE
Course Code	**PE-EC702C**
Title of Course	**Embedded System**
Nature of Course	Optional

COURSE OUTCOME (CO)
SESSION: 2020-21

Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
	CO2: Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level).
	CO3: Design real time embedded systems using the concepts of RTOS.
	CO4: Analyze various examples of embedded systems based on ATOM processor.
Department	ECE
Course Code	**PE-EC703A**
Title of Course	Neural Network and Fuzzy Logic Control
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Analyze and classify neural networks and its implementation algorithms.
	CO2: Apply suitable algorithms on different cases.
	CO3: Apply fuzzy logic and neural networks.
	CO4: Analyze the applications of Neural Network and Fuzzy logic in image processing.
Department	ECE
Course Code	PE-EC703B
Title of Course	Wireless Sensor Networks
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Design wireless sensor networks for a given application.
	CO2: Understand emerging research areas in the field of sensor networks.
	CO3: Understand MAC protocols used for different communication standards used in WSN.
	CO4: Explore new protocols for WSN.
Department	ECE
Course Code	PE-EC703C
Title of Course	Wavelet Transforms

Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Classify various wavelet transform and explain importance of it.
	CO2: Describe Continuous Wavelet Transform (CWT) and Discrete Wavelet Transform (DWT).
	CO3: Explain the properties and application of wavelet transform.
	CO4: Develop and realize computationally efficient wavelet based algorithms for signal and image processing.
	CO5: Explain brief features and strength of transform beyond wavelet.

Department	ECE
Course Code	OE-EC704A
Title of Course	Web Technology
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Design good web pages using different tags, tables, forms, frames and style sheets supported by HTML
	CO2: Implement, compile, test and run Java programs, comprising more than one class, to address a particular software problem.
	CO3: Demonstrate the ability to employ various types of selection statements and iteration statements in a Java program..
	CO4: Be able to leverage the object-oriented features of Java language using abstract class and interface.
	CO5: Be able to handle errors in the program using exception handling techniques of Java.
	CO6: Design applets as per the requirements with event handling facility.
Department	ECE
Course Code	**OE-EC704B**
Title of Course	**Optimization Technique**
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32

Course Outcomes	CO1: Formulate fitness functions and cost functions for engineering optimization problems and specify the constraints as required.
	CO2: Implement different single variable optimization algorithms including the gradient based methods.
	CO3: Analyze and implement different multi variable optimization algorithms and a multi objective optimization techniques based on Parento-Fronts.
	CO4: Implement Bio-inspired optimization algorithms for solving complex engineering problems.
Department	ECE
Course Code	OE-EC704C
Title of Course	Entrepreneurship
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Know the contribution of an entrepreneur and role of SSI units in growth and development of socioeconomic condition of our country.
	CO2: Learn market survey, sales promotions and management of working capital through costing and book keeping.
	CO3: Know different decision making technique and benefit of personal management system as well as motivational methods of an enterprise..
	CO4: Learn how to prepare a project report and knowledge about different tax system of an enterprise.
Department	ECE
Course Code	PE-EC801A
Title of Course	Antennas and Propagation
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the properties and various types of antennas.
	CO2: Analyze the properties of different types of antennas and their design.
	CO3: Operate antenna design software tools and come up with the design of the antenna of required specifications.
Department	ECE
Course Code	PE-EC801B
Title of Course	Fiber Optic Communication
Nature of Course	Optional

Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the principles fiber-optic communication, the components and the bandwidth advantages.
	CO2: Understand the properties of the optical fibers and optical components.
	CO3: Understand operation of lasers, LEDs, and detectors.
	CO4: Analyze system performance of optical communication systems.
	CO5: Design optical networks and understand non-linear effects in optical fibers.
Department	ECE
Course Code	PE-EC801C
Title of Course	Error Correcting Codes
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the error sources.
	CO2: Understand error control coding applied in digital communication.
Department	ECE
Course Code	PE-EC802A
Title of Course	Mixed Signal Design
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the practical situations where mixed signal analysis is required.
	CO2: Analyze and handle the inter-conversions between signals.
	CO3: Design systems involving mixed signals.
Department	ECE
Course Code	PE-EC802B
Title of Course	Industrial Automation and Control
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact	32

Hours	
Course Outcomes	CO1: Select suitable sensor to measure industrial parameters and the different types of actuators and its working. They will be able to design proper signal conditioning circuit to the transducer.
	CO2: Determine the effect of proportional gain, integral time, derivative gain constant on the system performance and will be able to tune the controller using tuning methods, implement PID using electronic , digital, pneumatic and hydraulic methods..
	CO3: Design the ladder logic to implement any process with given problem statement.
	CO4: Analyze DCS hardware and its merits/demerits in an industrial automation.
	CO5: Analyze SCADA hardware and software and its merits/demerits in industrial automation.
	CO6: Design the complex control scheme to a particular process.
Department	ECE
Course Code	PE-EC802C
Title of Course	VLSI Design Automation
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Ability to understand the concept of VLSI design..
	CO2: Ability to understanding the microelectronic process for VLSI fabrication.
	CO3: Ability to make analog and digital VLSI circuit using CMOS.
Department	ECE
Course Code	OE-EC803A
Title of Course	Internet of Things(IoT)
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: understand the application areas of IOT..
	CO2: realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
	CO3: understand building blocks of Internet of Things and characteristics.
Department	ECE
Course Code	**OE-EC803B**
Title of Course	**Big Data Analysis**
Nature of	Optional

Course	
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
	CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
	CO3 Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
	CO4: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.
Department	ECE
Course Code	OE-EC803C
Title of Course	Cyber Security
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: understand the concept of cyber security.
Department	ECE
Course Code	OE-EC804A
Title of Course	Artificial Intelligence
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Understand the modern view of AI as the study of agents that receive percepts from the environment and perform actions..
	CO2 Demonstrate awareness of the major challenges facing AI and the complex of typical problems within the field.
	CO3: Exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management.
	CO4: Asses critically the techniques presented and to apply them to real world problems.
Department	ECE
Course Code	**OE-EC804B**
Title of Course	**Microwave Integrated Circuits**

Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: Analyze the fabrication techniques of MIC and MMIC, use of active devices with MIC and MMIC, differentiate between MIC and MMIC.
	CO2: Aanalyze and design strip lines and micro strip lines, and model the discontinuities in those lines.
	CO3: Analyze and design slot lines, fin lines, coplanar lines and coplanar wave-guides.
	CO4: Design parallel coupled lines for couplers and power divider circuits.
	CO5: Differentiate between various measurement techniques associated with planar transmission lines.
Department	ECE
Course Code	OE-EC804C
Title of Course	Organizational Behavior
Nature of Course	Optional
Type of Course	Lectures
Contact Hours	3L+0T
Total Contact Hours	32
Course Outcomes	CO1: know about organisational structure, organisational behaviour and personality development.
	CO2: learn about motivational techniques and skill required to work in a group and the process of group decision making.
	CO3: know various leadership styles and the role of leader in achievement of organisational objective.
	CO4: learn about the reasons organizational change and its development.
Department	ECE
Course Code	**EC881**
Title of Course	**Project Stage II**
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	0T+15P
Total Contact Hours	15
Course Outcomes	CO1: Ability to generate the specification of the subsystems and forming the block diagram of the complete system.
	CO2: Ability to improving the experimental skills of the students in implementing, testing and interfacing different circuits.

	CO3: Ability to utilize scattered materials from several under graduate courses of telecommunication, electronics and propagation.
	CO4: Ability to improvise their all-round knowledge, particularly of recent developments which have not yet been included in the curriculum.
	CO5: Ability to build different circuits as subparts of the project that can serve in developing laboratory work.

Department	ECE
Course Code	**EC781**
Title of Course	**INDUSTRIALTRAINING**
Nature of Course	Compulsory
Type of Course	
Contact Hours	0L+0T
Total Contact Hours	
Course Outcomes	CO1: Abilitythe meetthe gapbetweentheIndustryrequirements andthelearningatInstitute.
	CO2: Abilityto familiartheworking cultureandenvironmentof theindustry.

Department	ECE
Course Code	**EC782**
Title of Course	**PROJECTPART1**
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P+0T
Total Contact Hours	
Course Outcomes	CO1: Abilitytoenablestudentstogeneratethespecificationofthesubsystemsandforming theblockdiagramofthecompletesystem.
	CO2: Abilitytoimprovetheexperimentalskillsofthestudentsinimplementing,testingand interfacingdifferentcircuits.
	CO3:Toprovidethe studentwithanintegratedapplication,toutilize

	scatteredmaterialsFrom severalundergraduatecoursesoftelecommunication,electronics andpropagation.
	CO4: Abilitytoimprovisetheir all-round knowledge, particularly ofrecent developments whichhavenotyetbeenincludedinthecurriculum
	CO5: Abilityto builddifferentcircuits assubpartsof theprojectthatcanserve indeveloping laboratorywork.

Department	ECE
Course Code	**EC891**
Title of Course	**GRANDVIVA**
Nature of Course	Compulsory
Type of Course	Sessional
Contact Hours	0P+0T
Total Contact Hours	6
Course Outcomes	CO1: Abilitytogetthescopeofrevisethecoreengineeringsubjectslearnsduringthe4yearof graduatecourse.
	CO2: Abilitytoknowtherequirementsofthesubjectswhicharenecessarytosolvethereallife problems.
	CO3:Abilitytogainthe knowledge howto facetheinterviewforarecruitmentdrive.

Semester I

Department	CIVIL ENGINEERING
Course Code	BS-PH101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +1 T
Total Contact Hours	44
Course Out Come	Basic concepts of mechanics, optics and its applications, electricity, magnetism and qualitativeunderstanding of concepts of quantum physics and statistical mechanics.

Department	CIVIL ENGINEERING
Course Code	BS-M102
Title of Course	Mathematics –IB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	After completing the course the student will be able to □ Apply the concept and techniques of differential and integral calculus to determine curvature andevaluation of different types of improper integrals. □ Understand the domain of applications of mean value theorems to engineering problems. □ Learn the tools of power series and Fourier series to analyze engineering problems and apply theconcept of convergence of infinite series in many approximation techniques in engineeringdisciplines. □ Apply the knowledge for addressing the real life problems which comprises of several variables orattributes and identify extremum points of different surfaces of higher dimensions. □Understand different types of matrices, their eigen values, eigen vectors, rank and also theirorthogonal transformations which are essential for understanding physical and engineering problems.

Department	CIVIL ENGINEERING
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	□ To understand and analyze basic electric and magnetic circuits □ To study the working principles of electrical machines and power converters. □ To introduce the components of low voltage electrical installations

Department	CIVIL ENGINEERING
Course Code	BS-PH191
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	After completing the course the student will be able to 1: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. 2: Ability to know optical property. 3: Ability to learn electrical property. 4: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. 5: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	CIVIL ENGINEERING
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Out Come	After completing the course the student will be able to 1: To learn about the operation, calibration and application of different electrical elements, instruments respectively and observe the constructional details of different electrical machines. 2: To learn about the RLC circuit behaviour under AC and DC excitation. 3: To learn about the characteristics features of a single-phase transformer 4: To learn about three phase circuitanalysis. 5: To learn about the characteristic behaviours of different rotating electrical machines. 6: To learn about the operation of different converters and LT switchgear.

Department	CIVIL ENGINEERING
Course Code	ES-ME192
Title of Course	Workshop/Manufacturing Practices(Gr-A)
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1T+4P
Total Contact Hours	65
Course Out Come	The student will learn: ☐ Introduction to engineering design and its place in society ☐ Exposure to the visual aspects of engineering design ☐ Exposure to engineering graphics standards ☐ Exposure to solid modelling

Semester II

Department	CIVIL ENGINEERING
Course Code	BS-CH201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	The concepts developed in this course will aid in quantification of several concepts in chemistry that havebeen introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic,atomic and molecular level modifications. Quantum theory is more than 100 years old and to understandphenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to: ☐ Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. considerations. exciting different molecular energylevels in various spectroscopic techniques electronegativity, oxidation states andelectronegativity. molecules.

Department	CIVIL ENGINEERING
Course Code	BS-M202
Title of Course	Mathematics –IIB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +1T
Total Contact Hours	40
Course Out Come	The students will be able to: ☐ Learn the methods for evaluating multiple integrals and their applications to different physicalproblems. ☐ Understand different techniques to solve first and second order ordinary differential equations with itsformulation to address the modelling of systems and problems of engineering sciences. ☐ Learn different tools of differentiation and integration of functions of a complex variable that are usedwith various other techniques for solving engineering problems. ☐ Apply different types of transformations between two 2-dimensional planes for analysis of physicalor engineering problems.

Department	CIVIL ENGINEERING
Course Code	ES-CS201
Title of Course	Programming forProblem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +0T
Total Contact Hours	40
Course Out Come	The student will learn ☐ To formulate simple algorithms for arithmetic and logical problems. ☐ To translate the algorithms to programs (in C language). ☐ To test and execute the programs and correct syntax and logical errors. ☐ To implement conditional branching, iteration and recursion. ☐ To decompose a problem into functions and synthesize a complete program usingdivide and conquer approach. ☐ To use arrays, pointers and structures to formulate algorithms and programs. ☐ To apply programming to solve matrix addition and multiplication problems andsearching and sorting problems. ☐ To apply programming to solve simple numerical method problems, namely rotfinding of function, differentiation of function and simple integration.

Department	CIVIL ENGINEERING
Course Code	HM- HU201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	25
Course Out Come	The student will acquire basic proficiency in English including reading and listening comprehension, writingand speaking skills.

Department	CIVIL ENGINEERING
Course Code	BS-CH291
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	After completing the course the student will be able to 1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. 2: Rationalise bulk properties and processes using thermodynamic considerations. 3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. 4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. 5: List major chemical reactions that are used in the synthesis of molecules.

Department	CIVIL ENGINEERING
Course Code	ES-CS291
Title of Course	Programming forProblem Solving
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4L +0T
Total Contact Hours	40
Course Out Come	☐ To formulate the algorithms for simple problems ☐ To translate given algorithms to a working and correct program ☐ To be able to correct syntax errors as reported by the compilers ☐ To be able to identify and correct logical errors encountered at run time ☐ To be able to write iterative as well as recursive programs ☐ To be able to represent data in arrays, strings and structures and manipulate them through a program ☐ To be able to declare pointers of different types and use them in defining self-referential structures. ☐ To be able to create, read and write to and from simple text files.

Department	CIVIL ENGINEERING
Course Code	ES-ME291
Title of Course	Workshop/Manufacturing Practices
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1T+4P
Total Contact Hours	52
Course Out Come	☐ Upon completion of this laboratory course, students will be able to fabricate components with theirown hands. ☐ They will also get practical knowledge of the dimensional accuracies and dimensional tolerancespossible with different manufacturing processes. ☐ By assembling different components, they will be able to produce small devices of their interest.

Department	CIVIL ENGINEERING
Course Code	HM-HU291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	☐ The student will acquire basic proficiency in English including reading and listening comprehension,writing and speaking skills.

COURSE OUTCOME (CO)
SESSION: 2020-21

Semester III (Second year)

Theory

Department	CIVIL ENGINEERING
Course Code	CE(BS)301
Title of Course	Biology for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	33
Course Out Come	After completing the course the student will be able to 1: Describe how biological observations of 18th Century that lead to major discoveries. 2: Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological. 3: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring. 4: Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. 5: Classify enzymes and distinguish between different mechanisms of enzyme action. 6: Identify DNA as a genetic material in the molecular basis of information transfer. **7**: Analyse biological processes at the reductionistic level.

Department	CIVIL ENGINEERING
Course Code	CE(ES)301
Title of Course	ENGINEERING MECHANICS
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+1T
Total Contact Hours	42
Course Outcomes	After completing the course the student will be able to 1. Illustrate system of forces and its resultant and free body diagram of forces. 2. List the types of friction and the laws of friction. 3. Analysis of truss by method of joints and method of sections. 4. Locate the centroid of simple figures and composite sections. 5. Demonstrate particle dynamics and kinematics of rigid bodies.

Department	CIVIL ENGINEERING
Course Code	CE(ES)302
Title of Course	Energy Science & Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	1L + 1T
Total Contact Hours	30
Course Outcomes	1. To make understand the ideas of scientific principles, energy systems and various non-renewable and renewable resources for energy. 2. To recognize the relation between energy, environment and economic system. 3. To identify the role of civil engineering in energy sources. 4. To interpret about green building LEED ratings, energy audit of facilities andoptimization of energy consumption.

Department	CIVIL ENGINEERING
Course Code	CE (BS)301
Title of Course	Mathematics – III (Transform & Discrete Mathematics)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	34
Course Out Come	1: Learn the tools of Laplace Transform, Fourier Transform and Z-Transform to analyse engineering problems. 2: Learn the ideas of functions, relation and algebraic structure and their applications in engineering environment. 3: Understand the concept of Logic, partially ordered set and apply the Counting technique in the problems of engineering fields. 4: Learn Basics of Graph Theory which are useful to solve engineering problems.

Department	CIVIL ENGINEERING
Course Code	CE(HS)301
Title of Course	HUMANITIES-I (EFFECTIVE TECHNICAL COMMUNICATION)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	36
Course Outcomes	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills. And understand the basics of Business Ethics and Corporate Communication

Department	CIVIL ENGINEERING
Course Code	CE(HS)302
Title of Course	INTRODUCTION TO CIVIL ENGINEERING
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	1L+1T
Total Contact Hours	33
Course Outcomes	1. Understand the basic of civil engineering. 2. Study History of Civil engineering, National Planning for Construction and Infrastructure Development, Fundamentals of Architecture & Town Planning, Fundamentals of Building Materials. 3. Discuss the Basics of Construction Management & Contracts Management, Environmental Engineering & Sustainability, basics of Geotechnical Engineering. 4. Explain fundamentals of Hydraulics, Hydrology &Water Resources Engineering, Ocean Engineering, Power Plant Structures, surveying techniques, &Geomatics, Traffic &Transportation Engineering, Repairs & Rehabilitation of Structures, Computational Methods, IT, IoT in Civil Engineering. 5. Follow the cases of large civil engineering projects by industry professionals, covering comprehensive planning to commission. 6. Learn Basics of Professionalism.

Practical/ Sessional

Department	CIVIL ENGINEERING
Course Code	CE(ES)391
Title of Course	Basic Electronics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1L+2P
Total Contact Hours	42
Course Outcomes	1. Understand the principles of semiconductor devices and their applications. 2. Design an application using Operational Amplifier. 3. Understand the working of timing circuit and oscillators. 4. Understand logic gates, flop flop as a building block of digital systems. 5. Learn the basics of Electronic communication system.

Department	CIVIL ENGINEERING
Course Code	CE(ES)392
Title of Course	Computer-aided Civil Engineering Drawing
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1L+2P
Total Contact Hours	42
Course Outcomes	1. Discuss the basic concepts of drawing. 2. Sketch the site plan, floor plan, elevation and section drawing of small residential buildings. 3. Illustrate perspective view of building and fundamentals of Building Information Modelling. 4. Describe the types of masonry bonds.

Department	CIVIL ENGINEERING
Course Code	CE(ES)393
Title of Course	Life Science
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	15
Course Out Come	1: Comparison of stomatal index in different plants. 2: Study of mineral crystals in plants; 3: Determination of diversity indices in plant communities;To construct ecological pyramids ofpopulation sizes in an ecosystem; 4:Determination of ImportanceValue Index of a species in a plant community; Seminar (with PPTs) on EIA of a Mega-Project (e.g.,Airport, 5: Preparation and extraction of genomic DNA and determination of yield by UV absorbance;

COURSE OUTCOME (CO)
SESSION: 2020-21

Semester IV (Second year)

Department	CIVIL ENGINEERING
Course Code	CE(ES)401
Title of Course	Introduction to Fluid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	40
Course Outcomes	On successful completion of this course, student should be able to: 1. define basic terms, values and laws in the areas of fluids properties, statics, kinematics and dynamics of fluids, and hydraulic design of pipe systems; 2. describe methods of implementing fluid mechanics laws and phenomena while analyzing the operational parameters of hydraulic problems; 3. practically apply tables and diagrams, and equations that define the associated laws; 4. calculate and optimize operational parameters of hydraulic problems; 5. explain the correlation between different operational parameters; 6. select engineering approach to problem solving based on the acquired physics and mathematical knowledge.

Department	CIVIL ENGINEERING
Course Code	CE(ES)402
Title of Course	Introduction to Solid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	34
Course Outcome	After going through this course, the students will be able to: 1. To identify the equilibrium conditions and elastic properties of axially loaded bars through stress-strain and force-displacement curves. 2. To identify the principal plane and principal stresses through Mohr circle. 3. To calculate the hoop and meridional stresses in thin cylinders and spherical shells. 4. To identify different degrees of freedoms for support conditions like hinge, roller and fixed constraints. 5. To calculate the bending moment, shear force and deflection of beams for uniformly distributed, concentrated, linearly varying and external concentrated moment. 6. To calculate the member forces in a plane truss using Method of Joint and Method of Section. 7. To identify torsional moment and twist on a circular shaft and calculate the shear stress. 8. To know the concepts of strain energy due to axial load, bending and shear. 9. To calculate the buckling load of columns using Euler's theory for different support constraints

Department	CIVIL ENGINEERING
Course Code	CE(PC)401
Title of Course	Soil Mechanics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+1T
Total Contact Hours	41
Course Outcomes	After going through this course, the students will be able to: 1. Classify soil as per grain size distribution curve and understand the index properties of soil. 2. Apply the concept of total stress, effective stress and pore water pressure for solving geotechnical problems. 3. Assess the permeability of different types of soil and solve flow problems. 4. Estimate the seepage loss, factor of safety against piping failure using flow net related to any hydraulic structure. 5. Determine vertical stress on a horizontal plane within a soil mass subjected to different types of loading on the ground surface and also the maximum stressed zone or isobar below a loaded area. 6. Apply the concept of shear strength to analyze different geotechnical problems and determine the shear strength parameters from lab and field tests.

Department	CIVIL ENGINEERING
Course Code	CE(PC)402
Title of Course	Environmental Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L2+T1
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies of water supply engineering and solid waste management 2. Describe different surface and groundwater sources; and composition and characteristics of municipal solid waste 3. Apply the methods of quantifying water requirement and MSW generation 4. Solve different mathematical problems regarding different components of water supply systems, distribution networks and MSW management systems 5. Compare between different water samples based on their physical, chemical and biological characteristics 6. Design different unit processes and operations involved in water treatment and MSW management

Department	CIVIL ENGINEERING
Course Code	CE(PC)403
Title of Course	Surveying &Geomatics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	42
Course Outcomes	Upon completing the course, the students will be able to: 1. Define and state the scope of surveying and geomatics in civil engineering 2. Understand the basic principles of surveying and geomatics engineering 3. Apply the different methods of surveying and geomatics to measure the features of interest 4. Analyze the traditional and advanced methods of surveying 5. Evaluate the different techniques of surveying and geomatics in solving real world problems. 6. Design and construct solutions for real world problems related to surveying and geomatics.

Department	CIVIL ENGINEERING
Course Code	CE(PC)404
Title of Course	CONCRETE TECHNOLOGY
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+1T
Total Contact Hours	40
Course Outcomes	On completion of the course, the students will be able to: 1. Test all the required properties of concrete materials as per IS code. 2. Compute the properties of concrete at fresh and hardened state. 3. Design the concrete mix as per latest IS code methods. 4. Ensure quality control while testing/ sampling. 5. Design the special type of concrete for specific application purposes. 6. Use the admixture as per requirement.

Department	CIVIL ENGINEERING
Course Code	CE(HS)401
Title of Course	Civil Engineering - Societal & Global Impact
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Out Come	On completion of the course, the students will be able to: 1. The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively. 2. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future 3. The Sustainability of the Environment, including its Aesthetics, 4. The potentials of Civil Engineering for Employment creation and its Contribution to the GDP 5. The Built Environment and factors impacting the Quality of Life 6. The precautions to be taken to ensure that the above-mentioned impacts are not adverse but beneficial. 7. Applying professional and responsible judgement and take a leadership role;

Department	CIVIL ENGINEERING
Course Code	CE(MC)401
Title of Course	Management – I (Organizational Behaviour)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	24L
Course Outcomes	CO1.Identify the importance and intricacies of organizational behavior. CO2.Describe personality, attitudes and perception to motivate employees and improve one's perception CO3.Monitor human resources through effective leadership CO4.Resolve organizational conflicts and politics through negotiations.

Department	CIVIL ENGINEERING
Course Code	CE(ES)491
Title of Course	Fluid Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	On completion of the course, the students will be able to: 1. Calibrate the notch and orifice meter. 2. Evaluate the performance of pump and turbine. 3. Determine the various hydraulic coefficients. 4. Determine the minor losses through pipes. 5. Measure the water surface profile due to formation of hydraulic jump. 6. Measure the water surface profile for flow over Broad crested weir.

Department	CIVIL ENGINEERING
Course Code	CE(ES)492
Title of Course	Solid Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	After going through this course, the students will be able to: 1. Demonstrate the method and findings of tension and compression tests on ductile and brittlematerials. 2. Explain the method of bending tests on mild steel beam and concretebeam. 3. Demonstrate the method and findings of Torsion test on mild steel circular bar and concrete beam. 4. Illustrate the concept of hardness and explain the procedure and findings of Brinnel and Rockwelltests. 5. Demonstrate the concept and procedure of calculation of spring constant and elaborate its use in CivilEngineering. 6. Demonstrate the method and findings of Izod and Charpy impacttests. 7. Understand the concepts of fatiguetest.

Department	Civil Engineering
Course Code	CE(ES)493
Title of Course	Engineering Geology Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	Upon completion of the course, the students will be able to: 1. Define and state the role of engineering geology in civil engineering 2. Understand origin of rocks and geologic structures 3. Apply different tools to identify rocks and minerals in hand specimen and under microscope 4. Analyze the geological structures through drawing the cross sections from the geological maps 5. Evaluate the results obtained from different geological experiments 6. Investigate the natural hazards/disasters that are caused by the geological reasons

Department	CIVIL ENGINEERING
Course Code	CE(PC)493
Title of Course	Surveying &Geomatics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	Upon completion of the course, the students will be able to: 1. State the interdependency and advancement of different surveying methods 2. Comprehend the working principles of different surveying and geomatics instruments and experiments 3. Execute the different methods of surveying and geomatics to measure the features of interest 4. Examine the results obtained from the surveying and geomatics experiments 5. Critically appraise the different techniques of surveying and geomatics in measuring and assessing the features of interest 6. Design and construct solutions for real world problems related to surveying and geomatics.

Department	CIVIL ENGINEERING
Course Code	CE(PC)494
Title of Course	Concrete Technology Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	On completion of the course, the students will be able to: 1. Demonstrate the method and findings of tension and compression tests on concrete. 2. Understand the concepts of different test on hardened concrete. 3. Calculate the specific gravity of concrete ingredients. 4. Find out the mix proportion of high grade of concrete. 5. Measure the workability of concrete mix. 6. Know about the quality of concrete. 7. Understand the different properties of cement.

Semester V

Department	CIVIL ENGINEERING
Course Code	CE(PC)501
Title of Course	Design of RC Structures
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Understand material properties and design methodologies for reinforced concretestructures. 2. Assess different type of loads and prepare layout for reinforced concretestructures. 3. Identify and apply the applicable industrial design codes relevant to the design of reinforced concretemembers. 4. Analyse and design various structural elements of reinforced concrete building like beam, slab, column, footing, andstaircase. 5. Assessment of serviceability criteria for reinforced concrete beam andslab. 6. Prepare structural drawings and detailing and produce design calculations and drawing in appropriate professionalformat.

Department	CIVIL ENGINEERING
Course Code	CE(PC)502
Title of Course	Engineering Hydrology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	40
Course Outcomes	On completion of the course, the students will be able to: 1. study the source, occurrence, movement and distribution of water which is a prime resource for development of anation. 2. learn about the functioning of reservoirs and estimation of storagecapacities. 3. learn about flood hazards, estimation of design floods for various structures and methods of estimating effects of passage of floods through rivers andreservoirs. 4. know the basic principles of measurement of flow inrivers.

Department	CIVIL ENGINEERING
Course Code	CE(PC)503
Title of Course	STRUCTURAL ANALYSIS-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. Distinguish between stable and unstable and statically determinate and indeterminate structures. 2. Apply equations of equilibrium to structures and compute the reactions. 3. Calculate the internal forces in cable and arch type structures. 4. Evaluate and draw the influence lines for reactions, shears and bending moments in beams due to moving loads. 5. Use approximate methods for analysis of statically indeterminate structures. 6. Calculate the deflections of truss structures and beams.

Department	CIVIL ENGINEERING
Course Code	CE(PC)504
Title of Course	Soil Mechanics – II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	41
Course Outcomes	After going through this course, the students will be able to: 1. Assess the compaction and consolidation characteristics of soil for solving geotechnical problems. 2. Calculate earth pressure on rigid retaining walls on the basis of classical earth pressure theories. 3. Analyze and design rigid retaining walls (cantilever types) from geotechnical engineering consideration. 4. Evaluate the bearing capacity of shallow foundation by applying established theory. 5. Estimate settlement in soils by different methods. 6. Compute safety of dams and embankments on the basis of various methods of slope stability analysis.

Department	CIVIL ENGINEERING
Course Code	CE(PC)505
Title of Course	Environmental Engineering – II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies of waste water engineering and hazardous waste management 2. Describe different home plumbing systems for water supply and wastewater disposal 3. Apply the methods of quantifying sanitary sewage and storm sewage 4. Solve different mathematical problems regarding different components of sewerage system 5. Compare between different wastewater samples based on their physical, chemical and biological characteristics 6. Design different unit processes and operations involved in wastewater treatment

Department	CIVIL ENGINEERING
Course Code	CE(PC)506
Title of Course	Transportation Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Understand the knowledge of planning, design and the fundamental properties of highway materials in highway engineering. 2. Apply the knowledge of geometric design and draw appropriate conclusion. 3. Interpret the concept of different methods in design, construction of the pavement. 4. Interpret traffic parameters by applying the knowledge in traffic planning and intersection design.

Department	CIVIL ENGINEERING
Course Code	CE(PC)591
Title of Course	RC Design Sessional
Nature of Course	Compulsory
Type of Course	Sessional
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	After going through this course, the students will be able to: 1. Understand material properties and design methodologies for reinforced concrete structures. 2. Assess different type of loads and prepare layout for reinforced concrete structures. 3. Identify and apply the applicable industrial design codes relevant to the design of reinforced concrete members. 4. Analyse and design various structural elements of reinforced concrete building like beam, slab, column, footing, and staircase. 5. Assessment of serviceability criteria for reinforced concrete beam and slab. 6. Prepare structural drawings and detailing and produce design calculations and drawing in appropriate professional format.

Department	CIVIL ENGINEERING
Course Code	CE(PC)594
Title of Course	Soil Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	After going through this course, the students will be able to: 1. Identify different types of soil by visual inspection. 2. Determine natural moisture content and specific gravity of various types of soil. 3. Estimate in-situ density by core cutter method and sand replacement method. 4. Analyze grain size distribution and Atterberg limits for soil. 5. Perform laboratory tests to determine permeability and compaction characteristics of soil. 6. Determine shear strength parameters of soil by unconfined compression test and vane shear test. 7. Determine shear strength parameters of soil by direct shear test. 8. Perform triaxial test to determine shear strength parameters of soil. 9. Determine California Bearing Ratio (CBR) of soil. 10. Prepare technical laboratory report

Department	CIVIL ENGINEERING
Course Code	CE(PC)595
Title of Course	Environmental Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	On completion of the course the students will be able to: 1. Experiment various physical characteristics for a given sample of water and wastewater 2. Determine various chemical characteristics for a given sample of water and wastewater 3. Examine the bacteriological characteristics for a given sample of water and wastewater 4. Examine the suitability of a few treatment options for a given sample of water and wastewater 5. Compare the determined quality parameters with standards to decide on the suitability of use for the tested water and disposal of tested wastewater

Department	CIVIL ENGINEERING
Course Code	CE(PC)596
Title of Course	Transportation Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	On completion of the course the students will be able to: 1. Identify and perform various experiments on soil, aggregate and bituminous materials in a group. 2. Interpret and apply the results of various experiments to design and solve various engineering problems related to bituminous overlay, sub base design and bituminous mix design.

Department	CIVIL ENGINEERING
Course Code	CE(PC)597
Title of Course	Computer Applications in Civil Engineering
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	On successful completion of this course, student should be able to: 1. Use the computer as a problem-solvingtool. 2. Identify and formulate Civil Engineering problems solvable bycomputers. 3. Perform linear algebra and matrix operations and their application to solve Civil Engineeringproblems 4. Solve sets of linear equations and determine roots and nonlinearequations 5. Construct, interpret and solve simple optimizationproblems 6. Develop programs for Civil Engineering analysis and designproblems. 7. Use various software used in industries for analysis anddesign.

Semester VI

Department	CIVIL ENGINEERING
Course Code	CE(PC)601
Title of Course	Construction engineering & Management
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	On completion of the course, the students will have: 1. An idea of how structures are built and projects are developed on thefield 2. An understanding of modern constructionpractices 3. A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and projecteconomics 4. A basic ability to plan, control and monitor construction projects with respect to time andcost 5. An idea of how to optimise construction projects based oncosts 6. An idea how construction projects are administered with respect to contract structures and issues. 7. An ability to put forward ideas and understandings to others with effective communication processes

Department	CIVIL ENGINEERING
Course Code	CE(PC)602
Title of Course	Engineering Economics, Estimation & Costing
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	29
Course Outcomes	On completion of the course, the students will: 1. Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses 2. Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. 3. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. 4. Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure. 5. Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure. 6. Be able to understand how competitive bidding works and how to submit a competitive bid proposal.

Department	CIVIL ENGINEERING
Course Code	CE(PC)603
Title of Course	Water Resources Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	31
Course Outcomes	On successful completion of this course, student should be able to: 1. Understand the fundamentals of flow in open channels. 2. Understand the concepts of irrigation. 3. Estimate the quantity of water required by different crops in different seasons, and accordingly the irrigation water requirement. 4. Design channels and other irrigation structures required for irrigation, drainage, soil conservation, flood control and other water-management projects. 5. Learn about groundwater resources, aquifers and wells.

Department	CIVIL ENGINEERING
Course Code	CE(PC)604
Title of Course	Design of Steel Structures
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	After going through this course, the students will be able to: 1. Identify the material properties of structural steel. Moreover, the students will identify different bolted and welded connections, analyse and design them for axial and eccentric loads. 2. Design different steel sections subjected to axial compression and tension following Indian codes of practices. 3. Comprehend the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice. 4. Analyse and design rolled and built up compression members along with base connection subjected to axial compression, bending and tension. 5. Calculate shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines. 6. Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them. 7. Design different components of an industrial building.

Department	CIVIL ENGINEERING
Course Code	CE(PE)601A
Title of Course	Stability of Slopes
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	On successful completion of this course, student should be able to: 1. Understand the fundamental theories and knowledge in the stability analysis of soil slopes. 2. Measure the finite and infinite slope stability. 3. Develop the analytical and numerical skills in treating a complicated practical slope problem. 4. Evaluate the safety and design proper slope protection measures. 5. Analyse the strength parameters in slope stability.

Department	CIVIL ENGINEERING
Course Code	CE(PE)601B
Title of Course	Foundation Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	On successful completion of this course, student should be able to: 1. Determine the load carrying capacity of pile foundation. 2. Compute the efficiency and settlement of pile group. 3. Understand different subsoil exploration methods and interpret field and laboratory test data to obtain design parameters for geotechnical analysis. 4. Correlate bearing capacity of shallow foundation from field test data. 5. Analyze and design sheet pile structure on the basis of earth pressure theories. 6. Understand and apply various types of ground improvement methods for solving complex geotechnical problems.

Department	CIVIL ENGINEERING
Course Code	CE(PE)601C
Title of Course	Ground Improvement Technique
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	On successful completion of this course, student should be able to: 1. gain competence in properly devising alternative solutions to difficult and earth construction 2. evaluate their effectiveness before, during and after construction. 3. understand different approaches to the ground modification. 4. Understand the soil stabilisation for reinforced earth construction.

Department	CIVIL ENGINEERING
Course Code	CE(PE)602A
Title of Course	Building Construction Practice
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	1. Identify the factors to be considered in construction of buildings and develop the construction practices and techniques for basic construction work related to specifications, site clearance, marketing, earthwork, masonary work, slip form, scaffoldings, de-shuttering forms etc. 2. Understand the sub structure construction techniques of basic structures: jacking, tunneling, piling, sheet pile, shoring, dewatering and stand by plant equipment for underground open excavation. 3. Understand the super structure construction techniques for launching girders, bridge decks, off shore platforms etc.

Department	CIVIL ENGINEERING
Course Code	CE(PE)602B
Title of Course	Structural Analysis – II
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. Apply the Slope Deflection and Moment Distribution Method to analyze indeterminate structures. 2. Develop and analyze the concept of suspension bridge and stiffness girders 3. Apply and analyze the concepts of curved beam analysis in hooks, rings and Bow girders. 4. Develop the concept bending in unsymmetrical beams. 5. Develop the fundamental concepts of plastic analysis using kinematic method and apply them in frames and continuous beam analysis. 6. Develop and analyze the portal frames using Portal and Cantilever method. Develop and analyze the indeterminate structures (continuous beams and frames) using flexibility and stiffness matrix method.

Department	CIVIL ENGINEERING
Course Code	CE(PE)602C
Title of Course	Industrial Structure
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. To perform the analysis and design of reinforced concrete members and their connections. 2. To identify and apply the industrial design codes relevant to the design of Reinforced concrete members. 3. To be familiar with the professional and contemporary design issues and fabrication of Reinforced concrete members.

Department	CIVIL ENGINEERING
Course Code	CE(OE)601A
Title of Course	Soft Skills and Interpersonal Communication – I
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	1. Analyse the dynamics of business communication and communicateaccordingly. 2. Write business letters andreports 3. Learn to articulate opinions and views withclarity 4. Appreciate the use of language to create beautifulexpressions 5. Analyse and appreciate literature. 6. Communicate in an official and formalenvironment.

Department	Civil Engineering
Course Code	CE(OE)601B
Title of Course	Introduction to Philosophical Thoughts
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	28
Course Outcomes	Students will be able to: **CO1.**Describe and distinguish key philosophical concepts on Indian philosophy, charvaka philosophy and samkhya philosophy. **CO2.**Read and comprehend key texts of yoga philosophy, naya philosophyand mimansa philosophy. **CO3.**Explain key philosophical concepts on vaisesika, Buddhist and jain philosophy.

Practical/ Sessional

Department	CIVIL ENGINEERING
Course Code	CE(PC)693
Title of Course	Water Resource Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	1. Determine Catchment area delineation (Manually and using DEM). 2. Compute average rainfall over a catchment area with arithmetic mean method, Thiessen polygon method and Isohyetal Method. 3. Use of different type of Rain gauges. 4. Measure infiltration rate using double ring infiltrometer. 5. Measure evaporation using evaporimeter. 6. Record bright sunshine hours using sunshine recorder.

Department	CIVIL ENGINEERING
Course Code	CE(PC)694
Title of Course	Steel Structure Design Sessional
Nature of Course	Compulsory
Type of Course	Practical/ Sessional
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	1. Identify the material properties of structural steel. Moreover, the students will identify different bolted and welded connections, analyse and design them for axial and eccentric loads. 2. Design different steel sections subjected to axial compression and tension following Indian codes of practices. 3. Comprehend the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice. 4. Analyse and design rolled and built up compression members along with base connection subjected to axial compression, bending and tension. 5. Calculate shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines. 6. Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them. 7. Design different components of an industrial building.

Department	CIVIL ENGINEERING
Course Code	CE(PC)695
Title of Course	Quantity Survey Estimation And Valuation Sessional
Nature of Course	Compulsory
Type of Course	Practical/Sessional
Contact Hours	1T+2P
Total Contact Hours	36
Course Outcomes	The subject aims to provide the student with: 1. An introduction to quantity surveying. 2. The capability to know analysis and schedule of rates 3. The ability to know specification of materials 4. An understanding about specification of works 5. The introduction to valuation.

Semester VII (Fourth year]

Theory

Department	CIVIL ENGINEERING
Course Code	CE(OE) 701A
Title of Course	METRO SYSTEM AND ENGINEERING
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	31
Course Outcomes	1. To acquire & understand fundamental principals of metro system and it's need, routing studies; basic planning and financing. 2. To acquire the knowledge of various construction methods for: stations, bridges, tunnenls, basics of construction planning and management, etc. 3. To apply the knowledge to design & adopt the system for Electronics and Communication Engineering such as signaling, automatic fare collection, operation control centre etc. 4. Understand the need for Mechanical work such as rolling stock, vehicle dynamics and structures. 5. To acquire & comprehend various Electrical systems in Metro systems such as OHE, Traction power, substations, standby and backup systems, green building, carbon credits and clear air mechanics.

Department	CIVIL ENGINEERING
Course Code	CE(OE)701B
Title of Course	ICT for Development
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	31
Course Outcomes	1. Define ICT and list different types of ICT and use of it. 2. Discuss Digital Revolution and Digital Communication. 3. Extrapolate Technology and Development on the basis of ICT. 4. List different types of CMC and cite important theoretical framework of CMC.

Department	CIVIL ENGINEERING
Course Code	CE(OE)701C
Title of Course	CYBER LAW & ETHICS
Nature of Course	Open elective courses
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	1. Understand the basics of different Cyber laws of different countries & IT act of India. 2. Discuss computer ethics, professional ethics, computer privacy issues, digital evidence controls, basics of Indian evidence act, legislative background. 3. Explain intellectual property right issues, software piracy, authorship, document forgery. 4. Illustrate Indian IT act and standards 5. Interpret international laws governing cyber space and role of INTERPOL on it.

COURSE OUTCOME (CO)

SESSION: 2020-21

Department	CIVIL ENGINEERING
Course Code	CE(PE)701A
Title of Course	Computational Hydraulics
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	On successful completion of this course, student should be able to: 1. Identify the complexities involved in fluid flow problems. 2. Model the specific flow problem in terms of defining the governing equations, initial and boundary conditions and appropriate solution schemes to use. 3. Develop finite difference formulation of ordinary and partial differential equations of flow problems. 4. Develop finite volume formulation of ordinary and partial differential equations of flow problems.

Department	CIVIL ENGINEERING
Course Code	CE(PE)701B
Title of Course	Disaster Preparedness and Planning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On completion of the course the students will be able to: 1. Define the basic concepts and terminologies disaster management 2. Understand and describe the categories of disaster 3. Realize the roles and responsibilities of a civil engineer towards society in time of a disaster 4. Analyze relationship between development and disasters 5. Apply different concepts of disaster management

Department	CIVIL ENGINEERING
Course Code	CE(PE)701C
Title of Course	Hydraulic Structures
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On successful completion of this course, student should be able to: 1. Identify the characteristics of various types of dams and their selection procedure. 2. Perform the reconnaissance survey and, geophysical investigations necessary for selection of suitable dam site 3. Estimate forces acting on a gravity dams and perform stability analysis. 4. Estimate the seepage loss through embankment dams and suggest necessary remedial measures. 5. Calculate the discharge through the overflow section and design the appropriate energy dissipation structures.

Department	CIVIL ENGINEERING
Course Code	CE(PE)702A
Title of Course	Prestressed Concrete
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Learn the introduction of prestressed concrete member and its deflection properties 2. Develop the design criteria of prestressed concrete section for flexure and shear properties 3. Analyze the anchorage zone stress for post-tensioned members 4. Impart knowledge regarding the methods of Analysis of Statically Indeterminate Structures. 5. Impart knowledge regarding the composite construction of Prestress and In-situ concrete. 6. Impart knowledge regarding Design of Prestressed concrete poles and sleepers and introduction of partial prestressing.

Department	CIVIL ENGINEERING
Course Code	CE(PE)702B
Title of Course	Repair & Rehabilitation of Structures
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	By the end of this course students will have the capability/knowledge of 1. Various distress and damages to concrete and masonry structures 2. The importance of maintenance of structures, types and properties of repair materials etc 3. Assessing damage to structures and various repair techniques

Department	CIVIL ENGINEERING
Course Code	CE(PE)702C
Title of Course	Finite Element Method
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies regarding air pollution and noise pollution 2. Describe the physics of air pollution and noise pollution 3. Apply the methods of air pollution and noise pollution measurements 4. Analyze different concepts of air and noise pollution solving mathematical problems 5. Compare air and noise quality with allowable standards and limits 6. Choose and design proper techniques for air pollution control and noise pollution control

Department	CIVIL ENGINEERING
Course Code	CE(PE)703A
Title of Course	Air and Noise Pollution and Control
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Obtain an understanding of the fundamental theory of the FEA method. 2. Develop the ability to generate the governing FE equations for systems governed by partial differential equations. 3. Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements and

Department	CIVIL ENGINEERING
Course Code	CE(PE)703B
Title of Course	Physico-Chemical Processes for Water and Wastewater Treatment
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On completion of the course the students will be able to: 1. Define the basic concepts and terminologies regarding physico-chemical treatment of water and wastewater 2. Describe the physics, chemistry and hydraulics of different unit operations and processes for water and wastewater treatment 3. Analyze different physico-chemical water and wastewater treatment options solving mathematical problems 4. Design different physico-chemical treatment processes to treat water and wastewater

Department	CIVIL ENGINEERING
Course Code	CE(PE)703C
Title of Course	Water and Air Quality Modelling
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On completion of the course the students will be able to: 1. Define the basic concepts and terminologies regarding water and air quality modelling 2. Describe the background mechanisms in modeling water and air quality 3. Analyze different water and air quality models solving mathematical problems 4. Apply the concepts of air and water quality modeling in air and water pollution control and management

Department	CIVIL ENGINEERING
Course Code	CE(PE)704A
Title of Course	Structural Dynamics
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	At the conclusion of this course, the students will have an understanding of: 1. Fundamental theory of dynamic equation of motion 2. Fundamental analysis methods for dynamic systems 3. Dynamic properties and behaviour of civil structures 4. Modelling approach of dynamic response in civil engineering applications

Department	CIVIL ENGINEERING
Course Code	CE(PE)704B
Title of Course	Advanced Structural Analysis
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Basic Knowledge of the student will increase. 2. Student will be able to apply stiffness and flexibility method using system approach. 3. Student will understand the yield conditions from their knowledge of stress-strain relations. 4. Student will be able to solve simple plate and shell problems

Department	CIVIL ENGINEERING
Course Code	CE(PE)704C
Title of Course	Coastal Hydraulics and Sediment Transport
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On successful completion of this course, student should be able to: 1. Explain and quantify coastal wave processes including wave generation, propagation, refraction, shoaling, diffraction, and breaking. 2. Explain and quantify coastal wave properties important to coastal engineering, including wave heights, speeds, induced water velocities, pressures, making appropriate approximations for deep and shallow waters. 3. Characterize and quantify basic coastal sediment transport processes and rates 4. Analyse coastal sites to determine design waves by utilizing historical and bathymetric data. Estimate hydrodynamic forces on coastal structures

Department	CIVIL ENGINEERING
Course Code	CE(PE)705A
Title of Course	Railway and Airport Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	30
Course Outcomes	Students will be able to 1. Explain the basics in planning functional components of Railway and Airport. 2. Illustrate the engineering concepts of construction, operation and maintenance of Railway and Airport components. 3. Interpret the geometric design parameters of Railway 4. Decide the runway orientation of proposed runway on the basis of previous wind data analysis 5. Assess the basic runway length parameters.

Department	CIVIL ENGINEERING
Course Code	CE(PE)705B
Title of Course	Pavement Design
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	30
Course Outcomes	At the end of the course, the student will be able to: 1. Differentiate between different types of pavements, both structurally and functionally. 2. Conduct Axle Load Survey and Estimate Design Traffic. 3. Analyze and design bituminous and cement concrete pavement using. 4. Understand the principles of Pavement Maintenance and identify various pavement distresses.

Department	CIVIL ENGINEERING
Course Code	CE(PE)705C
Title of Course	Transportation System Planning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	At the end of the course, the student will be able to: 1. To learn the fundamentals of transportation planning. 2. To understand the classical methods of urban transportation planning. 3. To be acquainted with the transportation landuse interaction.

PRACTICAL/SESSIONAL:

Department	CIVIL ENGINEERING
Course Code	CE(IN)791
Title of Course	Industrial Internship
Nature of Course	Compulsory
Type of Course	Practical/Sessional
Contact Hours	1
Total Contact Hours	12
Course Outcomes	Ability to acquire and apply fundamental principles of engineering. Become master in one's specialized technology Become updated with all the latest changes in technological world. Ability to communicate efficiently. Ability to identify, formulate and model problems and find engineering solution based on a systems approach. Capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Department	Civil Engineering
Course Code	CE(PROJ)792
Title of Course	Project Part 1
Nature of Course	Practical/Sessional
Type of Course	Lecture
Contact Hours per week	10P
Total Contact Hours	120
Course Outcomes	Students will be able to: **CO1.**Demonstrate a sound technical knowledge of their selected project topic. **CO2.** Undertake problem identification, formulation and solution. **CO3.** Design engineering solutions to complex problems utilising a systematic approach. **CO4.** Conduct an engineering project. **CO5.**Communicate with engineers and the community at large in written and oral forms. **CO6.**Demonstrate the knowledge, skills and attitudes of a professional engineer.

Semester VIII (Fourth year]

Theory:

Department	CIVIL ENGINEERING
Course Code	CE(HS)801
Title of Course	Professional Practice, law & Ethics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	30L
Course Outcomes	1. Cite Respective roles of various stakeholders 2. Define Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics, Code of Ethics. 3. Discuss General Principles of Contracts Management. 4. Explain Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system. 5. Discuss intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets.

Department	CIVIL ENGINEERING
Course Code	CE(PE)801A
Title of Course	GIS & Remote Sensing
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	32
Course Outcomes	Upon completing the course, the students will be able to: 1. Define and state the scope GIS & remote sensing in civil engineering 2. Understand the basic principles of remote sensing and GIS 3. Apply the various methods of remote sensing and GIS to different geospatial datasets 4. Analyze the different results obtained from different remote sensing data sources 5. Evaluate the different results in solving real world problems. 6. Design and construct optimum solutions for real world problems that can be resolved by GIS & remote sensing

Department	CIVIL ENGINEERING
Course Code	CE(PE)801B
Title of Course	Rock Mechanics
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	Upon completing the course, the students will be able to: 1. To understand the fundamentals of composition and classifications of rocks. 2. To apply the rock mechanics principle in design and analysis practical problems related to rock excavations. 3. To estimate stress-strain characteristics, failure characteristics. 4. To evaluate strength and structural features of rocks.

Department	CIVIL ENGINEERING
Course Code	CE(PE)801C
Title of Course	Environmental Laws and Policy
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	Upon completing the course, the students will be able to: 1. To apply the relevant measures to mitigate pollution from different sources. 2. To understand the effects of the various pollutants on the environment as a whole according to the formulated guidelines 3. To be able to give recommendations for alternatives to reduce pollution 4. To formulate standards of the various parameters corresponding to their impact on the environment with changing time

Department	CIVIL ENGINEERING
Course Code	CE(PE)801D
Title of Course	PAVEMENT MATERIALS
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	29
Course Outcomes	Upon completing the course, the students will be able to: 1. Identify the engineering properties and characteristics of the different materials that concern the pavement engineer. 2. Understanding and evaluation of modern testing techniques of soil, granular, and bituminous materials for pavement analysis and design. 3. Describe different Superpave aggregate tests and requirements. 4. Analysis of design mix for rigid pavements.

Department	Civil Engineering
Course Code	CE(OE)801A
Title of Course	Human Resource Development and Organizational Behaviour
Nature of Course	Open elective courses
Type of Course	Lecture
Contact Hours per week	2L
Total Contact Hours	24
Course Outcomes	Students will be able to: **CO1.** Understand the HR Management and system at various levels in general and in certain specific industries or organizations **CO2.** Create a congenial and cohesive ambience within the framework of organizational structure in achieving the organisational goals. **CO3.** Focus on and analyse the issues and strategies required to select and develop manpower resources **CO4.** Develop relevant skills necessary for application in HR related issues **CO5.** Integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions **CO6.** Identify the importance and intricacies of organizational behaviour.

Department	CIVIL ENGINEERING
Course Code	CE(OE)801B
Title of Course	Bridge Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	32
Course Outcomes	After going through this course, the students will be able to: 1. Discuss basic definitions, types, and components of bridges. 2. Discuss sub-surface investigations required for bridge construction. 3. Understand standard specification and loads for bride design. 4. Perform design of different types bearings and joints for bridges. 5. Perform design of various reinforced concrete and steel bridges.

Department	CIVIL ENGINEERING
Course Code	CE(OE)801C
Title of Course	Deep Foundations
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	On successful completion of this course, student should be able to: - Explain the concept of bearing capacity for deep foundation. - Estimate the safe bearing capacity including settlement consideration for deep foundations. - Select a suitable deep foundation system for various site conditions and also analysis of that. - Explain in what circumstances pile is needed and how to estimate pile and pile group capacity under various soil conditions Characterize.

Department	CIVIL ENGINEERING
Course Code	CE(OE)801D
Title of Course	Groundwater Contamination
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	On successful completion of this course, student should be able to: - To be able to understand the principles and theories regarding groundwater contamination with - To be able to formulate the various remedial measures for groundwater contamination

Department	CIVIL ENGINEERING
Course Code	CE(OE)802A
Title of Course	Soft Skills and Personality Development
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	25
Course Outcomes	1. Discuss about the Self growth theory of soft skill. 2. Study the concept of Competitive Spirit and Responsibility Factor to operate Professional Communication. 3. Develop the leadership quality and team playing strategies

Department	CIVIL ENGINEERING
Course Code	CE(OE)802B
Title of Course	Earthquake Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	34
Course Outcomes	After going through this course, the students will be able to: 1. To provide a coherent development to the students for the courses in sector of earthquake engineering. 2. To present the foundations of many basic engineering concepts related earthquake Engineering 3. To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering 4. To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy.

Department	CIVIL ENGINEERING
Course Code	CE(OE)802C
Title of Course	Urban Transport Planning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. Understanding the issues & challenges in the Transportation Sector 2. To develop skills required for Transport planning & formulation. 3. Understand optimization techniques for Transport Planning & Pricing.

Department	CIVIL ENGINEERING
Course Code	CE(OE)802D
Title of Course	Environmental Impact Assessment and Life Cycle Analyses
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	27
Course Outcomes	After going through this course, the students will be able to: 1. To understand and evaluate the impact of any activity (large or small scale) on the surrounding environment 2. To be able to formulate mitigation strategies to protect the environment leading to sustainability 3. To be able to understand the intricacies of Life Cycle Analysis and apply basic knowledge for coherent existence

COURSE OUTCOME (CO)
SESSION: 2020-21

PRACTICAL/SESSIONAL:

Department	CIVIL ENGINEERING
Course Code	CE(CV)891
Title of Course	Comprehensive Viva Voce
Nature of Course	compulsory
Type of Course	Practical/Sessional
Contact Hours	1
Total Contact Hours	
Course Outcomes	Students will be able to: **CO1:**Memorize the basic and advanced knowledge in civil engineering. **CO2:**Develop an idea about the environment of job market and their preparedness to defend the interview after graduation. **CO3:** Implement their knowledge in civil engineering acquired in the last four years and its usefulness to the society and assess the impact of civil engineering on the environment.

Department	CIVIL ENGINEERING
Course Code	CE (PROJ)892
Title of Course	Project
Nature of Course	compulsory
Type of Course	Practical/Sessional
Contact Hours	10P
Total Contact Hours	120
Course Outcomes	Students will be able to: CO1: recognize the scope of problem and conduct Literature review CO2: use existing/new methods to apply the fundamental aspects of civil engineering and their relevance with respect to the societal benefit CO3: set up experimentation / design / development of models to analyze and compare the results CO4: to develop the ability of working in the groups and to develop skills related to comprehensive report writing.

COURSE OUTCOME OF COMPUTER SCIENCE &ENGINEERING DEPARTMENT

1ST SEM

Department	Basic Science & Humanities (CSE)
Course Code	BS-PH-101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	44
Course Out Come	**CO1:** Ability to know the basic concepts of mechanics and oscillation. **CO2:** Elaborate the concept of optics and introduction to the principle of laser. **CO3:** Ability to understand electromagnetism, dielectric and magnetic properties of materials. **CO4:** Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation. **CO5:** Understand the basic concept of Statistical mechanics.

Department	Basic Science & Humanities (CSE)
Course Code	BS-M-101
Title of Course	Mathematics -IA
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Out Come	**CO1**: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals. **CO2:** Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems. **CO3:** Understand the concept of determinant and learn different types of matrices, concept of rank, system of linear equations, methods of matrix inversion. **CO4:** Understand linear spaces, its basis and dimension with corresponding applications in the field of computer science. **CO5:** Learn and apply the concept of Eigen values, Eigen vectors, diagonalization of matrices and orthogonalization in inner product spaces for understanding physical and engineering problems

Department	Electrical Engineering(CSE)
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering – 1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	**CO1:** To understand and analyze basic electric and magnetic circuits **CO2:** To study the working principles of electrical machines and power converters. **CO3:** To introduce the components of low voltage electrical installations

Department	Basic Science & Humanities (CSE)
Course Code	BS-PH-191
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2**: Ability to know optical property. **CO3**: Ability to learn electrical property. **CO4**: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. **CO5**: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	Electrical Engineering(CSE)
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering – 1
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	30
Course Out Come	**CO1:** To understand and analyze basic electric and magnetic circuits **CO2:** To study the working principles of electrical machines and power converters. **CO3:** To introduce the components of low voltage electrical installations

Department	Mechanical Engineering(CSE)
Course Code	ES-ME191
Title of Course	Workshop/Manufacturing Practices
Nature of Course	Compulsory
Type of Course	Lecture + Practical
Contact Hours	1L+4P
Total Contact Hours	64
Course Out Come	CO1: **Concept** of Engineering materials and its physical, chemical and mechanical properties & applications. CO2: **Understand** different conventional manufacturing processes mainly covering basic principles, different methods and general applications. CO3: **Basic Concept** of forming/shapingand casting. CO4: **Understanding** various aspects of welding processes and its applications. CO5: **Practices** of elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling.

2ND SEM

Department	Basic Science & Humanities (CSE)
Course Code	BS-CH-201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	CO1:Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. CO2: Rationalise bulk properties and processes using thermodynamic considerations. CO3: **:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities (CSE)
Course Code	BS-M-201
Title of Course	Mathematics -IIA
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40

Course Out Come	**CO1:** Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment.
	CO2: Understand the basic ideas of statistics with different characterisation of a univariate and bivariate data set.
	CO3: Apply statistical tools for analysing data samples and drawing inference on a given data set.

Department	CSE
Course Code	ES-CS 201
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
	CO2: Rationalise bulk properties and processes using thermodynamic considerations.
	CO3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
	CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
	CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities (CSE)
Course Code	HM HU 201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	25
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	Basic Science & Humanities (CSE)
Course Code	BS-CH-291
Title of Course	Chemistry-1 Lab

Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. **CO2:** Rationalise bulk properties and processes using thermodynamic considerations. **CO3:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. **CO4:** Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. **CO5:** List major chemical reactions that are used in the synthesis of molecules.

Department	CSE
Course Code	ES-CS-291
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	30
Course Out Come	**CO1:** To formulate the algorithms for simple problems **CO2:** To translate given algorithms to a working and correct program **CO3:** To be able to correct syntax errors as reported by the compilers **CO4:** To be able to identify and correct logical errors encountered at run time **CO5:** To be able to write iterative as well as recursive programs **CO6:** To be able to represent data in arrays, strings and structures and manipulate them through a program **CO7:** To be able to declare pointers of different types and use them in defining self-referential structures. **CO8:** To be able to create, read and write to and from simple text files.

Department	Mechanical Engineering(CSE)
Course Code	ES-ME 291
Title of Course	Engineering Graphics & Design
Nature of Course	Compulsory

Type of Course	Practical
Contact Hours	1L+4P
Total Contact Hours	65
Course Out Come	CO1:Understanding and drawing of lines, lettering, dimensioning, scales and geometrical construction of curves. CO2: Learn projection of points, lines and surfaces and solids like cube, pyramid, prism, cylinder and cone. CO3: Drawing isometric view from orthogonal/sectional views of simple solid objects. CO4: Understand and draw full and half sectional views of solids and develop the cut surfaces of prism, cylinder and cone. CO5: To learn Computer Aided Drafting using AUTO-CAD.

Department	Basic Science & Humanities (CSE)
Course Code	HM HU 291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

3RD SEM

Department	ECE(CSE)
Course Code	ESC-CS301
Title of Course	Analog & Digital Electronics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	CO1: Realize the basic operations of different analog components. CO2: Realize basic gate operations and laws Boolean algebra. CO3: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

Department	CSE
Course Code	PCC-CS301
Title of Course	Data Structure & Algorithms
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	38
Course Outcome	CO1: Differentiate how the choices of data structure & algorithm methods impact the performance of program

	CO2: Solve problems based upon different data structure & also write programs.
	CO3: Identify appropriate data structure & algorithmic methods in solving problem.
	CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
	CO5: Compare and contrast the benefits of dynamic and static data structures implementations.

Department	CSE
Course Code	PCC-CS302
Title of Course	Computer Organisation
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	CO1: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations. CO2: Understand basic structure of different combinational circuits multiplexer, decoder, encoder etc. CO3: Perform different operations with sequential circuits. CO4: Understand memory and I/O operations.

Department	Basic Science & Humanities (CSE)
Course Code	BSC-301
Title of Course	Mathematics –III (Differential Calculus)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	40
Course Out Come	**CO1:** Learn to apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines. **CO2:** Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation. **CO3**: Learn the methods for evaluating multiple integral and their applications to different physical problems. **CO4:** Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences. **CO5**: Learn Basics of Graph Theory which are useful to solve engineering problems.

Department	Basic Science & Humanities (CSE / IT)
Course Code	HS-MC-301
Title of Course	Economics for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	**CO1**: Ability to understand Economic Decisions Making and considering that students willlearn to find out Engineering Costs & Estimation. **CO2**: Ability to learn Cash Flow and also able to calculate Rate of Return Analysis. **CO3**: Ability to know Inflation and Price Change, Present Worth Analysis. **CO4**: Ability to learn depreciation and able to analysis the requirement of replacement.

Department	ECE(CSE)
Course Code	ESC391
Title of Course	Analog & Digital Electronics Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	30
Course Out Come	CO1: Realize the basic operations of different analog components. CO2: Realize basic gate operations and laws Boolean algebra. CO3: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

Department	CSE
Course Code	PCC-CS 391
Title of Course	Data Structure & Algorithm Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	36
Course Out Come	CO1: Differentiate how the choices of data structure & algorithm methods impact the performance of program. CO2: Solve problems based upon different data structure & also write programs. CO3: Identify appropriate data structure & algorithmic methods in solving problem. CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing. CO5: Compare and contrast the benefits of dynamic and static data structures implementations.

Department	CSE
Course Code	PCC-CS 392
Title of Course	Computer Organisation Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	32
Course Out Come	CO1: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations. CO2: Understand basic structure of different combinational circuits multiplexer, decoder, encoder etc. CO3: Perform different operations with sequential circuits. CO4: Understand memory and I/O operations.

Department	CSE
Course Code	PCC-CS393
Title of the Course	IT Workshop (Sci Lab/MATLAB/Python/R)
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4
Total Contact Hours	32
Course Outcomes	CO1: To master an understanding of scripting & the contributions of scripting languages. CO2: Design real life problems and think creatively about solutions. CO3: Apply a solution in a program using R/Matlab/Python. CO4: To be exposed to advanced applications of mathematics, engineering and natural sciences to program real life problems.

4TH SEM

Department	CSE
Course Code	PCC-CS401
Title of the Course	Discrete Mathematics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+1T
Total Contact Hours	36
Course Outcomes	CO1: Express a logic sentence in terms of predicates, quantifiers, and logical connectives. CO2: Derive the solution for a given problem using deductive logic and prove the solution based on logical inference. CO3: Classify its algebraic structure for a given a mathematical problem. CO4: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

	CO5: Develop the given problem as graph networks and solve with techniques of graph theory.

Department	CSE
Course Code	PCC-CS402
Title of the Course	Computer Architecture
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	33
Course Outcomes	CO1: Learn pipelining concepts with a prior knowledge of stored program methods. CO2: Learn about memory hierarchy and mapping techniques. CO3 Study of parallel architecture and interconnection network

Department	CSE
Course Code	PCC-CS403
Title of the Course	Formal Language & Automata Theory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	37
Course Outcomes	CO1: Write a formal notation for strings, languages and machines. CO2: Design finite automata to accept a set of strings of a language. CO3: For a given language determine whether the given language is regular or not. CO4: Design context free grammars to generate strings of context free language. CO5: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars CO6: Write the hierarchy of formal languages, grammars and machines. CO7: Distinguish between computability and non-computability and Decidability and undecidability.

Department	CSE
Course Code	PCC-CS404
Title of the Course	Design and Analysis of Algorithms
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. CO2: Describe the greedy paradigm and

	explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms. CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming. CO5: develop the dynamic programming algorithms, and analyze it to determine its computational complexity. CO6: For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems. CO7: Explain the ways to analyze randomized algorithms (expected running time, probability of error). CO8: Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS) .

Course Code	BSC-401
Title of Course	Biology
Department	Basic Science & Humanities (CSE)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	33
Course Out Come	**CO1**: Describe how biological observations of 18th Century that lead to major discoveries. **CO2**: Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological. **CO3**: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring. **CO4**: Convey that all forms of life have the same building blocks and yet the

<table>
<tr><td></td><td>manifestations are as diverse as one can imagine.

CO5: Classify enzymes and distinguish between different mechanisms of enzyme action.

CO6: Identify DNA as a genetic material in the molecular basis of information transfer.

CO7: Analyse biological processes at the reductionistic level.

CO8: Apply thermodynamic principles to biological systems.

CO9: Identify and classify microorganisms.</td></tr>
</table>

Department	CSE
Course Code	MC-401
Title of the Course	Environmental Sciences
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	1L
Total Contact Hours	40
Course Outcomes	CO1: To understand the natural environment and its relationships with human activities. CO2: To apply the fundamental knowledge of science and engineering to assess environmental and health risk. CO3: To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations. CO4: Acquire skills for scientific problem-solving related to air, water, noise& land pollution.

Department	CSE
Course Code	PCC-CS492
Title of the Course	Computer Architecture Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	CO1: Learn pipelining concepts with a prior knowledge of stored program methods. CO2: Learn about memory hierarchy and

	mapping techniques. CO3 Study of parallel architecture and interconnection network.

Department	CSE
Course Code	PCC-CS494
Title of the Course	Design & Analysis Algorithm Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	36
Course Outcomes	CO1: For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms. CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming. CO5: develop the dynamic programming algorithms, and analyze it to determine its computational complexity. CO6: For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems. CO7: Explain the ways to analyze randomized algorithms (expected running time, probability of error). CO8: Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

5TH SEM

Department	ECE(CSE)
Course Code	ESC-501
Title of the Course	Signals & Systems
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	30
Course Outcomes	CO1: Understand the concepts of continuous time and discrete time systems. CO2: Understand sampling theorem and its implications. CO3: Analyse systems in complex frequency domain. CO4: Understand the concepts of continuous time and discrete time systems.

Department	CSE
Course Code	PCC-CS501
Title of the Course	Compiler Design
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	45
Course Outcomes	CO1: Understand given grammar specification develop the lexical analyser. CO2: Design a given parser specification design top-down and bottom-up parsers. CO3: Develop syntax directed translation schemes. CO4: Develop algorithms to generate code for a target machine.

Department	CSE
Course Code	PCC-CS502
Title of the Course	Operating Systems
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	37
Course Outcomes	CO1: Create processes and threads. CO2: Develop algorithms for process

	scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. CO3: For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. Design and implement file management system. CO4: For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Department	CSE
Course Code	PCC-CS503
Title of the Course	Object Oriented Programming
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	34
Course Outcomes	CO1: Specify simple abstract data types and design implementations, using abstraction functions to document them. CO2: Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity. CO3: Name and apply some common object-oriented design patterns and give examples of their use. CO4: Design applications with an event-driven graphical user interface.

Department	CSE
Course Code	HSMC-501
Title of the Course	Introduction to Industrial Management (Humanities III)
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: Interpret given organization structure, culture, climate and major provisions of

	factory acts and laws. CO2: Explain material requirement planning and store keeping procedure. CO3: Plot and analyze inventory control models and techniques. CO4: Prepare and analyze CPM and PERT for given activities. CO5: List and explain PPC functions.

Department	CSE
Course Code	PEC-IT501A
Title of the Course	Theory of Computation
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	35
Course Outcomes	CO1: Define a system and recognize the behavior of a system. They will be able to minimize a system and compare different systems. CO2: Convert Finite Automata to regular expression. Students will be able to check equivalence between regularlinear grammar and FA. CO3: Minimize context free grammar. Student will be able to check equivalence of CFL and PDA. CO4: They Will be able to design Turing Machine. CO5: Design Turing machine.

Department	CSE
Course Code	PEC-IT501B
Title of the Course	Artificial Intelligence
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	34
Course Outcomes	**CO1:** To indicate the limitation of conventional computational approaches and the advantage of Artificial Intelligence in complex real life problem solving. **CO2:** To discuss on the strategies for various shortest path problems, optimization problems, machine

<table>
<tr><td></td><td>learning problems and various well known gaming problems like chess, missionaries and cannibal problems, tick-tack-toe problems, etc.
CO3: To illustrate the functionalities and working model of various high end AI systems like robotics, expert systems, etc.
CO4: To recognize the limitation of AI in contributing in the roadmap of future strategically development in various AI related fields.</td></tr>
</table>

Department	CSE
Course Code	PEC-IT501C
Title of the Course	Advanced Computer Architecture
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To distinguish the concepts of Computer Architecture and Organization. **CO2:** To illustrate various Parallel Processing Architectures, Data and Resource Dependencies, Program Partitioning and Scheduling, Control Flow vs. Data Flow. **CO3:** To discuss on the Network topologies, RISC vs. CISC, Memory Hierarchy, and Virtual Memory. **CO4:** To elaborate the concepts of Pipelining, Instruction Pipelining, dynamic pipelining, and arithmetic pipelines. **CO5:** To indicate multiprocessors, vector and array processing principles. CO6: To recognize Data Flow Architecture and Parallel Programming Models, Languages, Compilers.

Department	CSE
Course Code	PEC-IT501D
Title of the Course	Computer Graphics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Outcomes	**CO1:** To elaborate the representation of graphics in the form of picture elements or picture coordinates in computers.
	CO2: To illustrate how graphics are created and updated with the help of some preliminary algorithms.
	CO3: To explain the concept of image transformation and translation to satisfy some image related problems.
	CO4: To discuss on the basics of 2d and 3d transformations and their underlying relations.
	CO5: To enlighten on the approaches towards overcoming the limitations of basic drawing algorithms, translation and transformation techniques.

Department	CSE
Course Code	MC-CS 501
Title of the Course	Constitution of India
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	23
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Union Government and its Administration .
	CO2: Know the structure of the Indian Union: Federalism, Centre- State relationship
	CO3: Analyze Local Administration District's Administration head.
	CO4: Describe role of Election Commission Election Commission.

Department	CSE
Course Code	PCC-CS591
Title of the Course	Compiler Design Lab
Nature of Course	PRACTICAL

Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	CO1: Be exposed to compiler writing tools. CO2: Learn to implement the different Phases of compiler CO3: Be familiar with control flow and data flow analysis CO4: Learn simple optimization techniques

Department	CSE
Course Code	PCC-CS592
Title of the Course	Operating System Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To operate on UNIX / Linux operating system with various shell commands, including different kernel level activities. **CO2:** To handle and synchronize processes and threads, with and without interrupts. **CO3:** To employ the concept of pipes for improving the efficiency of an operating system in terms of speed up and throughput.

Department	CSE
Course Code	PCC-CS593
Title of the Course	Object Oriented Programming Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To write and execute Object Oriented Programs to solve simple engineering problems. **CO2:** To developing programs using interfaces, polymorphism etc. **CO3:** To conduct experiments on multi-threaded programming, event-driven and concurrent programming.

6TH SEM

Department	CSE
Course Code	PCC-CS601
Title of the Course	Database Management Systems
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: For a given query write relational algebra expressions for that query and optimize the developedexpressions CO2: For a given specification of the requirement design the databases using E R method andnormalization. CO3: For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, andDB2. CO4: For a given query optimize its execution using Query optimizationalgorithms CO5: For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, anddurability. CO6: Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Department	CSE
Course Code	PCC-CS602
Title of the Course	Computer Networks
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	47
Course Outcomes	CO1: Understand research problem formulation. CO2: Analyze research related information CO3: Follow research ethics CO4: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. CO5: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. CO6: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	CSE
Course Code	PEC-IT601A
Title of the Course	Advanced Algorithms
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1: Analyze the complexity/performance of different algorithms. CO2: Determine the appropriate data structure for solving a particular set of problems. CO3: Categorize the different problems in various classes according to their complexity. CO4: Students should have an insight of recent activities in the field of the advanced data structure.

Department	CSE
Course Code	PEC-IT601B
Title of the Course	Distributed Systems
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1: Design trends in distributed systems. CO2: Apply network virtualization. CO3: Apply remote method invocation and objects.

Department	CSE
Course Code	PEC-IT601C
Title of the Course	Software Engineering
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	44
Course Outcomes	**CO1:** To illustrate different phases of developing high-end software in an industry. **CO2:** To recognize different techniques of software testing, reusability of software and software maintenance. **CO3:** To identify different challenges in maintaining or updating old software. **CO4:** To justify the strategies for testing, reusability etc. to reduce cost of development and / or maintenance. **CO5:** To demonstrate the role and

	responsibilities of software engineers in various phases of software development.

Department	CSE
Course Code	PEC-IT601D
Title of the Course	Image Processing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	44
Course Outcomes	**CO1:** To discuss on the basics of digital image processing and digital image formation. **CO2:** To illustrate different mathematical preliminaries to deal with digital image processing. **CO3:** To explain the concept of Image restoration and image segmentation.

Department	CSE
Course Code	PEC-IT602A
Title of the Course	Parallel and Distributed Algorithms
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	44
Course Outcomes	**CO1:** To discuss on the parallel computing and its various aspects. **CO2:** To recognize various parallel algorithms. **CO3:** To use of linear systems of equation and sorting. To illustrate various graph algorithms and Parallel Programming Languages.

Department	CSE
Course Code	PEC-IT602B
Title of the Course	Data Warehousing and Data Mining
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	49
Course Outcomes	CO1:Study of different sequential pattern algorithms CO 2:Study the technique to extract patterns from time series data and it application in real world.

	CO3: Can extend the Graph mining algorithms to Web mining CO4: Help in identifying the computing framework for Big Data

Department	CSE
Course Code	PEC-IT602C
Title of the Course	Human Computer Interaction
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	47
Course Outcomes	CO1: Differentiate between various software vulnerabilities. CO2: Software process vulnerabilities for an organization. CO3: Monitor resources consumption in a software. CO4: Interrelate security and software development process.

Department	CSE
Course Code	PEC-IT602D
Title of the Course	Pattern Recognition
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40
Course Outcomes	**CO1:** To explain the concept of pattern recognition and its different phases. **CO2:** To discuss on the idea of feature extraction and different approaches towards prototype selection. **CO3:** To illustrate the Support Vector Machine and its application in real life problem solving.

Department	CSE
Course Code	OEC-IT601A
Title of the Course	Numerical Methods
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	26
Course Outcomes	CO1: Ability to understand numerical computation & Interpolation. CO2: Ability to learn Numerical integration & solution of linear equations.

	CO3: Ability to solve Numerical solution of Algebraic & differential equation.

Department	CSE
Course Code	OEC-IT601B
Title of the Course	Human Resource Development and Organizational Behavior
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	24
Course Outcomes	**CO1:** To illustrate the roles and functions of the HR. **CO2:** To discuss on different HR planning strategies. **CO3:** To indicate the importance of training and development and performance management system.

Department	CSE
Course Code	PCC-CS691
Title of the Course	Database Management System Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To create database, perform basic operation like insertion, deletion, and updation. **CO2:** To retrieve data from the database through query languages like SQL. **CO3:** To configure a database at the background of a high level program using front end tools and forms.

Department	CSE
Course Code	PCC-CS692
Title of the Course	Computer Networks Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To write socket programming for UDP, TCP and sliding window protocols. **CO2:** To conduct experiments on simulators for MAC and routing protocols.

	CO3: To implement data link layer flow control and error control mechanisms.

Department	CSE
Course Code	PROJ-CS681
Title of the Course	Project I
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	6P
Total Contact Hours	1 SEM
Course Outcomes	**CO1:** To conduct survey on the work done in the chosen domain. **CO2:** To formulate the problem out of the survey. **CO3:** To propose some technique towards the solution of the problem defined.

7TH SEM

Department	CSE
Course Code	PEC-CS701A
Title of the Course	Quantum Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	37
Course Outcomes	CO1:knowledge of Vector spaces CO2:Matrices, Quantum state CO3:Density operator and Quantum

Department	CSE
Course Code	PEC-CS701B
Title of the Course	Cloud Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	**CO1:** To explain the basics of cloud computing and its architecture. **CO2:** To illustrate the use of different platforms in cloud computing. **CO3:** To elaborate the infrastructure and cloud security. **CO4:** To explain the basic concepts of services and applications.

Department	CSE
Course Code	PEC-CS701C
Title of the Course	Digital Signal Processing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40
Course Outcomes	**CO1:** To discuss about discrete time signals and LTI systems. **CO2:** To illustrate the application of Z-transform, Discrete Fourier transforms and fast Fourier Transform. **CO3:** To indicate the design and implementation of filters. **CO4:** To generalize Digital Signal Processors and differentiate between ASIC and FPGA.

Department	CSE
Course Code	PEC-CS701D
Title of the Course	Multi-agent Intelligent Systems
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	33
Course Outcomes	CO1: To compare different application areas for agent systems. CO2: To build intelligent systems. CO3: To classify multi-agent interactions.

Department	CSE
Course Code	PEC-CS701E
Title of the Course	Machine Learning
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	46
Course Outcomes	CO1: To learn the concept of how to learn patterns and concepts from data without being explicitly programmed CO2: To design and analyse various machine

	learning algorithms and techniques with a modern outlook focusing on recent advances. CO3: Explore supervised and unsupervised learning paradigms of machine learning.

Department	CSE
Course Code	PEC-CS702A
Title of the Course	Neural Networks and Deep Learning
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Neural network. CO2: Develop the skills to gain a basic understanding of neural network theory . CO3: a) Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic Neural network. CO4: a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of Neural network and deep learning.

Department	CSE
Course Code	PEC-CS702B
Title of the Course	Soft Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	42

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Outcomes	**CO1:** To explain the fuzzy sets, fuzzy logic systems and its various applications in real life problem solving. **CO2:** To illustrate the concept of Artificial Neural Network and its applications. **CO3:** To discuss on the concept of Genetic Algorithm and its various applications. **CO4:** To elaborate the basics of Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).

Department	CSE
Course Code	PEC-CS702C
Title of the Course	Adhoc –Sensor Network
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	32
Course Outcomes	CO1: To distinguish between different types of wireless networks. CO2: To classify different architectures. CO3: To compare between different communication protocols. CO4: To identify the requirements for establishing infrastructure. CO5: To identify various sensor network platforms and tools.

Department	CSE
Course Code	PEC-CS702D
Title of the Course	Information Theory and Coding
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	45
Course Outcomes	**CO1:** To illustrate the basic concepts of source encoding and channel encoding. **CO2:** To explain the basic concepts of coding for error detection and correction. **CO3:** To elaborate the cyclic, BCH and convolution codes.

Department	CSE
Course Code	PEC-CS702E
Title of the Course	Cyber Security
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	**CO1:** To indicate the basics of cybercrime and its various categories. **CO2:** To discuss about cybercrime in mobile and wireless devices. **CO3:** To illustrate different tools and methods used in cybercrime. **CO4:** To elaborate the concepts of phishing and identity theft, cybercrime and cyber security.

Department	CSE
Course Code	OEC-CS701A
Title of the Course	Operation Research
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: To solve different linear programming problems (LPP). CO2: To discuss on the Network Analysis and Inventory control. CO3: To Familiarize the Game Theory and Queuing Theory.

Department	CSE
Course Code	OEC-CS701B
Title of the Course	Multimedia Technology
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	45
Course Outcomes	**CO1:** To discuss on various aspects of multimedia technology and its application. **CO2:** To demonstrate different multimedia applications developed using Text, Audio, Image and Video. **CO3:** To illustrate different multimedia storage models and access techniques. **CO4:** To explain the basics of image and video databases.

Department	CSE
Course Code	OEC-CS701C
Title of the Course	Introduction to Philosophical Thoughts
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: a) Define , b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts ofCarvaka school. CO2: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts ofBuddhism. CO3: Analyse nature of Indian philosophy.

Department	CSE
Course Code	HSMC 701
Title of the Course	Project Management and Entrepreneurship
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	2L+1T
Total Contact Hours	40
Course Outcomes	**CO1:** To analyze various concepts project management, project planning and project scheduling. **CO2:** To implement the concept of Time Cost Trade-off Analysis, Resource Allocation and Levelling. **CO3:** To familiarize with project life cycle, project cost and project quality management. **CO4:** To explain the overview of Software Project Characteristics and Management and IT in projects.

Department	CSE
Course Code	PROJ-CS781
Title of the Course	Project II
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	12P
Total Contact Hours	

Course Outcomes	**CO4:** To conduct survey on the work done in the chosen domain. **CO5:** To formulate the problem out of the survey. **CO6:** To propose some technique towards the solution of the problem defined.

8TH SEM

Department	CSE
Course Code	PEC-CS801A
Title of the Course	Signal and Networks
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	38
Course Outcomes	CO1: Analyze design and implement combinational logic circuits. CO2: Develop a digital logic and apply it to solve real life problems. CO3: Simulate and implement combinational and sequential circuits

Department	CSE
Course Code	PEC-CS801B
Title of the Course	Cryptography and Network Security
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	38
Course Outcomes	**CO1:** To discuss on various types of attacks and their characteristics. **CO2:** To illustrate the basic concept of encryption and decryption for secure data transmission. **CO3:** To Analyze and compare various cryptography techniques. **CO4:** To explain the concept of digital

	signature and its applications. **CO5:** Proposing new strategies to secure data communication.

Department	CSE
Course Code	PEC-CS801C
Title of the Course	Natural Language Processing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	**CO1:** To recognize the basics of Regular Expressions and Automata. **CO2:** To explain the concept of tokenization, morphology, language modeling, Hidden Markov Models and POS Tagging. **CO3:** To discuss on the text classification and context free grammar. **CO4:** Computational Lexical Semantics and Information Retrieval.

Department	CSE
Course Code	PEC-CS801D
Title of the Course	Web and Internet Technology
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	34
Course Outcomes	**CO1:** To illustrate the basics of Internet technology and related concepts like WWW, Internet, Intranet, etc. **CO2:** To explain the concept of Email in relation with some application layer protocols like SMTP, POP etc. **CO3:** To indicate different threats in the internet and relate strategies to overcome those threats. **CO4:** To create web pages using HTML, Javascript etc. **CO5:** To explain the basic concepts of search engine, internet telephony etc.

Department	CSE
Course Code	PEC-CS801E
Title of the Course	Internet of Things
Nature of Course	LECTURE

COURSE OUTCOME (CO)

SESSION: 2020-21

Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1:Understand the vision of IoT from a global context. CO2:Determine the Market perspective of IoT. CO3:Use of Devices, Gateways and Data Management in IoT. CO4: Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints. CO5:Building state of the art architecture in IoT.

Department	CSE
Course Code	OEC-CS801A
Title of the Course	Big Data Analytics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1:Describe big data and use cases from selected business Explain NoSQL big data management domains CO2: Install, configure, and run Hadoop and HDFS CO3:Perform map-reduce analytics using Hadoop Co4:Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

Department	CSE
Course Code	OEC-CS801B
Title of the Course	Cyber Law and Ethics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	32
Course Outcomes	**CO5:** To indicate the basics of cybercrime and its various categories. **CO6:** To discuss about cybercrime in mobile and wireless devices. **CO7:** To illustrate different tools and methods used in cybercrime. **CO8:** To elaborate the concepts of phishing and identity theft, cybercrime and cyber security.

Department	CSE

Course Code	OEC-CS801C
Title of the Course	Mobile Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To design and implement mobile applications to realize location-aware computing. **CO2:** To administrate and maintain a wireless LAN. **CO3:** To design algorithms for location estimation based on different routing techniques. **CO4:** To develop mobile computing applications by analyzing their properties and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools.

Department	CSE
Course Code	OEC-IT801D
Title of the Course	Robotics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40
Course Outcomes	**CO1:** To illustrate the basics of robotics, its components and various applications. **CO2:** To discuss about kinematics of serial and parallel robots. **CO3:** To elaborate velocity and static analysis of robot manipulators, Dynamics of serial and parallel manipulators. **CO4:** To explain the concept of motion planning and control, Modelling and control of flexible robots, Modelling and analysis of wheeled mobile robots.

Department	CSE
Course Code	OEC-CS801E
Title of the Course	Soft Skill & Interpersonal Communication
Nature of Course	LECTURE
Type of Course	Elective

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact Hours	3L
Total Contact Hours	40
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts ofSelf-Discovery. CO2:Interpersonal Communication improvement. CO3: Analyse Soft Skills.

Department	CSE
Course Code	OEC-CS802A
Title of the Course	E-Commerce & ERP
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To elaborate the basics of e-commerce and its various applications. **CO2:** To illustrate the concepts of business to business e-commerce and its various aspects. **CO3:** To discuss about various legal and security issues. **CO4:** To elaborate the idea of e-business.

Department	CSE
Course Code	OEC-CS802B
Title of the Course	Micro-electronics and VLSI Design
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To explain the basics of VLSI design with its features. **CO2:** To illustrate the structure of MOS and its application in VLSI design. **CO3:** To elaborate various micro-electronic processes for VLSI fabrication. **CO4:** To indicate the use of Hardware Description Language for various digital circuit designs.

Department	CSE
Course Code	OEC-CS802C

COURSE OUTCOME (CO)
SESSION: 2020-21

Title of the Course	Economic Policies in India
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: Define, explain in detail and Issues in growth, development, and sustainability, Population and economic development, Factors in development, critical evaluation of growth, inequality, poverty and competitiveness, pre- and post- reform eras, Macroeconomic policies and their impact: fiscal policy, financial and monetary policies, policies and performance; production and productivity; credit; labour markets and pricing; land reforms; regional variations, production trends,small scale industries; public sector; foreign investment, labour regulation, trends and performance, trade and investment policy. CO2: Can define and understand government policies and will enable informed participation in economic decision making, thus improving their employment prospects and career advancement. CO3: Analyze current economic policy thus improving their chances of getting employed, and be more effective, in positions of responsibility and decision making. CO4: Differentiate and compare between fiscal policy,financial and monetary policies , policies and performance; production and productivity; credit; labour markets and pricing; land reforms; regional variations CO5: Be able to devise a given problem into independent modules and then to solve by integrating the modules by providing appropriate interfaces. CO6 Identify unsolved but necessary real world problems of Economic policies of India and thereafter generate detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Economic policies of India. .

Department	CSE
Course Code	PROJ-CS881
Title of the Course	Project III
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	12P
Total Contact Hours	1 SEM
Course Outcomes	**CO1:** To apply advanced programming techniques in identified real world problems. **CO2:** To analyze the utiles of solutions. **CO3:** To carry out technical report/thesis writing.

Course Outcome (CO) [1st Year Theory New Syllabus] Session 2018-19, 2019-20

Department	Basic Science & Humanities
Course Code	BS-PH-101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	44
Course Out Come	**CO1:** Ability to know the basic concepts of mechanics and oscillation. **CO2:** Elaborate the concept of optics and introduction to the principle of laser. **CO3:** Ability to understand electromagnetism, dielectric and magnetic properties of materials. **CO4:** Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation. **CO5:** Understand the basic concept of Statistical mechanics.

Department	Basic Science & Humanities
Course Code	BS-M-101
Title of Course	Mathematics -IA
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	40
Course Out Come	**CO1**: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals. **CO2:** Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems. **CO3:** Understand the concept of determinant and learn different types of matrices, concept of rank, system of linear equations, methods of matrix inversion. **CO4:** Understand linear spaces, its basis and dimension with corresponding applications in the field of computer science. **CO5:** Learn and apply the concept of Eigen values, Eigen vectors,

	diagonalization of matrices and orthogonalization in inner product spaces for understanding physical and engineering problems

Department	EE
Course Code	**ES EE 101**
Title of Course	**Basic Electrical & Electronic Engineering –1 (Group A+Group B)**
Nature of Course	Compulsory
Type of Course	Theory
Contact Hours	3L+1T
Total Contact Hours	41
Course Out Come	**CO1:** Ability to explain the fundamentals of Physics. **CO2:** Ability to explain the basic knowledge of Electrical and Electronics Engineering. **CO3:** Ability to apply DC network theorem and Kirchhoff's law on different electrical circuits. **CO4:** Ability to determine AC fundamentals like generation of ac voltages, waveforms, average and RMS values, peak factor, form factor, series and parallel resonance circuits. **CO5:** Ability to explain principles of electromagnetism and associated laws. **CO6:** Ability to identify various semiconductors and ability to design and analyse different electrical circuits using different semiconductors.

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Outcome (CO) [<mark>1st Year Practical New Syllabus</mark>] <mark>Session 2018-19, 2019-20</mark>

Department	Basic Science & Humanities
Course Code	BS-PH-191
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2**: Ability to know optical property. **CO3**: Ability to learn electrical property. **CO4**: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. **CO5**: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	EE
Course Code	**ES EE191**
Title of Course	**Basic Electrical &Electronic Engineering– 1(Lab)(Group A+Group B)**
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	40
Course Out Come	**CO1:** Ability to perform different experiments of Basic Electrical and Electronics Engineering. **CO2:** Ability to perform different experiments to verify network theorems.

Department	ME
Course Code	**ES ME191**
Title of Course	Engg. Drawing & computer graphics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1:** Use the drawing instruments effectively and able to dimension the given figures. **CO2:** Appreciate the usage of engineering curves in tracing the paths of simple machine components. **CO3:** Able to draw the basic views related to projections of Lines, Planes.

Department	Basic Science & Humanities
Course Code	BS-CH-201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	CO1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. CO2: Rationalise bulk properties and processes using thermodynamic considerations. CO3: : Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities
Course Code	BS-M-201
Title of Course	Mathematics -IIA
Nature of Course	Compulsory

Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	40
Course Out Come	**CO1:** Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment. **CO2:** Understand the basic ideas of statistics with different characterisation of a univariate and bivariate data set. **CO3:** Apply statistical tools for analysing data samples and drawing inference on a given data set.

Department	IT
Course Code	ES-CS201
Title of Course	Programming for Problem Solving
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	36
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Programming for

	Problem Solving
	CO2: a) Directly apply the fundamental concepts of Programming to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Programming for Problem Solving. CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Programming for Problem Solving CO4: a) Compare and contrast in details between the fundamental concepts of Algorithm and Programming and thereafter b) describe an overview level interconnected map of concepts/terminologies of Programming for Problem Solving. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Programming for Problem Solving. CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Programming.

Department	Basic Science & Humanities
Course Code	HM HU 201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact Hours	2L + 0T
Total Contact Hours	25
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	Basic Science & Humanities
Course Code	BS-CH-291
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	P 3
Total Contact Hours	30
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
	CO2: Rationalise bulk properties and processes using thermodynamic considerations.
	CO3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
	CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
	CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	IT
Course Code	ES-CS291
Title of Course	Programming for Problem Solving
Nature of Course	Professional core courses
Type of Course	Practical
Contact Hours	4+4
Total contact hours	36
Credit	2
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of algorithm and correct program.
	CO2: a) Directly apply the fundamental concepts of Programming to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using correct syntax.
	CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of arrays, strings.
	CO4: a) Compare and contrast in details between the fundamental concepts of structures and thereafter b) describe an overview level interconnected map of concepts/terminologies of self-referential structures.
	CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of simple text files.
	CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Programming.

Department	ME
Course Code	**ES ME291**
Title of Course	Engg. Drawing & computer graphics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1:** Use the drawing instruments effectively and able to dimension the given figures. **CO2:** Appreciate the usage of engineering curves in tracing the paths of simple machine components. **CO3:** Able to draw the basic views related to projections of Lines, Planes.

Department	Basic Science & Humanities
Course Code	HM HU 291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	IT
Course Code	ESC 301
Title of Course	Analog and digital electronics
Nature of Course	Compulsory
Type of Course	Theory
Contact Hours	3
Total contact hours	30
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Programming for Problem Solving

CO2: a) Directly apply the fundamental concepts of Programming to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Programming for Problem Solving.

CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Programming for Problem Solving

CO4: a) Compare and contrast in details between the fundamental concepts of Algorithm and Programming and thereafter b) describe an overview level interconnected map of concepts/terminologies of Programming for Problem |

	Solving.
	CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Programming for Problem Solving.
	CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Programming.

Department	IT
Course Code	PCC-CS301
Title of Course	Data Structure & Algorithm
Nature of Course	Professional core courses
Type of Course	Lecture
Contact Hours	3
Total contact hours	36
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Data Structure & Algorithm.

CO2: a) Directly apply the fundamental concepts of Data Structure & Algorithm to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using different data.

CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems |

using the concept of solving problem.

CO4: a) Compare and contrast in details between the fundamental concepts of dynamic and static data structures and thereafter b) describe an overview level interconnected map of concepts/terminologies of dynamic and static data structures.

CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of principal algorithms for sorting, searching, and hashing.

CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Data Structure & Algorithm.

Department	Information Technology
Course Code	PCC-CS302
Title of Course	Computer Organization
Nature of Course	Theory
Type of Course	COMPULSORY
Contact Hours	3+1=4
Total contact hours	36
Credit	3
Course Outcomes	CO1 a) Define, b) explain in detail, and thereafter c) state the necessity/importance of basic organization of computer, role of operating system and compiler/assembler, instruction cycle, instruction format, addressing modes, commonly used number systems, overflow and underflow, design of adders, design of ALU, design of memory unit, memory organization, design of control unit. CO2 a) Directly apply basic organization of computer, role of operating system and compiler/assembler, instruction cycle, instruction format, addressing modes, commonly used number systems, overflow and underflow, design of adders, design of ALU, design of memory unit, memory organization, design of control unit to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the above concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems. CO3 a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems requiring computer organization, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems).

	CO4 a) Compare and contrast in details among basic organization of computer, role of operating system and compiler/assembler, instruction cycle, instruction format, addressing modes, commonly used number systems, overflow and underflow, design of adders, design of ALU, design of memory unit, memory organization, design of control unit, and thereafter b) describe an overview level interconnected map of concepts. CO5 a) Identify and thematically explain where and how basic organization of computer, role of operating system and compiler/assembler, instruction cycle, instruction format, addressing modes, commonly used number systems, overflow and underflow, design of adders, design of ALU, design of memory unit, memory organization, design of control unit are utilized in large scale real world systems with computer organization components , and thereafter b) Design the schematics for typical components of large scale known real world systems with computer organization components. CO6 a) Identify unsolved but necessary real world problems with computer organization components and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems.

Department	Basic Science & Humanities (CSE / IT)
Course Code	BSC-301
Title of Course	Mathematics –III (Differential Calculus)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 2

Total Contact Hours	40
Course Out Come	**CO1:** Learn to apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines.

CO2: Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation.

CO3: Learn the methods for evaluating multiple integral and their applications to different physical problems.

CO4: Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences.

CO5: Learn Basics of Graph Theory which are useful to solve engineering problems. |

Department	Basic Science & Humanities
Course Code	HS(MC)-301
Title of Course	Economics for Engineers

COURSE OUTCOME (CO)
SESSION: 2020-21

Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	**CO1**: Ability to understand Economic Decisions Making and considering that students will learn to find out Engineering Costs & Estimation. **CO2**: Ability to learn Cash Flow and also able to calculate Rate of Return Analysis. **CO3**: Ability to know Inflation and Price Change, Present Worth Analysis. **CO4**: Ability to learn depreciation and able to analysis the requirement of replacement.

Department	IT
Course Code	ECS-391
Title of Course	Analog & Digital Electronics Lab
Nature of Course	Professional core courses
Type of Course	Practical
Contact Hours	4
Total contact hours	6 MONTH DURATION
Credit	2
Course Outcomes	CO1: Learn to design a Class A amplifier, phase-Shift Oscillator trigger. CO2: Apply concept to solve different kind of digital and analogue circuits. CO3: To be exposed to advanced applications engineering and natural sciences to solve real life problems.

Department	IT
Course Code	PCC-CS391
Title of Course	Data Structure & Algorithm Lab
Nature of Course	Professional core courses
Type of Course	Practical
Contact Hours	4+4
Total contact hours	6 month duration
Credit	2
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Data Structure & Algorithm. CO2: a) Directly apply the fundamental concepts of Data Structure & Algorithm to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using different data. CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of solving problem. CO4: a) Compare and contrast in details between the fundamental concepts of dynamic and static data structures and thereafter b) describe an overview level interconnected map of concepts/terminologies of dynamic and static data structures. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of principal algorithms for sorting, searching, and hashing. CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Data Structure & Algorithm.

Department	Information Technology
Course Code	PCC CS 392
Title of Course	Computer Organization Lab
Nature of Course	Practical
Type of Course	Program Core
Contact Hours	3
Total contact hours	33
Credit	2
Course Outcomes	CO1 a) Define, b) explain in detail, and thereafter c) state the necessity/importance of IC-chips like Multiplexer , Decoder, Encoder, Comparator, Truth Table verification and clarification from Data-book, design of adder/ Subtractor composite unit, Design of BCD adder, Design of a 'Carry-Look-Ahead' Adder circuit, use of multiplexer unit to design a composite ALU, use of ALU chip for multibit arithmetic operation, implementation read write operation using RAM IC, Cascading two RAM ICs for vertical and horizontal expansion CO2 a) Directly apply IC-chips like Multiplexer , Decoder, Encoder, Comparator, Truth Table verification and clarification from Data-book, design of adder/ Subtractor composite unit, Design of BCD adder, Design of a 'Carry-Look-Ahead' Adder circuit, use of multiplexer unit to design a composite ALU, use of ALU chip for multibit arithmetic operation, implementation read write operation using RAM IC, Cascading two RAM ICs for vertical and horizontal expansion to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the above concepts to solve (design andimplement) elementary model problems on the idealistic components of real-world systems with computer organization components. CO3 a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems requiring computer organization, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems). CO4 a) Compare and contrast in details among IC-chips like Multiplexer , Decoder, Encoder, Comparator, Truth Table verification and clarification from Data-book, design of adder/ Subtractor composite unit, Design of BCD adder, Design of a 'Carry-Look-Ahead' Adder circuit, use of multiplexer unit to design a composite ALU, use of ALU chip for multibit arithmetic operation, implementation read write operation using RAM IC, Cascading two RAM ICs for vertical and horizontal expansion, and thereafter b) describe an overview level interconnected map of concepts. CO5

	a) Identify and thematically explain where and how IC-chips like Multiplexer , Decoder, Encoder, Comparator, Truth Table verification and clarification from Data-book, design of adder/ Subtractor composite unit, Design of BCD adder, Design of a 'Carry-Look-Ahead' Adder circuit, use of multiplexer unit to design a composite ALU, use of ALU chip for multibit arithmetic operation, implementation read write operation using RAM IC, Cascading two RAM ICs for vertical and horizontal expansion are utilized in large scale real world systems with computer organization components, and thereafter b) Design the schematics for typical components of large scale known real world systems. CO6 a) Identify unsolved but necessary real world problems requiring computer organization and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems.

Department	IT
Course Code	PCC-CS-393
Title of Course	IT WORKSHOP
Nature of Course	Professional core courses
Type of Course	Practical
Contact Hours	4
Total contact hours	6 MONTH DURATION
Credit	2
Course Outcomes	CO1: To master an understanding of scripting & the contributions of scripting languages. Design real life problems and think creatively about solutions . CO2: Apply a solution in a program using R/Matlab/Python. CO3: To be exposed to advanced applications of mathematics, engineering and natural sciences to program real life problems.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	IT
Course Code	PCC-CS401
Title of Course	DISCRETE MATHEMATICS
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3+1
Total contact hours	6 MONTH DURATION
Credit	4
Course Outcomes	CO1: a) Define , explain in detail use mathematically correct terminology and notation . b) Construct correct direct and indirect proofs. CO2: Directly apply the fundamental concepts of mathematics to solve (implement) the most elementary/simplest model problems. CO3: a) Analyze , b) know Syntax, Semantics, Validity and Satisfiability, Graphs and Trees .

Department	Information Technology
Course Code	PCC-CS-402 Semester: 4th B.Tech.
Title of Course	Computer Architecture.
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Credit:	3
CO1	a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Computer Components, performance metrics, pipeline, hazards, memory organisation, ILP, bus sub-systems, multiprocessors parallelism.
CO2	Can identify and illustrate the working principles of Computer Components, performance metrics, pipeline, hazards, memory organisation, ILP, bus sub-systems, multiprocessors parallelism.

CO3	Can analyse the architectural aspects of a simple computing system, identify appropriate computational components and estimate the desired system design parameters. Will be able to find output and debug errors on pipeline, storage, interconnection design issues.
CO4	Can differentiate and compare between Computer Components independently and be able to interconnect these components by appropriate interfaces.
CO5	Be able to devise a given problem into independent modules and identify appropriate architectural Components and then to devise the system by integrating the modules by providing appropriate interfaces.
CO6	Can identify, estimate, design and implement appropriate computing system for Unknown real world problems.

Department	IT
Course Code	PCC-CS403
Title of Course	Formal Language & Automata Theory
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6Month Duration
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of automata theory. CO2: Be able to construct finite state machines and the equivalent regular expressions. CO3: Be able to construct pushdown automata and the equivalent context free grammars. CO4: Be able to construct Turing machines and Post machines. Be able to prove the equivalence of languages described by Turing machines and Post machines

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Information Technology
Course Code	PCC-CS404
Title of Course	Design and Analysis of Algorithm
Nature of Course	Theory
Type of Course	Program Core
Contact Hours	3
Total contact hours	36
Credit	3
Course Outcomes	CO1 a) Define, b) explain in detail, and thereafter c) state the necessity/importance of characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms, of the subject design and analysis of algorithms. CO2 a) Directly apply characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the above fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems. CO3 a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world algorithms, and thereafter b) Compute the output of given model algorithmic subroutines (and also identify errors in the design and implementation of given model algorithmic subroutines). CO4 a) Compare and contrast in details among characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms, and thereafter b) describe an overview level interconnected map of concepts/terminologies of design and analysis of algorithms. CO5 a) Identify and thematically explain where and how characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms, are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems. CO6 a) Identify unsolved but necessary real world problems having algorithmic

	component/s and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems.
Department	Basic Science & Humanities
Course Code	BSC-401
Title of Course	Biology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	33
Course Out Come	**CO1**: Describe how biological observations of 18th Century that lead to major discoveries. **CO2**: Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological. **CO3**: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring. **CO4**: Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. **CO5**: Classify enzymes and distinguish between different mechanisms of enzyme action. **CO6**: Identify DNA as a genetic material in the molecular basis of information transfer. **CO7**: Analyse biological processes at the reductionistic level. **CO8:** Apply thermodynamic principles to biological systems. **CO9**: Identify and classify microorganisms.

Department	IT
Course Code	MC401
Title of Course	Environmental sciences
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6 month duration
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance to understand the natural environment and its relationships with human activities. CO2: Be able to apply the fundamental knowledge of science and engineering to assess environmental and health risk. CO3: Be able to understand environmental laws and regulations to develop guidelines and procedures for health and safety issues.
Department	IT
Course Code	PCC-CS 492
Title of Course	Computer Architecture Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4+4
Credit	2
Course Outcomes	CO1: a) Define ,b) explain fundamental concepts of VHDL. CO2: a) Directly apply the fundamental concepts of VHDL to solve different gates. CO3: a) Analyze (the design and implementation of idealistic components of real world systems.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Information Technology
Course Code	PCC-CS494
Title of Course	Design and Analysis of Algorithm
Nature of Course	Practical
Type of Course	Compulsory
Contact Hours	3
Total contact hours	36
Credit	3
Course Outcomes	CO1 a) Define, b) explain in detail, and thereafter c) state the necessity/importance of characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms, of the subject design and analysis of algorithms. CO2 a) Directly apply characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the above fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems. CO3 a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world algorithms, and thereafter b) Compute the output of given model algorithmic subroutines (and also identify errors in the design and implementation of given model algorithmic subroutines). CO4 a) Compare and contrast in details among characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms, and thereafter b) describe an overview level interconnected map of concepts/terminologies of design and analysis of algorithms. CO5 a) Identify and thematically explain where and how characteristic of algorithm, analysis of algorithm, fundamental algorithmic strategies, graph and tree algorithms, depth first search, breadth first search, shortest path algorithms, minimum spanning trees, network flow algorithms, tractable and intractable problems, approximation algorithms and randomized algorithms, are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems.

	CO6 a) Identify unsolved but necessary real world problems having algorithmic component/s and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems.

Department	IT
Course Code	ESC501
Title of Course	Signals & Systems
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6 monthS
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of signal and system. CO2: a) Directly apply the fundamental concepts of continuous and discrete system to solve (design and implement) elementary model problems. CO3: know Fourier, Laplace and z- Transforms.

Department	IT
Course Code	PCC-CS501
Title of Course	Compiler design
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6 month
Credit	3
Course Outcomes	CO1: Understand the fundamental and functional architecture of a compiler. CO2: Understanding principle flow of execution through different phases (modules). CO3: Designing small programs for each independent but correlated module.

	CO4:Designing and solving grammatical problems. CO5:Developing a new grammar. CO6:Developing a mini sample compiler.

Department	IT
Course Code	PCC-CS502
Title of Course	Operating system
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6 month
Credit	3
Course Outcomes	CO1: Understand functional architecture of an operating system CO2:Develop algorithms for subsystem components CO3:Design device drivers and multi threading libraries for a tiny OS CO4:Develop application programs using UNIX system calls CO5:Design and solve synchronization problems CO6:Understand standard UNIX and FAT file systems

Department	IT
Course Code	PCC-CS503
Title of Course	Object oriented programming
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: Define, explain in detail and thereafter state the necessity/importance of the fundamental concepts of JVM, java byte-code, classes, functions,

	data and objects of object oriented paradigm. CO2: Can define, declare and use different kinds of constructors, function overloading, inheritance, abstract classes and methods, interface, package, multi threading, Exception handling, java applet. CO3: Can analyse simple problems, identify appropriate components and write program to solve simple problems. Will be able to find output and debug errors. CO4: : Can differentiate and compare between Arrays, String, class, object, Function, Recursion, function overloading, function overriding ,exception, error ,multi threading, multi tasking independently and be able to interconnect these components by appropriate interfaces. CO5: Be able to devise a given problem into independent modules and then to solve by integrating the modules by providing appropriate interfaces. CO6: Can Write Java Programs for Unknown real world problems

Department	IT
Course Code	HSMC-501
Title of Course	Introduction to industrial management
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: Define, explain in detail and thereafter state the necessity/importance of the fundamental concepts of industrial behaviour. CO2: Analyse Critical Path Method (CPM) and Programme Evaluation Review Technique (PERT).

	CO3: Can analyse Materials Management.

Department	Information Technology
Course Code	PEC-IT 501A. Semester: 5th B.Tech.
Title of Course	Theory of Computation
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40 Credit: 3
CO1	a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Digital circuits, STD, FSM, Finite Automata, DFA, NFA, Optimization, Equivalence, Moore & Melay machines, Regular expressions, grammar, context free languages, context free grammar, pumping lemma, Push down automata, optimization of CFL, Turing machine.
CO2	Can identify and illustrate the working principles of Digital circuits, STD, FSM, Finite Automata, DFA, NFA, Optimization, Equivalence, Moore & Melay machines, Regular expressions, grammar, context free languages, context free grammar, pumping lemma, Push down automata, optimization of CFL, Turing machine.
CO3	Can analyse the computational aspects of a simple computing system, identify appropriate computational components and estimate the desired system design parameters. Will be able to find output and debug errors on Digital circuits, STD, FSM, Finite Automata, DFA, NFA, Optimization, Equivalence, Moore & Melay machines, Regular expressions, grammar, context free languages, context free grammar, pumping lemma, Push down automata, optimization of CFL, Turing machine.
CO4	Can differentiate and compare between computational Components independently and be able to explain the inter-connection these components by appropriate interfaces.
CO5	Be able to devise a given problem into independent modules and identify appropriate computational components and then to devise the system by integrating the modules by providing appropriate interfaces.
CO6	Can identify, estimate, design and implement appropriate computational system for Unknown real world problems.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Information Technology
Course Code	PEC-IT501B
Title of Course	Artificial Intelligence
Nature of Course	Theory
Type of Course	Program Elective Elective
Contact Hours	3
Total contact hours	34
Credit	3
Course Outcomes	CO1 a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the overview of Artificial Intelligence, intelligent agents, problem solving, search techniques, heuristic search strategies, adversarial search, knowledge and reasoning, predicate logic, representing knowledge using rules, probabilistic reasoning, planning, natural language processing, learning and expert systems. CO2 a) Directly apply intelligent agents, problem solving, search techniques, heuristic search strategies, adversarial search, knowledge and reasoning, predicate logic, representing knowledge using rules, probabilistic reasoning, planning, natural language processing, learning and expert systems to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the above concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems with AI components. CO3 a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems with AI components, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems). CO4 a) Compare and contrast in details among intelligent agents, problem solving, search techniques, heuristic search strategies, adversarial search, knowledge and reasoning, predicate logic, representing knowledge using rules, probabilistic reasoning, planning, natural language processing, learning and expert systems, and thereafter b) describe an overview level interconnected map of concepts of AI. CO5 a) Identify and thematically explain where and how intelligent agents, problem solving, search techniques, heuristic search strategies, adversarial search, knowledge and reasoning, predicate logic, representing knowledge using rules, probabilistic reasoning, planning, natural language processing, learning and expert systems are utilized in large scale real world systems with AI components, and thereafter b) Design the schematics for typical components of large scale known real world systems with AI components. CO6 a) Identify unsolved but necessary real world problems with AI components and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems.

Department	IT
Course Code	PEC-IT501C
Title of Course	Advanced Computer Architecture
Nature of Course	Program Elective Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental logic gates of computer. CO2: a) Directly apply the fundamental concepts of the elements of computer design for programmer. CO3: a) Analyse (identify parts, their interconnections) the design and implementation of idealistic components of real-world systems. CO4: a) Compare and contrast in details between different types of architecture. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of different architecture. CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems for computer architecture.

Department	IT
Course Code	PEC-IT501D
Title of Course	Computer Graphics
Nature of Course	Program Elective Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the

	necessity/importance of the fundamental concepts of Computer Graphics. CO2: a) Directly apply the fundamental concepts of Computer Graphics to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using different scan conversion algorithm. CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Computer Graphics. CO4: a) Compare and contrast in details between the fundamental concepts of transformation & viewing and thereafter b) describe an overview level interconnected map of concepts/terminologies of Computer Graphics. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Transformation & viewing, Curves, Hidden surfaces and Color &shading models. CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Computer Graphics.

Department	IT
Course Code	MCCS501
Title of Course	CONSTITUTION OF INDIA
Nature of Course	Professional core courses mandatory
Type of Course	Theory
Contact Hours	3
Total contact hours	6 MONTHS
Credit	0
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Union Government and its Administration . CO2: Know the structure of the Indian Union: Federalism, Centre- State relationship

	CO3: Analyze Local Administration District's Administration head.
	CO4: Describe role of Election Commission Election Commission.

Department	IT
Course Code	MCCS501
Title of Course	Essence of indian knowledge tradition
Nature of Course	Professional core courses mandatory
Type of Course	Theory
Contact Hours	3
Total contact hours	6 MONTHS
Credit	0
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Union Government and its Administration . CO2: Know the structure of the Indian Union: Federalism, Centre- State relationship CO3: engineering students, except those studying in IITs and NITs, will now be studying humanities, social sciences including management, environmental sciences, Indian Constitution and essence of Indian traditional knowledge, from the next academic session.

Department	IT
Course Code	PCC CS591
Title of Course	Compiler Design
Nature of Course	Professional core courses
Type of Course	Practical
Contact Hours	4
Total contact hours	6 months

COURSE OUTCOME (CO)
SESSION: 2020-21

Credit	2
Course Outcomes	CO1: Understand the fundamental and functional architecture of a compiler.
	CO2: Understanding principle flow of execution through different phases (modules).
	CO3: Designing small programs for each independent but correlated module.
	CO4: Designing and solving grammatical problems.
	CO5: Developing a new grammar.
	CO6: Developing a mini sample compiler.

Department	Information Technology
Course Code	PCC CS 592
Title of course	Operating System Lab
Nature of course	Compulsory
Type of course	Practical
Contact hours	4
Total contact hours	6 MONTHS
Credit	2
Course Outcomes	CO1: Understand gcc compiler, and Makefiles CO2: Understand the high-level structure of the Linux kernel both in concept and source code CO3: Acquire a detailed understanding of one aspect (the scheduler) of the Linux kernel

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	IT
Course Code	PCC CS 593
Title of Course	OBJECT ORIENTED PROGRAMMING
Nature of Course	Professional core courses
Type of Course	Theory
Contact Hours	4
Total contact hours	6 MONTHS
Credit	2
Course Outcomes	CO1: Define, explain in detail and thereafter state the necessity/importance of the basic control Structures, strings and function for Object Oriented programming. Classes,objects, members of a class and the relationships among them needed for a finding the solution to specific problem. CO2: Directly apply the concept of constructors, function overloading, reusability using inheritance, interfaces and packages,different exception handling mechanisms and concept of user interface components to design GUI in Java using Applet & AWT along with response to events CO3: Can analyse simple problems, identify appropriate components and write program to solve simple problems. Will be able to find output and debug errors. CO4: : Can differentiate and compare between Arrays, String, class, object, Function, Recursion, function overloading, function overriding ,exception, error ,multi threading, multi tasking independently and be able to interconnect these components by appropriate interfaces. CO5: Be able to devise a given problem into independent modules and then to solve by integrating the modules by providing appropriate interfaces. CO6: Can Write Java Programs and develop complex Graphical user interfaces for Unknown real world problems using Applet &AWT along with response of events, Java Swing.

Department	Information Technology
Course Code	PCC-CS601
Title of cours	Database Management Systems
Nature of course	Regular
Type of course	Lecture
Contact hours	3:0:0=3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: Understand functional components of the DBMS. CO2: Devise queries using Relational Algebra, Relational Calculus and SQL. CO3: Design database schema. CO4:Develop E-R model CO5:Evaluate and optimize queries. CO6: Understand transaction processing, concurrency control and recovery techniques.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Information Technology
Course Code	PCC-CS 602
Title of course	Computer Networking
Nature of course	Compulsory
Type of course	Lecturer
Contact hours	3+0=3
Total contact hours	6 months
Course Outcomes	CO1: a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Layers, switching, active components, multiplexing, multiple access, data transmission, Digital, Optical, Satellite and mobile communications
	CO2: Analyze MAC layer protocols and LAN technologies
	CO3: Design applications using internet protocols
	CO4: Implement routing and congestion control algorithms
	CO5: Develop application layer protocols

DEPARTMENT	Information Technology
COURSE CODE	PEC-IT601A
TITLE OF COURSE	Advanced algorithm
NATURE OF COURSE	Elective
TYPE OF COURSE	Lecture
CONTACT HOURS	3 Lecture
TOTAL CONTACT HOURS	36
COURSE OUTCOMES	CO1: Define, explain in detail and thereafter state the necessity/importance of the fundamental concepts of basic of distributed system. CO2: Differentiate between different types of faults and fault handling techniques in order to implement fault

	tolerant systems.
	CO3: Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints.

DEPARTMENT	Information Technology
COURSE CODE	PEC-IT601B
TITLE OF COURSE	Distributed Systems.
NATURE OF COURSE	Elective
TYPE OF COURSE	Lecture
CONTACT HOURS	3 Lecture
TOTAL CONTACT HOURS	36
Credit	3
COURSE OUTCOMES	CO1: Define, explain in detail and thereafter state the necessity/importance of the fundamental concepts of basic elements , standard protocols used in distributed systems, distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc CO2: Can define, declare and use knowledge of the core architectural aspects of distributed systems , different models in distributed systems and implement distributed programs using sockets and RPC/RMI. CO3: Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints and security issues of distributed system. CO4: Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems. CO5: Be able to devise a given problem into independent modules and then to solve by integrating the modules by providing appropriate interfaces. CO6: Can identify, estimate, design and implement appropriate computing system for Unknown real world problems using concept of building large-scale distributed applications.

Department	IT

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Code	PEC- IT 601 C
Title of Course	Software Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Total Contact Hours	36
Course Outcomes	CO1: Define Software Engineering and explain in detail and thereafter state the necessity/importance of the fundamental concepts of SDLC, COCOMO Model, Context diagram, DFD, System design, Decision tree, Decision table ,coding & documentation, Structured and Object Oriented programming, Testing ,validation and verification metrics ,software project management and object oriented design in UML. CO2: Directly apply the fundamental concepts of Software Engineering to solve (implement) the most elementary/simplest model problems, and thereafter Design & develop the software projects .Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Software Engineering. CO3: Analyze and Identify requirements and prepare models using different SDLC.Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Software Engineering for an organization/institute. CO4: Compare and contrast in details between the fundamental concepts of Software Engineering and thereafter describe an overview level interconnected map of concepts/terminologies of Software Engineering. CO5: Identify risks, manage the change to assure quality in software projects and explain where and how the Models are utilized in large scale real world systems, and thereafter Design the schematics for typical components of large scale known real world systems using the concept of Software Engineering. CO6: Identify unsolved but necessary real world problems of Software Engineering and thereafter demonstrate and evaluate real time projects with respect to software engineering principles.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Information Technology
Course Code	PEC-IT 601D. Semester: 6th B.Tech.
Title of Course	Image Processing
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40 Credit: 3
CO1	a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Image representation, processing, filtering, segmentation, restoration, projection, feature extraction, ehancements, transformation, smoothing, masking, colouring etc.
CO2	Can identify and illustrate the working principles of image processing methods - Image representation, processing, filtering, segmentation, restoration, projection, feature extraction, ehancements, transformation, performance parameters, smoothing, masking, colouring etc.
CO3	Can analyse the technical aspects of a simple image processing software, identify appropriate computational components/methods and estimate the desired system design parameters. Will be able to find output and debug errors on problems related to Image representation, processing, filtering, segmentation, restoration, projection, feature extraction, ehancements, transformation, performance parameters, smoothing, masking, colouring.
CO4	Can differentiate and compare between image processing techniques/components independently and be able to apply these techniques/components by appropriate interfaces.
CO5	Be able to devise a given image processing problem into independent modules and identify appropriate techniques/ components and then to develop/implement the system by integrating the modules by providing appropriate interfaces.
CO6	Can identify, estimate, design, implement and use appropriate image processing system for real world image processing needs.

Department	IT
Course Code	PEC-IT602A
Title of Course	Parallel and Distributed Algorithm
Nature of Course	Professional core courses
Type of Course	Elective
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: Define Parallel & Cluster Computing. CO2: a) Directly apply the fundamental concepts of Computation speed, Parallel & Cluster Computing Problem Solving. CO3: Synchronous Computations, load balancing, distributed termination examples .
Department	IT
Course Code	PEC-IT602B
Title of Course	Data Warehousing and Data MininG
Nature of Course	Elective
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Data Warehousing; Data Mining . CO2: Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns . CO3: Methodologies for stream data processing and stream data systems.

Department	IT
Course Code	PEC-IT602C
Title of Course	Human Computer Interaction
Nature of Course	Elective
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms . CO2: Design rules . CO3: Cognitive models –Socio-Organizational issues and stake holder requirements .

Department	IT
Course Code	PEC-IT602D
Title of Course	Pattern Recognition
Nature of Course	Elective
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of pattern recognition. CO2: a) Directly apply the fundamental concepts of pattern recognition to solve (implement) the most elementary/simplest model problems. CO3: a) Analyze Maximum-Likelihood estimation Gaussian mixture models.

Department	IT
Course Code	OEC-IT601A
Title of Course	Numerical Methods
Nature of Course	Open elective courses(new 2019(0))
Type of Course	Elective
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Truncation and rounding errors, Fixed and floating point arithmetic, Propagation of errors. CO2: Discuss Interpolation. CO3: Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.

Department	IT
Course Code	OEC-IT601 B
Title of Course	Human Resource Development and Organizational Behavior
Nature of Course	Open Elective
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Challenges and Opportunities for OB. CO2: Historical Background, Fundamental Concepts of OB, Challenges . CO3: Group Behaviour: Characteristics of Group, Types of Groups, Stages of Group Development, Group Decision .

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	Information Technology
Course Code	PCC-CS691
Title of cours	Database Management Systems Labs
Nature of course	Regular
Type of course	Lecture
Contact hours	3:0:0=3
CREDIT	2
Total contact hours	6 MONTHS
Course Outcomes	CO1: Design and Implement a database schema CO2: Devise queries using DDL, DML, DCL and TCL commands.

	CO3: Develop application programs using PL/SQL
	CO4:Design and implement a project using embedded SQL and GUI.
	CO5:Apply modified components for performance tuning in open source software.

Department	Information Technology
Course Code	PCC CS 692
Title of course	Computer Networking Lab
Nature of course	Compulsory
Type of course	Practical
Contact hours	0:3=3
CREDIT	2
Total contact hours	6 MONTHS
Course Outcomes	CO1: Understand and apply different network commands
	CO2: Develop programs for client-server applications
	CO3: Perform packet sniffing and analyze packets in network traffic.
	CO4: Implement error detecting and correcting codes

COURSE OUTCOME (CO)

SESSION: 2020-21

Department	Information Technology
Course Code	PROJ CS681
Title of course	PROJECT 1
Nature of course	Compulsory
Type of course	Practical
Contact hours	0:6=6
CREDIT	3
Total contact hours	6 MONTHS
Course Outcomes	CO1: Understand and apply different CONCEPTS IN PROJECT

Department	Information Technology
Course Code	PEC-IT701A
Title of course	Internet technology
Nature of course	Elective
Type of course	Lecturer
CREDIT	3
Contact hours	3:0:0=3
Course Outcomes	CO1: Understand advanced networking concepts and internet and web application architectures
	CO2: Analyze and understand different advanced routing protocols being used in web application development.
	CO3: Analyze and evaluate different solution available in the field of networking and web application development
	Co4: Implement solution for different critical network related issue

Department	IT

COURSE OUTCOME (CO)
SESSION: 2020-21

Course Code	PEC-IT701B
Title of Course	Quantum computing
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of quantum mechanics. CO2: Develop the skills to gain a basic understanding of quantum physics. CO3: Understand the concepts of photon. CO4: On completion of the course students will be able to knowledge of Vector spaces, Matrices, Quantum state, Density operator and Quantum.

Department	IT
Course Code	PEC-IT701C
Title of Course	Cloud Computing
Nature of Course	Professional Elective Courses
Type of Course	Theory
Contact Hours	3
Credit	3
Course Outcomes	CO1: Cloud Computing and its Basics CO2: Use of Platforms in Cloud Computing Concepts CO3: Cloud Infrastructure and Cloud Management CO4: Concepts of Services and Applications

Department	Information Technology
Course Code	PEC-IT701D
Title of course	Machine learning
Nature of course	Elective
Type of course	Lecturer
CREDIT	3
Contact hours	3:0:0=3
Course Outcomes	CO1: To learn the concept of how to learn patterns and concepts from data without being explicitly programmed
	CO2: To design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
	CO3: Explore supervised and unsupervised learning paradigms of machine learning.

Department	IT
Course Code	PEC-IT702A
Title of Course	Multimedia Technology
Nature of Course	Professional Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Multimedia Technology.
	CO2: a) Directly apply the fundamental concepts of Multimedia Technology to solve (implement) the most elementary/simplest model problems, and

	thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Text, Audio, Image and Video.
	CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Multimedia Technology.
	CO4: a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of Multimedia Technology.
	CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Storage and Access Techniques, Multimedia Database, Document Architecture and Content Management Techniques.
	CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Multimedia Technology.

Department	IT
Course Code	PEC-IT702B
Title of Course	Neural network and deep learning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Neural network. CO2: Develop the skills to gain a basic understanding of neural network theory . CO3: a) Understand the concepts of fuzzy sets, knowledge representation using

	fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic Neural network. CO4: a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of Neural network and deep learning.

Department	IT
Course Code	PEC-IT702C
Title of Course	Soft computing
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of soft computing. CO2: Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory. CO3: a) Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic CO4: a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of soft computings. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of different soft computing Techniques.

Department	IT
Course Code	PEC-IT702D
Title of Course	Ad hoc and sensor network
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Ad hoc and sensor network. CO2: To analyse the various design issues and challenges in the layered architecture of Ad hoc wireless networks. CO3: a) Understand the concepts of sensor network.

Department	IT
Course Code	PEC-IT702E
Title of Course	Information Theory and Coding
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of To develop an understanding of modern network architectures from a design and performance perspective. CO2: To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). CO3: To provide an opportunity to do network programming 4 To provide a WLAN measurement ideas. PreCO2: To analyse the various design issues and challenges in the layered architecture of Ad hoc wireless networks.

Department	IT
Course Code	PEC-IT702F
Title of Course	Cyber Security
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: To develop an understanding of modern network architectures from a design and performance perspective. CO 2: To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). CO3: To provide an opportunity to do network programming 4 To provide a WLAN measurement ideas. CO2: To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). CO3: To provide an opportunity to do network programming 4 To provide a WLAN measurement ideas. PreCO2: To analyse the various design issues and challenges in the layered architecture of Ad hoc wireless networks.

Department	IT
Course Code	OEC-IT701A
Title of Course	Operation Research
Nature of Course	Open Elective courses(new)
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of LP formulation. CO2: a) Directly apply the fundamental concepts of to solve problems on

queing theory ,game theory.

CO3: Analyse network paths.

Department	IT
Course Code	OEC-IT701B
Title of Course	Introduction to Philosophical Thought
Nature of Course	Open Elective courses(new)
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Carvaka school. CO2: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Buddhism. CO3: Analyse nature of Indian philosophy.

Department	IT
Course Code	OEC-IT701C
Title of Course	Soft Skills & Interpersonal Communication
Nature of Course	Open Elective courses(new)
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Self-Discovery. CO2: Interpersonal Communication improvement. CO3: Analyse Soft Skills.

COURSE OUTCOME (CO)
SESSION: 2020-21

Department	IT
Course Code	HSMC701
Title of Course	Project management and entrepreneurship
Nature of Course	Open Elective courses(new)
Type of Course	Lecture
Contact Hours	2
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of ENTREPRENEURSHIP. CO2: a) Directly apply the fundamental concepts of to solve problems on queing theory ,game theory. CO3: Analyse network paths.

Department	Information Technology
Course Code	PROJ IT 781
Title of course	PROJECT 2
Nature of course	Compulsory
Type of course	Practical
Contact hours	0:12=12
CREDIT	6
Total contact hours	6 MONTHS
Course Outcomes	CO1: Understand and apply different CONCEPTS IN PROJECT

Department	Information Technology
Course Code	PEC-IT801A
Title of course	SIGNAL AND NETWORK
Nature of course	Professional Elective courses(new)
Type of course	Lecturer
Contact hours	3:0:0=3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: Analyze design and implement combinational logic circuits.
	CO2: Develop a digital logic and apply it to solve real life problems.
	CO3: Simulate and implement combinational and sequential circuits

Department	Information Technology
Course Code	PEC-IT801B
Title of course	Cryptography & Network Security
Nature of course	Professional Elective courses(new)
Type of course	Lecturer
Contact hours	3:0:0=3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: Analyze encryption algorithms.
	CO2: Perform packet sniffing and analyze packets for vulnerabilities
	CO3: Identify system vulnerabilities of

	communication protocols
	Co4:Design firewalls
	Co5:Develop intrusion detection system

Department	IT
Course Code	PEC IT 801 C
Title of Course	Speech and Language Processing
Nature of Course	Professional Elective courses(new)
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Regular Expressions and Automata theory. CO2: Analyze Word Tokenization, Normalization, Sentence Segmentation etc. CO3:. Named Entity Recognition, Multi Word Extraction, Spell Checking – Bayesian Approach,
Department	Information Technology
Course Code	PEC-IT801D
Title of Course	Internet of Things
Nature of Course	Professional Elective courses(new)
Type of Course	Program Elective
Contact Hours	3

COURSE OUTCOME (CO)

SESSION: 2020-21

Total contact hours	36
Credit	3
Course Outcomes	**CO1** a) Define, b) explain in detail, and thereafter c) state the necessity/importance of environmental parameters measurement and monitoring, sensors and its characteristics, smart sensors and its architecture of the subject internet of things (IOT). **CO2** a) Directly apply characteristic of environmental parameters measurement and monitoring, sensors and its characteristics, smart sensors and its architecture to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the above fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems with IOT components. **CO3** a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems with IOT components, and thereafter b) Compute the output of given model subsystems with IOT components (and also identify errors in the design and implementation of given model subsystems with IOT components). **CO4** a) Compare and contrast in details among environmental parameters measurement and monitoring, sensors and its characteristics, smart sensors and its architecture and thereafter b) describe an overview level interconnected map of concepts/terminologies of IOT. **CO5** a) Identify and thematically explain where and how environmental parameters measurement and monitoring, sensors and its characteristics, smart sensors and its architecture, are utilized in large scale real world systems with IOT components, and thereafter b) Design the schematics for typical components of large scale known real world systems with IOT components. **CO6** a) Identify unsolved but necessary real world problems having IOT components and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems.

COURSE OUTCOME (CO)

SESSION: 2020-21

Department	IT
Course Code	PEC IT 801 E
Title of Course	Remote Sensig and GIS
Nature of Course	Professional Elective courses(new)
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of the Introduction and Overview of Geographic Information Systems . CO2: Analyze definition of a GIS Regular Expressions and Automata theory. CO3: Concept of Data Quality and Database Concepts Major data feeds to GIS.

Department	IT
Course Code	OEC-IT801A
Title of Course	Big Data Analytics
Nature of Course	Open Elective courses(new)
Type of Course	Theory
Contact Hours	3
Total contact hours	6 months
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Data analysis. CO2: Understand big data for business intelligence. CO3: Learn business case studies for big data analytics. CO4: Understand nosql big data management. Perform map-reduce analytics using Hadoop and related tools .

Department	Information Technology
Course Code	OEC-IT801B
Title of cours	Cyber Law and Ethics
Nature of course	Open Elective courses(new)
Type of course	Lecture
Contact hours	3:0:0=3
Total contact hours	6 months
Course Outcomes	CO1: Understand of Forgery, Hacking, Software Piracy, Computer Network intrusion. CO2: Security challenges posted by mobile devices, cryptographic security for mobile devices, Attacks on mobile/cellphones, Theft, Virus, Hacking. Bluetooth; Different viruses on laptop. CO3: Analyze the performance of MAC protocols used for wired network and wireless networks.

Department	Information Technology
Course Code	OEC-IT801C
Title of cours	Mobile Computing
Nature of course	Open Elective courses(new)
Type of course	Lecture
Contact hours	3:0:0=3
Total contact hours	6 months
Course Outcomes	CO1: Understand algorithm/protocols, environments and communication systems in mobile computing. CO2: Evaluate the efficiency of mobile IPv4 and IPv6 architectures with agents and proxies.

	CO3: Analyze the performance of MAC protocols used for wired network and wireless networks.
	CO4: Evaluate the performance of TCP protocols in Wireless Networks with mobile nodes.
	CO5: Design and analyze the existing routing protocols for multi-hop wireless networks.

Department	Information Technology
Course Code	OEC-IT801D
Title of Course	Bio Informatics
Nature of Course	Theory
Type of Course	Open Elective courses(new)
Contact Hours	3
Total contact hours	48
Credit	3
Course Outcomes	CO1 a) Define, b) explain in detail, and thereafter c) state the necessity/importance of molecular biology. CO2 DNA sequence analysis. CO3 Introduction Probabilistic models used in Computational Biology.

Department	Information Technology
Course Code	OEC-IT801E
Title of course	Robotics
Nature of course	Open Elective courses(new)
Type of course	Lecture

COURSE OUTCOME (CO)
SESSION: 2020-21

Contact hours	3:0:0=3
Credit	3
Total contact hours	6 months
Course Outcomes	CO1: Understand algorithm/protocols for robotics. CO2: Kinematics of serial robots . CO3: Analyze the performance of robots.

Department	IT
Course Code	OEC-IT802A
Title of Course	E-Commerce & ERP
Nature of Course	Open Elective courses(new)
Type of Course	Lecture
Contact Hours	3
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of E-Commerce & ERP. CO2: a) Directly apply the fundamental concepts of E-Commerce & ERP to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using E-Commerce Technologies. CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of E-Commerce Business Models. CO4: a) Compare and contrast in details between the fundamental concepts of Four C's, E-Payment, E-Marketing and thereafter b) describe an overview level interconnected map of concepts/terminologies of E-Commerce & ERP. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the

	schematics for typical components of large scale known real world systems using the concept of Enterprise Resource Planning(ERP). CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in E-Commerce & ERP.

Department	IT
Course Code	OEC-IT802B
Title of Course	Micro-electronics and VLSI Design
Nature of Course	Open Elective courses(new)
Type of Course	Lecture
Contact Hours	39
Credit	3
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of VLSI. CO2: Define CMOS circuits, MOS transistor switches. CO3: Analyze Verification and Testing concept.

DEPARTMENT	Information Technology
COURSE CODE	OEC-IT802C
TITLE OF COURSE	Economic Policies in India
NATURE OF COURSE	Elective
TYPE OF COURSE	Lecture
CONTACT HOURS	3Lecture
TOTAL CONTACT HOURS	36
COURSE OUTCOMES	CO1: Define, explain in detail and Issues in growth, development, and sustainability, Population and economic development, Factors in development, critical evaluation of growth, inequality, poverty and competitiveness, pre- and post- reform eras, Macroeconomic policies and their impact:

	fiscal policy, financial and monetary policies, policies and performance; production and productivity; credit; labour markets and pricing; land reforms; regional variations, production trends,small scale industries; public sector; foreign investment, labour regulation, trends and performance, trade and investment policy. CO2: Can define and understand government policies and will enable informed participation in economic decision making, thus improving their employment prospects and career advancement. CO3: Analyze current economic policy thus improving their chances of getting employed, and be more effective, in positions of responsibility and decision making. CO4: Differentiate and compare between fiscal policy,financial and monetary policies , policies and performance; production and productivity; credit; labour markets and pricing; land reforms; regional variations CO5: Be able to devise a given problem into independent modules and then to solve by integrating the modules by providing appropriate interfaces. CO6 Identify unsolved but necessary real world problems of Economic policies of India and thereafter generate detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Economic policies of India. .

Department	Information Technology
Course Code	PROJ CS881
Title of course	PROJECT 3
Nature of course	Compulsory
Type of course	Practical
Contact hours	0:12=12
CREDIT	3

COURSE OUTCOME (CO)

SESSION: 2020-21

Total contact hours	6 MONTHS
Course Outcomes	CO1: Understand and apply different CONCEPTS IN PROJECT