Program specific outcomes and course outcomes for all programs offered by the institution arestated and displayed on website and communicated to teachers and students

(I) FIRST YEAR ENGINEERING

Subject Code	Subject Name	CO	Course Outcomes
FEC101	APPLIED MATHS I	1	.Apply the knowledge of matrices to solve the problems
		2	Know and to understand various types of numerical methods
		3	Ability to interpret the mathematical results in physical or practical terms for complex number
		4	Ability to find higher order and nth order derivative
		5	Solve and analyze the partial derivatives and its application in related field of engineering
		6	Inculcate the habit of Mathematical thinking through Indeterminates forms and Taylors series expansion
FEC201	APPLIED MATHS II	1	.Apply the concepts of first order and first degree differential equations in the engineering problems
		2	Apply the concept of Higher order LDE to the engineering problems
		3	. Apply concepts of Beta and Gamma functions to the engineering problems
		4	Apply SCILAB programming techniques to solve differential equation to model complex engineering activities
		5	. Apply concepts of double integral of different coordinate systems to the engineering problems
		6	. Apply concepts of triple integral of different coordinate systems to the engineering problems
FEC102	APPLIED PHYSICS I	1	..Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.
		2	.Apply the knowledge of Quantum mechanics to uncertainty principle and motion of free particle
		3	.To comprehend the basic concepts of semiconductor physics and apply the same to electronic devices
		4	Apply the knowledge of superconductivity to SQUID and Magnetic levitation.
		5	.Apply the reasons for Acoustic defects and use this in the proper design of a

			Hall/Auditorium.
		6	.Use the knowledge of piezoelectric and Magnetostriction effect for production of ultrasonic waves and its application in various fields.
FEC202	APPLIED PHYSICS II	1	. Comprehend principles of interference and diffraction
		2	. Illustrate the principle, construction and working of various LASERs and its applications
		3	Identify various applications of optical fibers
		4	. Comprehend the concepts of electrodynamics and Maxwell's equations and their use in telecommunication systems.
		5	. Apply the concepts of electromagnetism in focusing systems and CRO
		6	. Comprehend the significance of Nano science and nanotechnology, its applications
FEC103	APPLIED CHEMISTRY I	1	.Apply The Knowledge Of Types Of Hardness Of Water and Its Estimation
		2	.Apply The Knowledge Of Various Softening And Disinfecting Methods
		3	.Apply The Knowledge Of Various Softening And Disinfecting Methods.
		4	.Apply The Knowledge Of Thermodynamics In Studying Different Chemical Systemsin Equilibrium Obeying Gibb's Phase Rule
		5	.Apply The Knowledge Of Lubricants,Types,Properties and Mechanism To Avoid Frictional Resistence
		6	.Demonstrate The Knowledge Of Portland Cement And Carbon Nano Materials
FEC203	APPLIED CHEMISTRY II	1	.Identify types of corrosion and factors affecting it related to problems affecting all industries
		2	Identify different types of corrosion control methods to study corrosion control in various industries
		3	Apply the knowledge of different types of fuels , including their production and refining metallurgy
		4	. Illustrate composition and properties of different types of alloys and the process of powder metallurgy
		5	Illustrate principles of green chemistry
		6	Illustrate properties and applications of different types of composite materials
FEC104	ENGINEERING MECHANICS	1	.Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
		2	Correlate real life application to specific type of friction and estimate required force to overcome friction and to analyze type of force on each member of truss.
		3	. Demonstrate the understanding of Centroid and its significance and locate the same. Also understand the principle of virtual work for system of connected rigid bodies
		4	. Establish relation between velocity and acceleration of a particle and analyse the motion by plotting the relation. Illustrate different types of motions and establish

			Kinematic relations for a rigid body
		5	. Illustrate different types of motions and establish Kinematic relations for a rigid body
		6	. Analyze body in motion using force and acceleration, work-energy, impulse-momentum principles and understanding concept of equilibrium in non coplanar force systems
FEC204	ENGINEERING DRAWING	1	.Apply the basic principles of projections in 2D drawings.
		2	Apply the basic principles of projections in converting 3D view to 2D drawing
		3	. Read a given drawing
		4	. Visualize an object from the given two views.
		5	. Use CAD tool to draw different views of a 3D object
		6	. Use CAD tool to draw an object in 3D.
FEC105	BEE	1	.To understand fundamentals of DC circuits
		2	. To understand DC circuits analysing using network theorems
		3	. To learn the fundamental and analyse single phase AC circuit
		4	To learn the fundamentals and analyse 3 phase AC circuits
		5	To learn the basic operations and analyse the performance of single phase transformer
		6	To understand the construction and basic operation of DC motor and generators
FEC205	SPA	1	.Understand the basic terminology used in computer programming
		2	.Write, compile and debug programs in C language
		3	.Use different data types in a computer program
		4	.Design programs involving decision structures, loops and functions
		5	.Describe the dynamics of memory by the use of pointers
		6	.Use different data structures and create/update basic data files
FEC106	ENVIRONMENTAL STUDIES	1	.Understand the depleting Nature of Environmental Resources, Global Environmental Crisis and will acquire a clear concept about Ecosystem.
		2	To adapt to 3R (Reuse, Recovery, Recycle).
		3	. Use different control measures related to Environmental Pollution
		4	Analyse various Case Studies related to Environmental Legislation
		5	. Know the working of Renewable energy sources &Equipment.
		6	. Understand the techniques of Disaster Management and will get awareness about Green Building
FEC206	COMMUNICATION SKILLS	1	Understand and evaluate information they listen to and express their ideas with greater clarity
		2	. Speak and respond effectively along the various channels of communication in a business organization

		3	. Speak convincingly before an audience with the help of an expanded vocabulary and a relevant digital content
		4	. Read and summarize effectively
		5	. Communicate through result oriented writing both within and outside the organization
		6	Write a set of effective and easy to understand technical description, instructions and convey the same using global information technology

(II) DEPARTMENT OF BIO-MEDICALS

Program Specific Outcomes (PSOs)

PSO1	To impart technical knowledge and competency skills to perform in various areas like sales & marketing, product engineering, research & development, hospital administration, regulatory affairs and also to venture into entrepreneurship..
PSO2	Develop proficiency in various soft skills and bring awareness about social obligations and professional ethics to pursue professional career in a healthcare industry.
PSO3	Motivate to pursue research and specialization in a plethora of domains in the field of Biomedical Engineering covering disciplines such as, Medical Instrumentation, Neuroscience, Computational Engineering, Robotics Engineering, Medical Signal and Image processing, Rehabilitation Engineering, VLSI, Nanotechnology and Biosensors, etc.

S.E: SEMESTER-III (CBCGS-R 2016)

Subject Code	Subject Name	Course Outcomes
BMX-301	Applied Mathematics III	CO1: Demonstrate the basic knowledge of Laplace Transform CO2: Understand the reverse methodology to recover the original signal by using Laplace Transform CO3: Understand the concepts regarding Fourier Series CO4: Analyze the various operations performed in a Vector Quantity

		CO5: Analyze the various types of Integration performed in Vectors CO6: Understand the basic Concepts of Complex Variables and its Integration as well as Bessel Function
BMX-302	Basics of Human Physiology	CO1:To measure blood pressure using occlusive cuff method CO2:To apply blood cell counting principle for measuring blood composition CO3:To analyse electrical activity of heart. CO4:To apply the knowledge of instruments used for supporting cardiovascular system
BMX-303	Electrical Network Analysis and Synthesis	CO1:Apply number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis, source transformation and several methods of simplifying networks CO2:Discriminate between different one port and two port network parameters CO3:Apply the concept of graphical solution to electrical network CO4:Analyze time and frequency response of the electrical circuits CO5:To make the learner learn how to synthesize an electrical network from a given impedance/admittance function CO6:To make the learner learn how to synthesize an electrical network from a given impedance/admittance function
BMX-304	Electronic Circuit Analysis and Design	CO1: Understand the basic semiconductor components like P-N junction diodes, zener diodes and their various applications CO2: Understand BJT working and its various configurations and DC operating conditions CO3:Understanding AC operating conditions and Design of single stage small signal CE amplifiers CO4:Design of single stage small signal CS amplifiers CO5: Understand the working of MOSFETs, its characteristics and its various applications CO6:Understanding the concept of multistage amplifiers
BMX-305	Biomaterials, Prosthetics and Orthotics	CO1: It enables students to understand about various Biomaterial and also techniques for characterization of Surface properties of Biomaterials It enables students to understand various Laws of Motion and the types of force CO2: It enables students to understand about various Biomaterial Properties and Applications of Polymeric and degradable Biomaterials and Composite Materials CO3: It enables students to understand about various Biomaterial Properties and Applications of Metallic Biomaterials and its Biocompatibility The student become very familiar with various concepts like various body and joint movements, the human Gait Analysis and also various types of Levers and understand various

		Anatomical Levers CO4: Biological Testing of Biomaterials are discussed and studies CO5: The student become well versed with various techniques to analyze Gait of Human and the instrumentation involved in it CO6: Principles in designing orthoses and prostheses and various design considerations are studied for handicapped person, amputees and congenitally disabled people Students get an idea how to overcome various disabilities when people suffer from Lower Extremity orthoses and prostheses, Upper Extremity orthoses and prostheses. Spinal orthoses.
BMA-301	Object Oriented Programing	CO1:To apply fundamental programming constructs CO2:To illustrate the concept of packages, classes and objects CO3:To elaborate the concept of strings, arrays and vectors CO4:To implement the concept of inheritance and interfaces CO5:To implement the notion of exception handling and multithreading CO6:To develop GUI based application.

S.E: SEMESTER-IV(CBCGS-R 2016)

Subject Code	Subject Name	Course Outcomes
BMC401	Applied Mathematics IV	CO1: Understand the importance of determining Eigen Values and Eigen Vectors. CO2: Understand the various methods to solve integrals of Complex Functions. CO3: Understand the importance of Probability in their respective Department. CO4: Analyze the various methods of Correlation CO5: Understand the various methods of applying algebraic operations in Vector Quantity CO6: Understand the various scales of Variations
BMC402	Biomedical Transducers and Measuring Instruments	CO1: o clearly understand generalized medical instrumentation system, general properties of transducers, static and dynamic characteristics of transducers and sensors. CO2: Understand the fundamental principles and applications of various types of sensors including motion, displacement and pressure sensors.

		CO3: To understand principle of various biopotential electrodes CO4: Understand principle and working of chemical sensor CO5: To understand principle of various biosensors, and differentiate various amperometric and potentiometric sensors. CO6:Present different transduction methods for measuring temperature.
BMC403	Linear Integrated Circuits	CO1: Analyse different types of differential amplifiers CO2: Demonstrate basics of operational amplifiers CO3: Analyse and design operational amplifier to perform mathematical operations CO4:Analyse and design operational amplifier as oscillators CO5: Illustrate basics of negative feedback and perform analysis on different types of circuits with negative feedback CO6: Exhibit working of power amplifiers, its types and DC and AC analysis and designing
BMC404	Digital Electronics	CO1:TO Understand various number systems and its arithmetic (BCD, Binary, Octal, Hexadecimal) CO2:Solve sums on K-maps, Boolean algebra and SOP-POS implementations. CO3: Design code converter circuits, parity generator-checker circuits and magnitude comparator circuits. CO4:Design circuits using multiplexers, demultiplexers, and decoders CO5:Design synchronous and asynchronous counters and registers using flip flops CO6:Design various gates using various logic families
BMC405	Signals and Control Systems	CO1: To represent signals and system mathematically. CO2: To represent integral of LTI systems and properties of system in terms of impulse response. CO3: To determine Fourier series representation of CT and properties of Fourier series. CO4: To derive and determine Laplace transform, region of convergence, application of Laplace transform and Inverse Laplace transform CO5: To understand the fundamentals of control systems and its system types. CO6: To analyze the time domain and frequency domain behavior of the

		systems along with determining the stability of the system.

TE: Semester-V(CBSGS-R-2012)

Subject Code	Subject Name	Course Outcomes
BMC501	Biomedical Instrumentation-I	CO1: Demonstrate the principles of electronics used in designing various diagnostic equipment. CO2: Have in-depth knowledge about different streams in Biomedical Engineering with greater emphasis on health care equipments and the advanced technologies such as Telemedicine, Telemetry, Medical Imaging, etc.. CO3: Exhibit competency in suggesting, designing and offering the apt, reliable and optimum solution after understanding customer's requirement completely.. CO4:Demonstrate ability of correlating theoretical concepts with their practical implementation while performing laboratory exercises and project work. CO5: Provide a better technical support with exposure to the hospitals and health care industry. CO6.Use modern methodologies, multi-disciplinary skill set and knowledge while working on real time projects that demand convergence of engineering, science and technology
BMC502	Microprocessors	CO1: To develop background knowledge and core expertise in microprocessor CO2: To study the concepts and basic architecture of 8086 Pentium processor and Co-processor 8087 CO3: To know the importance of different peripheral devices and their interfacing to 8086 CO4: To know the design aspects of basic microprocessor based system CO5: To write assembly language programs in microprocessor for various applications
BMC503	Analog and Digital Circuits Design	CO1: To understand and provide knowledge of various Analog And Digital Circuits Such as Timer IC 555, PLL IC, VCO, 723 voltage regulator . CO2: . To understand different types of filters and design them for the given specifications

		CO3:To understand, learn and analyze fundamentals of Electronics and Digital circuits CO4:To develop analytical aptitude and to understand basic electronic concepts related to engineering profession CO5: To develop competency in terms of logical thinking, programming and application skills. CO6:To design and develop various circuits for biomedical applications and to develop logical thinking of students
BMC504	Biomedical Digital Signal Processing	Co1:To Understand the fundamental techniques and applications of digital signal processing with emphasis on biomedical signals. Co2:Implement algorithms based on discrete time signals CO3:Understand Circular and linear convolution and their implementation using DFT analyse signals using discrete Fourier transform. CO4:Understand efficient computation techniques such as DIT and DIF FFT algorithms. CO5:Design FIR filters using window method, digital IIR filters by designing prototype analog filters and then applying analog to digital conversion
BMC505	Principles of Communication Engineering	CO1: The students will able to understand basic principles used in analog and digital communications systems. CO2: The students will also get familiar with techniques of analog modulation as communication transmitters and receivers techniques are discussed for different transmission conditions. CO3: The students will able to understand techniques of digital modulation as communication transmitters and receiver's techniques are discussed for different transmission conditions. CO4: The students will also get familiar with multiplexing techniques used in analog and digital communications. CO5: The students will also be able to use communication techniques in electronic and tele-communication applications. CO6: The students will also be able to apprehend to use communication techniques in Bio-Medical application with safety consideration.
BML506	Business Communication Ethics	CO1: Communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities CO2: Participate and succeed in Campus placements and competitive examinations like GATE, CET.

		CO3: Possess entrepreneurial approach and ability for life-long learning CO4: Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.

TE: Semester-VI(CBSGS-R-2012)

Subject Code	Subject Name	Course Outcomes
BMC601	Biomedical Instrumentation –II	CO1 :Demonstrate the principles of electronics used in designing various diagnostic equipment. CO2: Have in-depth knowledge about different streams in Biomedical Engineering with greater emphasis on health care equipments and the advanced technologies such as Telemedicine, Telemetry, Medical Imaging, etc. CO3: Exhibit competency in suggesting, designing and offering the apt, reliable and optimum solution after understanding customer's requirement completely CO4: Demonstrate ability of correlating theoretical concepts with their practical implementation while performing laboratory exercises and project work. CO5: Provide a better technical support with exposure to the hospitals and health care industry. CO6: Use modern methodologies, multi-disciplinary skill set and knowledge while working on real time projects that demand convergence of engineering, science and technology.
BMC603	Biological Modelling and Simulation	CO1: Generation of a model of an physical system CO2: basic concepts of Action potential and how they are generated, measured by experimental set up. CO3: understanding the NM physiological system CO4: understanding the Eye physiology and muscular forces acting on it CO5: understanding Human thermoregulation system CO6: models of other physical system with immune response , Drug activity
BMC604	Microcontrollers	CO1: To study basics of embedded system. Features of embedded system to be taught and they need to understand from examples. To learn Real Time Operating

	and Embedded Systems	System. CO2: To understand architecture, memory capacity and CPU and machine cycle timing. CO3: Develop understanding of hardware and software design and will be able to design controller based real time applications CO4: To understand the peripheral chips and the technique to interface with 8051 CO5: To learn serial communication protocol and learn associated programming. CO6: Develop programming skills for designing and developing automated and user friendly systems.
BMC605	Medical Imaging –I	CO1: The students will able to understand essential physics, concepts of Ultrasound medical imaging technique and how they are employed in diagnosis and therapy. CO2: The students will able to understand essential physics, concepts of X-ray medical imaging technique and how they are employed in diagnosis and therapy. CO3: Get familiar with the current techniques of X-ray Imaging like fluoroscopy and digital radiography CO4: Students will able to understand basic physics of thermography, endoscopy techniques and its applications. CO5: To apprehend the importance of radiation constructive utilization and safety. CO6: Students will be able to evaluate and correct non-diagnostic images effectively.
BMC606	Biostatistics	CO1: Understanding probability and sampling distributions. CO2: Understanding statistical estimation, hypothesis testing CO3: Understanding analysis of variance and regression analysis CO4: Understanding test of goodness of fit, independence and homogeneity CO5: Application of statistical methods to sample data and analyze the same CO6: Develop a strong foundation for designing algorithms for computation

BE: Semester-VII(CBSGS-R-2012)

Subject Code	Subject Name	Course Outcomes
BMC701	Biomedical Instrumentation-III	CO1: Demonstrate the principles of electronics used in designing various diagnostic equipment. CO2: Have in-depth knowledge about different streams in Biomedical Engineering with greater emphasis on health care equipments and the advanced technologies such as Telemedicine, Telemetry, Medical Imaging, etc.. CO3: Exhibit competency in suggesting, designing and offering the apt, reliable and optimum solution after understanding customer's requirement completely. CO4: Demonstrate ability of correlating theoretical concepts with their practical implementation while performing laboratory exercises and project work. CO5:Provide a better technical support with exposure to the hospitals and health care industry. CO6.Use modern methodologies, multi-disciplinary skill set and knowledge while working on real time projects that demand convergence of engineering, science and technology
BMC702	Medical Imaging – II	CO1: The students will able to understand essential physics and concept of Computed Tomography imaging technique. CO2: The students will also get familiar with current techniques in CT Imaging along with their clinical applications CO3: The students will able to understand physics and concepts of Magnetic Resonance Imaging and Magnetic Resonance Spectroscopy techniques CO4: The students will also get familiar with current techniques in MRI and MRS Imaging along with their clinical applications CO5: The students will able to understand the how medical imaging techniques like CT, MRI and MRS are employed in diagnosis and therapy. CO6: The students will also be able to apprehend the importance of radiation constructive utilization and safety.
BMC703	Biomechanics Prosthesis and Orthotics	CO1.It enables students to understand various Laws of Motion and the types of force CO2:The student become well versed with the Tissue mechanics, Concept of Stress and Strain, BioMechanical properties of Skin,Tendon,Ligament and Bone CO3.The student become very familiar with various concepts like various body

		and joint movements, the human Gait Analysis and also various types of Levers and understand various Anatomical Levers CO4:The student become well versed with various techniques to analyze Gait of Human and the instrumentation involved in it. CO5:Principles in designing orthoses and prostheses and various design considerations are studied for handicapped person, amputees and congenitally disabled people CO6.Students get an idea how to overcome various disabilities when people suffer from Lower Extremity orthoses and prostheses, Upper Extremity orthoses and prostheses. Spinal orthoses
BMC704	Very Large Scale Integrated Circuits	CO1: Students will be able to understand the technology behind the integrated circuits and will be able to design them as per the requirement CO2: Students will learn VHDL programming and will be able to write different programs. CO3: Students will be able to understand the fabrication, characteristics of MOSFET. How MOSFET capacitance formed and its types. CO4: Inverter characteristics will be learnt. Students will be able to derive relations of Voh, Vol, Vil, Vih of inverter CO5: Different processes used in VLSI fabrication are learnt. CO6: Students will learn to make layouts of different digital circuits and correlate it with its fabrication.
BMC705	Networking and Information System in Medicine	CO1:To understand the fundamental component of computer Networking. CO2: To understand the functioning and configuration of various networking devices and components. CO3: To understand a concept about network security. CO4: To understand the healthcare IT infrastructure and also the prevalent standards in healthcare informatics.

BE: Semester-VIII(CBSGS-R-2012)

Subject Code	Subject Name	Course Outcomes
BMC801	Nuclear Medicine	CO1: The students will able to understand essential physics, concepts of radiopharmaceuticals and how they are employed in nuclear medicine

		diagnosis and therapy. CO2: The students will also be able to apprehend the importance of radiation safety and radioactive waste management. CO3: The students will able to understand essential physics, concepts of In-vitro techniques of nuclear medicine along with their clinical applications. CO4: The students will able to understand essential physics, concepts of In-vivo techniques of nuclear medicine along with their clinical applications. CO5: The students will also get familiar with current techniques used in Nuclear Medicine CO6: The students will also get familiar with radionuclide used in treatment of benign and malignant diseases.
BMC802	Biomedical Microsystems	CO1: To understand various fabrication technology for MEMS devices CO2:To apply the knowledge of MEMS in Biomedical field CO3:To understand recent advancements in Biomedical Engineering for a successful career in the area of nanotechnology. CO4:Use the knowledge of MEMS to develop various miniaturized Biomedical devices. CO5:MEMS based drug delivery systems
BMC803	Hospital Management	CO1: Understand and apply resource management concepts (personnel, finance, and material resources) and the processes and strategies needed in specific hospital sectors. CO2: Communicate effectively and develop their leadership and teambuilding abilities. CO3: 3. Apply modern change management and innovation management concepts to optimize structures. CO4: Analyze existing hospital service policies and enhance their alignment within the local and national context. CO5: understand various purchase procedure CO6:understands all medical aspects
BME804	Elective –LFO	CO1: Understand the fundamentals and clinical applications of Laser and Fiber Optics CO2: . Correlate the knowledge of medicine and engineering for the wellness of human being CO3: . Understand the safety aspects while dealing with Laser and Fiber Optic Units.

		CO4: Understand the research oriented aspects with respect to sub stainable development CO5: To calculate the professional's ethics with respect to multidisciplinary settings when utilizing lasers in conjunctions with industrial or clinical framework CO6: To comprehend the effective reports with respect to clinical aspects of lasers

For Post Graduate Courses

ME: Semester- I

Subject Code	Subject Name	Course Outcomes
BMC 101	Anatomy and Physiology for Engineers	CO1: understanding human anatomy and physiology CO2: understanding of knowledge of medicine and engineering for development of medicine CO3: understanding of knowledge of medicine and engineering for development of various instruments CO4:to study cardiovascular and respiratory system CO5: to study musculokeletal system and central nervous system CO6:to understand Endocrine system
BMC 102	Biomedical sensors, Applications and Intelligent instrumentation	CO1: To clearly understand generalized medical instrumentation system, properties and characteristics of transducer. CO2: A learner will be able to get the clear domain knowledge about various measurement system. CO3: Understand the fundamentals principles and applications of various types of sensors including motion, displacement and pressure sensors. CO4: Students will able to develop measurement systems by selecting different types of sensor CO5: To understand different transduction methods for measuring temperature CO6:Students will also get familiar with biochemical measurements.

BMC 103	Advanced Digital Signal Processing	CO1:To study types of signals and related theorms. CO2: To design filters. CO3: To study frequency domain processing in Fourier transform. CO4: To study adaptive cancellation and statistical processing. CO5: To study wavelet and its application in biomedical signal processing. CO6: Correlation techniques and applications.
BMDLO101X	Department Level Optional Course: ESBE	CO1: This section deals with the information about various architectures available for microcontrollers and in-depth study of commonly available microcontrollers. Also decision making for choice of application specific microcontroller. CO2: This section generally for revision of software knowledge in C and C++ programming and how to use the same for programming a microcontroller. CO3: This section deals with detailed study of PIC architecture, Instruction set, interfacing of key pad and LCD display. How these devices can be used for design of standalone embedded systems. CO4: In the digital world, modern trend is to do all the linear processing in digital domain. The emphasis is for just sensing the signal and with the help of sigma-delta ADC transferred to microcontroller, which does all the amplification, base restoration, filtering and signal processing. In this series ADS 1298, AFE 4300 and AFE 4490 will be introduced. CO5: This section emphasizes on real time operating systems. Models for event control program and multiprocessor systems are introduced.

M.E: Semester- II

Subject Code	**Subject Name**	**Course Outcomes**
BMC 101	Biomedical Instrumentation and Design	CO1: To design electrodiagnostics instruments. CO2: To understand use of medical equipments in various departments in the hospital. CO3: To understand use of diagnostic, Therapeutic, instruments for treatment. CO4: To study and design EMG, ECG, EEG, PPG amplifiers. CO5: To study basic application of BP, Heart rate, Body temperature, respiration rate, Apnea detector.
BMC 102	Biomedical Image Processing	CO1: A learner will be able to understand the basic concepts of image processing CO2: The students will able to understand essential physics and concept of Medical Imaging modalities. CO3: A learner will be able to apply image processing concepts for medical images.

		CO4: The students will able to analyze Morphology and segmentation techniques and implement them in images. CO5: The students will able to do quantitative analysis and visualization of medical images of numerous modalities. CO6: Learner will be able to understand the concept of abnormality detection through state of art modalities
BMC 103	Advanced medical Imaging	CO1: Students able to understand essential physics, principle and physiology fundamental of Medical Imaging systems. CO2: Compute image reconstructions of different imaging modalities using reconstruction methods. CO3: Apprehend the importance of radiation constructive utilization and safety. CO4: Identify basic causes of image contrast and artifacts. CO5: Describe the clinical applications of each Imaging modality. CO6: Apply their knowledge to understanding emerging Medical Imaging technologies.
BMDLO101X	Department Level Optional Course	CO1: CO2: Study of Fiber optics CO3: CO4:application of lase in diagnostic purpose & therapy CO5: combination of laser & fiber optics for various surgical applications

II) DEPARTMENT OF BIO-TECHNOLOGY

Departmental PSO's

PSO 1	Understand & design the complex engineering problems and need for sustainable development.
PSO 2	Use of appropriate techniques of modern engineering & it's tools for the public health and safety
PSO 3	Use research-based knowledge and research methods to provide valid conclusions on recent technologies

SECOND YEAR -(CBCGS-R 2016)

BTC301: Applied Mathematics- III

Name of the course	CO code	Course outcome {CO}
Microbiology	1	The students will be able to know discovery of microbiology & classification of microbiology
	2	Students will be able to carry out various microbiological techniques like staining & isolation very well
	3	They would be able to know microbial media & microbial nutrition
	4	Students will be able to carry out various microbiological techniques to study microbial growth
	5	They would have detailed knowledge of various sterilization techniques, which would be useful for other courses
	6	Students will be able to carry out various experiments on antimicrobial therapy & water & soil microbiology

Name of the course	CO code	Course outcome {CO}
Applied Mathematics- III	1	To understand the basic concepts of Laplace and Inverse Laplace Transform.
	2	Able to solve the Differential Equations using Laplace Transform
	3	To understand the importance of eigen value and eigen vectors, as well as orthogonal and Congruent reduction of quadratic forms.
	4	To analyse the various algaebric operations in Complex functions
	5	To analyze integrations in Complex functions by using bilinear transformations and Cross Ratio
	6	To understand the various methods of Optimization like Lagrange's Multiplier, Kuhn-Tucker Method

BTC302: Microbiology

BTC303: Cell Biology

Name of the course	CO code	Course outcome {CO}
Cell Biology	1	The students will be able to know discovery of cell & different types of cells
	2	Students will have a knowledge of different cyto receptors concepts
	3	The students will be able to know terminology of cell organelles nutrition
	4	Students will understand different mechanism like protein sorting, cell communication and fWeak of information and transport

	5	The students will be able to know cellular communication & pathogenicity of cell
	6	students will have good knowledge of cancer, its types & etiology

BTC304: Biochemistry

Name of the course	CO code	Course outcome {CO}
Biochemistry	1	Students will have a strong chemical foundation of biology including various interactions in biological systems
	2	Students will have a strong foundation in structures and reactions of biomolecules
	3	Students will have insight about the function, structure and kinetics of enzymes
	4	Students will study about the classification, function and role of various vitamins and hormones in metabolism
	5	Students will study about the various metabolic pathways of major biomolecules
	6	Students will have a clear idea of bioenergetics including laws of thermodynamics

BTC305: Unit Operations-I

Name of the course	CO code	Course outcome {CO}
Unit Operations-I	1	The student will have a thorough grounding on measurement of pressure drop, velocity, fWeak rates etc. of fluids
	2	The student will be able to understand the dynamics of fluids
	3	They will be able to operate certain fWeak measurement devices and understand applications of different valves and pumps
	4	The student will be able to understand the importance of particle size distribution, screening equipment and different types of conveyors
	5	They will be able to learn factors affecting size reduction and size reduction equipments
	6	They will be able to learn different separation methods which are depend on particle mechanics through liquids

BTC306: Process Calculations

Name of the course	CO code	Course outcome {CO}

Process Calculations	1	Students will be able to develop understanding about material balance and energy balances.
	2	Students will be able to study the stoichiometry and thermodynamics of microbial growth and product formation
	3	The student will be able to understand basic application of various unit operations.
	4	The student will be able to understand application of unit processes to industrial and theoretical problems
	5	They will have a clear understanding of the various systems of units and will be able to do the conversion of units of one system to another.
	6	They will be able to do basic calculations for biological systems & access the property data from appropriate sources

SECOND Year Semester- IV (CBCGS-R 2016)

BTC401: Applied Mathematics- IV

Name of the course	CO code	Course outcome {CO}
Applied Mathematics- IV	1	To Understand the basics of Fourier Series
	2	To analyze the concepts of Fourier Integral
	3	To Understand the various Differential Equations of Ellipse, and other functions
	4	Understand the various methods of Vector Integrations.
	5	Understand the basic concept of vector
	6	Ability to perform algebraic operations in vectors and apply various theorems of vectors.

BTC402: Molecular Genetics

Name of the course	CO code	Course outcome {CO}
Molecular Genetics	1	Student will able to understand nucleic acids DNA, various types of DNA, RNA and their properties
	2	Students will be able to study the organization of DNA in chromosomes and the mendelism principle of genetics and various genetics aberrations
	3	The student will able to understand detailed process of DNA replication, damage and repair
	4	The students will understand the mechanism of formation of RNA from DNA in prokaryotic and eukaryotic system
	5	The students will understand the mechanism of formation of proteins from RNA in prokaryotic and eukaryotic system

	6	The student will understand the control mechanism associated with regulation of gene expression

BTC403: Fermentation Technology

Name of the course	CO code	Course outcome {CO}
Fermentation Technology	1	To describe key industrial bioprocesses, from the traditional to the recently evolved and general requirements for fermentation
	2	Understand regulatory mehanism and working of various types of productions
	3	Appreciate the use of microorganisms for the production of value added commodities and learn the tehniques to isolate and improve and store them
	4	Understand the construction and requirements of a fermentation system
	5	Integrate biological and engineering principles involved in the production
	6	Develop critical thinking skills and learn to employ a quantitative, scientific approach towards conversion of biological materials to value added products

BTC404: Analytical Methods in Biotechnology

Name of the course	CO code	Course outcome {CO}
Analytical Methods in Biotechnology	1	They would be capable of handling Centrifugation and understand its working
	2	The students will understand principles behind working of Chromatography
	3	They would use Electro kinetic methods effectively in research work
	4	The students will understand advantages and limitations of advanced Analytical Methods such as spectroscopy
	5	The students will understand principle behind radioisotopic techniques
	6	The students will be capable of handling different instruments in the laboratory and able to compare different separation techniques

BTC405: Immunology and Immunotechnology

Name of the course	CO code	Course outcome {CO}
Immunology and Immunotechnology	1	Students will be able to understand the bodies innate adaptive response to various pathogenic & nonpathogenic agents.
	2	Students will be able to understand structure and function of various antigens and antibodies
	3	Students will be able to understand various pathways of generation and regulation of immune responses
	4	Students will be able to understand the immune mechanism through antigens and antibodies interaction

	5	Students will study and understand disorders of human related immune system.
	6	Students will be able to apply the knowledge of immunology in production of monochonal antibodies and recombinant vaccines

BTC406: Unit Operations-II

Name of the course	CO code	Course outcome {CO}
Unit Operations-II	1	The student will be able to understand one of the mode of heat transfer i.e. Conduction and Insulation with numerical problems
	2	The student will be able to understand one of the mode of heat transfer i.e. Convection and heat transfer with phase change with numerical problems
	3	The students have an ability to understand the concept of radiation and able to solve numerical problems
	4	The student will be able to learn heat transfer equipment with evaporators and condensers
	5	They will have a clear understanding of the theories of Mass transfer i.e. diffusion and application of diffusion in bioprocess operations.
	6	They will be able to know about Distillation Unit and can calculate theoretical stages

Third Year- Semester-V (CBCGS-R 2012)

BTC501: Bioinformatics-1

Name of the course	CO code	Course outcome {CO}
Bioinformatics-1	1	Understand and explain different types of biological data types of DNA and protein sequencing methods including the concepts involved and applications of bioinformatics
	2	Understand and explain different types of data storage techniques and major bioinformatics databases
	3	Understand and explain different types of alignment, dynamic programming algorithms and concept, importance and of phylogenetic analysis
	4	Understand different types of visualization tools and methods used in bioinformatics
	5	Understand and explain different types of protein structure and the concept and different methods of molecular modelling
	6	Understand and explain the process of Drug Discovery and different

		algorithms used in drug discovery

BTC502: Genetic Engineering

Name of the course	CO code	Course outcome {CO}
Genetic Engineering	1	Understand in general preparation and purification of plasmids
	2	Know about various enzymes and vectors used in recombinant DNA technology
	3	Design various strategies for cloning foreign DNA in host DNA
	4	Implement the knowledge of various DNA transfer techniques in genetic engineering
	5	Understand various genetic techniques for analysis of recombinant DNA
	6	To apply the knowledge of recombinant DNA technology in various fields of Biotechnology

BTC503: Biophysics

Name of the course	CO code	Course outcome {CO}
Biophysics	1	To Understand how molecules are created, and studied
	2	Students will be able to understand nucleic acid interactions
	3	They would be able to relate structure and function of biological membranes
	4	Getting insight on how experimental methods and physical approaches can be used to study the structure of proteins
	5	Students will be able to understand lipids and their interactions
	6	Understanding and appreciation of biophyscs as an interdisciplinary research field

BTC504: Thermodynamics & Biochemical Engineering

Name of the course	CO code	Course outcome {CO}
Thermodynamics & Biochemical Engineering	1	The student will be able to check the feasibility of a reaction
	2	They can learn the first and second laws of thermodynamics, evaluate entropy changes and understand the concepts of heat, work and energy conversion with calculation of heat and work quantities
	3	Problem solving skills will be developed during the course which is related to processes involving thermal changes with PVT behaviour
	4	The students can apply these concepts in the biotechnology industries
	5	The students will be able to understand relationships among thermodynamic properties, fugacity and activity coefficient

	6	The students will be able to learn properties of solution with criteria of phase equilibria

BTC505: Bioreactor Analysis & Technology

Name of the course	CO code	Course outcome {CO}
Bioreactor Analysis & Technology	1	Student will be able to understand basic reaction kinetics
	2	Student will be able to understand the different types of ideal reactors
	3	Students will understand working of multiple reactors and reaction systems and can solve practical problems
	4	Students can learn heterogeneous systems and reaction kinetics of solid catalyst
	5	Student will be able to understand the non-ideal behavior of reactors.
	6	They will understand working principle of unconventional reactors

BTC506: Business Communication & Ethics

Name of the course	CO code	Course outcome {CO}
Business Communication & Ethics	1	Application of engineering knowledge in the professional areas with linguistic competence
	2	Ability to have analytical skills, power of judgement and negotiation skills in any professional arena.
	3	Possession of an entrepreneurial approach in different context.
	4	Ability to succeed in competitive examination, self-analysis and various professional activities.
	5	Awareness of the significance of an engineer's social responsibilities and contribution sin a broader range at par with technological transformation and recent advancements.
	6	Demonstration of interpersonal skills in a wide spectrum as engineers to succeed in campus placements and any other interviews

Third Year-Semester- VI(CBCGS-R 2016)

BTC601: Bioinformatics-II

Name of the course	CO code	Course outcome {CO}
Bioinformatics-II	1	Understand different methods of molecular modelling, theory of energy minimization and its importance in molecular modelling
	2	Understand geometry of protein structure and different types of interactions between protein and ligand.

	3	Understand the biological phenomenon of protein folding and applications of chaperones in bioinformatics.
	4	Understand the concept of Machine Learning, different types of algorithms used in Machine Learning and their applications in Bioinformatics
	5	Understand importance of Interoperability in Bioinformatics and implement different types of interoperability languages
	6	Understand the concepts of Pharmacophore, Prodrugs, Endogenous Compounds and the process of Drug Designing and Docking & concept, application and results analysis of QSAR

BTC602: Cell & Tissue Culture

Name of the course	**CO code**	**Course outcome {CO}**
Cell & Tissue Culture	1	Students will be able to understand plant experiments and cultured plant cells.
	2	Students will carry out plant cell culture by various techniques.
	3	Students can apply the knowledge of plant cell culture techniques for production of various useful bioproducts
	4	Students will understand and carry out animal cell culture
	5	Students will be able to understand about the various laboratory techniques, primary culture and cell lines.
	6	Students can apply the knowledge of animal tissue culture in animal biotechnology and stem cell culture

BTC603: Enzyme Engineering

Name of the course	**CO code**	**Course outcome {CO}**
Enzyme Engineering	1	Give insight into the functioning of Enzyme molecules. their constructions, structure, interactions with other cellular molecules including process of catalysis and allosterism.
	2	They will also study in detail about the enzyme kinetics and inhibition studies.
	3	Students will study about the different methods for the analysis of enzyme activity
	4	They will study about the methods of isolation, purification and genetic modification of enzymes
	5	Students will have a clear idea about the various criteria's for enzyme purity and subunit analysis along with immobilization techniques.
	6	They will be able to design operational strategies for enzyme based reactors along with industrial uses and applications of enzymes

BTC604: IPR, Bioethics & Biosafety

Name of the course	CO code	Course outcome {CO}
IPR, Bioethics & Biosafety	1	Comprehend different types of Intellectual Property Rights. Recognize importance of protection of new knowledge and innovations and its role in business.
	2	To be aware of rules and regulations set up at international level for various biotechnology related work so that any further research can be formulated accordingly.
	3	To understand the concept of patents & infringement. Criteria of patentability and related case study
	4	To know the social and legal state of the society with respect to genetically engineered products or other outcomes of biotechnology. Students will be able to assist in technology upgradation & enhancing competitiveness.
	5	Work according to the safety precautions set up by international bodies while handling biohazardous materials
	6	To understand the ethical perspectives of handling biomaterials.

BTC605: Process Control & Instrumentation

Name of the course	CO code	Course outcome {CO}
Process Control & Instrumentation	1	Student will be able to understand the basic concept of instrumentation and first order system with numerical.
	2	Students will be able to know first order in series and able to solve numerical.
	3	The students have an ability to understand the second order system with different examples
	4	Students will be able to understand the different types of controllers
	5	Students will be able to understand closed loop control system.
	6	Students will be able to carry out design of controller with different criterion of stability and able to learn application of process dynamics and control in bioreactors & sterilizers.

BTC606: Elective-I (Research Methodology)

BTC606: Elective-I (Stem Cell Biology)

Name of the course	CO code	Course outcome {CO}
Elective-I (Stem Cell Biology)	1	Students will understand universal mechanism and development of an organism.
	2	They will understand animal developmental biology at a cellular level and formulation of an embryo.
	3	Understand the basic concepts of a plant cell development and growth regulators.
	4	Learn various types of stem cells present in the human body and their regeneration.
	5	Describe the techniques involved in creating, maintaining and studying stem cells.
	6	Describe the significance of stem cell technology and application in regenerative medicine and public health.

Name of the course	CO code	Course outcome {CO}
Elective-I (Research Methodology)	1	Write a literature review which supports a research project and states clearly the project's contribution to knowledge.
	2	Craft research questions pertinent to the biological, medical and health sciences, based on an extensive knowledge of the relevant literature
	3	Understand and apply research approaches, techniques and strategies in the appropriate manner. Develop a comprehensive research methodology for a research question
	4	Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process
	5	Students will be able to write their project report in a scientific stepwise manner
	6	Student's will be able to effectively communicate their research findings i.e publish their papers in scientific journals

B.E.-Semester- VII(CBCGS-R 2016)

BTC701: Bio-separation & Downstream Processing Technology - I

Name of the course	**CO code**	Course outcome {CO}
Bio-separation & Downstream Processing Technology - I	1	Student will be able to know stepwise downstream processing from fermentation broth & different aspects of biomolecules
	2	Student will be able to know the process of cell disruption.
	3	Gain the skills & knowledge necessary to understand & design different steps for removable of insoluble & biomass
	4	Student will be able to describe gas absorption with possible interactions of unit operations
	5	Student will be able to describe possible interactions of liquid-liquid extraction.
	6	To know the principle, theory & applications of precipitation methods.

BTC702: Bioprocess Modeling & Simulation

Name of the course	**CO code**	**Course outcome {CO}**
Bioprocess Modeling & Simulation	1	Students will be able to understand the mathematical models in Biochemical Engineering systems
	2	Students will be able to learn about different aspects of modelling in Bioprocess system
	3	Students will be able to formulate model for biochemical system.
	4	Students will be able to solve Biochemical models
	5	Students will be able to learn various techniques to solve and simulate various bioprocess models.
	6	Understand the important physical phenomena from the problem statement.

BTC703: Elective-II (Food Biotechnology)

Name of the course	**CO code**	**Course outcome {CO}**
Elective-II (Food Biotechnology)	1	Understand and explain different constituents and properties of food including their function and enzymes used in food processing
	2	Understand and explain the sources, activity, growth and survival of microorganism in food and also introduce them to new protein foods
	3	Understand and explain microbial fermentation involved in food processing and production of dairy products and beverages.
	4	Understand and explain fermentation methods for food preservation and preparation of various food additives
	5	Understand and explain different post harvest technology for food crops and

		different methods of food preservation
	6	Understand and explain fruit juices and its types and food packaging methods and materials for various foods

BTC703: Elective-II (Pharmaceutical Biotechnology)

Name of the course	CO code	Course outcome {CO}
Elective-II (Pharmaceutical Biotechnology)	1	Students will study about the classification, nomenclature and different sources of drugs
	2	Students will have a clear idea about Pharmacodynamics and Pharmacokinetics
	3	Students will be able to study the various In vivo and In vitro approaches of Drug discovery and design
	4	Students will be able to study the clinical and preclinical trials needed in drug development.
	5	Students will also study about the medicinal chemistry related to various Antibacterial, Anticancer and Antiviral drugs
	6	They will also know the role of different Biopharmaceuticals in the treatment of various health disorders and the different approaches for drug discovery and drug design

B.E.--Semester- VIII (CBCGS-R 2016)

BTC801: Environmental Biotechnology

Name of the course	CO code	Course outcome {CO}
Environmental Biotechnology	1	By studying this subject the students can be able to get knowledge of environmental science including biogeochemical cycles along with monitoring of air pollutants
	2	Students will study about the various types of air pollution along with equipment used for control of air pollution and engineered systems for bioremediation.
	3	Students will be able to study the design of different waste water treatment plants
	4	Students will be able to understand the topics like soil pollution along with bioremediation and phytoremediation techniques along with solid waste management and hazardous waste management handling.
	5	Students will be able to know the role of nanotechnology and genetic engineering in pollution control
	6	Students will be able to study the various downstream processing in

		biological treatment processes and will get to know the different Effluent treatment. Studies of various industries and will study the various environmental standards and Environmental Legislation.

BTC802: Bio-separation & Downstream Processing Technology-II

Name of the course	CO code	Course outcome {CO}
Bio-separation & Downstream Processing Technology-II	1	Student will be able to know the process of adsorption & chromatography
	2	To know the principle, theory & applications of membrane seperations.
	3	Gain the skills & knowledge necessary to understand & design gas-liquid contacting
	4	Student will be able to know designing of different product purification steps by using crystallization & drying methods.
	5	Student will be able to describe principle, theory, applications & possible interactions of unit operation
	6	Student will be able to know stepwise downstream processing of some products.

BTC803: Bioprocess Plant & Equipment Design

Name of the course	CO code	Course outcome {CO}
Bioprocess Plant & Equipment Design	1	This course makes the students to learn the methods and practices following in the design of Bioprocess equipment and Properties of suitable materials for construction. The course imparts Knowledge of equipment fabrication and testing methods.
	2	This course makes the students to draw the designed equipment to scale. The course imparts knowledge on optimum design of equipment based on economics and process considerations.
	3	The course imparts advanced knowledge on bioreactor and fermenter design and efficient utilization of the principles in bioprocess technology.
	4	Knowledge of detailed design and drawing of different types of distillation columns.
	5	Design various equipment such as tall vessel, unfired pressure vessels internal or external pressure and with various heads and closures including nozzles, openings and reinforcements, Bolts, flanges, gaskets etc.
	6	Design principles for different types of evaporators and sterilization systems.

BTC804: Elective-III (Non-Conventional Sources of Energy)

Name of the course	CO code	Course outcome {CO}
Elective-III (Non-	1	Create awareness among students about Non-Conventional sources of energy and to gain knowledge and understanding of solar energy and its

Conventional Sources of Energy)		applications.
	2	The students will know and understand principle of Wind and Geothermal energy.
	3	The students will know and understand principle of Ocean energy.
	4	Recognize energy problems and to apply biotic systems for remediation and make them understand Fuel cells.
	5	Get the knowledge of Hydrogen energy and Nuclear Energy.
	6	Providing basic knowledge about the magnetohydromic system and energy management.

BTC804: Elective-III (Agriculture Biotechnology)

Name of the course	**CO code**	**Course outcome {CO}**
Elective-III (Agriculture Biotechnology)	1	To understand basic plant biology and breeding methods. Apply the transgenic methods to develop better quality crops.
	2	To gain knowledge about transgenic plant analysis, principle behind generation of herbicide and pest tolerant plants.
	3	To understand the stress condition in plants and methods to overcome it.
	4	To design methods for crop improvement.
	5	To analyse applications based on molecular farming. Harness the plants for imroved quality biomaterials.
	6	To Understand the advantages and drawbacks of engineered plants and modify them accordingly.

(IV) DEPARTMENT OF CHEMICAL ENGINEERING

Program Specific Outcomes (PSOs)

PSO1	The ability to identify, formulate and solve chemical engineering problems

PSO2	The ability to design a process that meets desired specifications with consideration of environmental, safety, economic and ethical criteria.
PSO3	An appreciation of contemporary issues relevant to chemical engineering

Second Year (Chemical Engineering)- Sem III

CHC301 Applied Mathematics-III

Name of the course	CO	Course outcome (CO)
Applied Mathematics-III	1	To understand the basic concepts of Laplace and Inverse Laplace Transform
	2	Able to solve the Differential Equations using Laplace Transform
	3	To understand the importance of eigen value and eigen vectors, as well as orthogonal and Congruent reduction of quadratic forms
	4	To analyse the various algaebric operations in Complex functions
	5	To analyze integrations in Complex functions by using bilinear transformation and Cross Ratio
	6	To understand the various methods of Optimization like Lagrange's Multiplier, Kuhn-Tucker Method

CHC302 Engineering Chemistry I

Name of the course	CO	Course outcome (CO)
Engineering Chemistry-I	1	Students will understand different theories of chemical bonding, organo metallic chemistry, mechanism and application of Photochemical processes.
	2	Students will also be capable of defining Stability of Coordination compounds, Kinetics and energy profile diagrams of reactions.
	3	Students will have knowledge of metal carbonyls and their properties.

	4	Students will able to express role of metallo proteins in biological processes.
	5	Students will be able to carry out organic estimations, gravimetric analysis and handle different instruments in the laboratory.
	6	Students will be to identify the significance of rearrangement reactions, intermidiate and laws of photochemistry.

CHC303 Fluid Flow Operations

Name of the course	CO	Course outcome (CO)
Fluid Flow Operations	1	Students will demonstrate ability to design various components of process Equipment as heads, shell, and flanges.
	2	Students will demonstrate ability to design of Chemical Equipment.
	3	Students will demonstrate understanding of design of storage vessel
	4	Students will demonstrate general understanding of fabrication techniques and Equipment testing as a designer.
	5	Students will demonstrate understanding of design of Agitator.
	6	Students will demonstrate understanding of design of Support

CHC304 Chemical Engineering Thermodynamics I

Name of the course	CO	Course outcome (CO)
Chemical Engineering Thermodynamics I	1	Students will be able to apply first law of thermodynamics to flow and non-flow processes and will learn to calculate heat and work for various types of processes.
	2	Students will learn about Second and Third law of thermodynamics and concept of Entropy They will be able to apply these concepts to Carnot cycle, Heat engines, Refrigerator, etc.
	3	Students will learn to calculateExergy for various types of processes.
	4	Students will learn about various Equations of State for non-ideal gases and departure functions.
	5	Students will learn concepts of Maxwell Equation, Joule Thomson effect.
	6	Students will learn concepts of Thermodynamic Charts, Diagrams and their applications, Fugacity and fugacity coefficient.

CHC305 Process Calculations

Name of the course	CO	Course outcome (CO)

Process Calculations	1	Students will learn to calculate mass and energy flow rates into and out of various process equipments.
	2	Students will learn to calculate conversion, selectivity etc for various reactions with and without recycle.
	3	Students will learn to calculate latent heat, sensible heat and energy to be transferred.
	4	Students will learn to calculate standard heat of reaction from heat of formation, heat of combustion.
	5	Students will learn to carry out degrees of freedom analysis for various units.
	6	Students will learn combined material and energy balance of unit operations.

CHC306 Chemical Technology

Name of the course	CO	Course outcome (CO)
Chemical Technology	1	Concept and brief description of the Unit Operations and Unit Processes used in Chemical Industries. It gives brief idea about chemical Industries
	2	Draw and illustrate the process flow diagram for a given process of acids and fertilizers.
	3	Draw and illustrate the process flow diagram for manufacturing of natural products. Determine the overall process aspects including yield, the formation of by-products and generation of waste, etc.
	4	Draw and illustrate the process flow diagram for Synthesis of Important Heavy Organic Chemicals and Intermediates
	5	Concepts and Synthesis of Polymers
	6	Basic Building Blocks of Petrochemical Industry

Second Year (Chemical Engineering)- Sem IV

CHC401 Applied Mathematics-IV

Name of the course	CO	Course outcome (CO)
Applied Mathematics-IV	1	To Understand the basics of Fourier Series
	2	To analyze the concepts of Fourier Integral
	3	To Understand the various Differential Equations of Ellipse, and other functions
	4	Understand the various methods of Vector Integrations.

CHC402 Engineering Chemistry II

Name of the course	CO	Course outcome (CO)
Engineering Chemistry II	1	Students will understand the concepts of electrochemistry, chromatographic methods, and different analytical techniques.
	2	Students will be able to carry out, optical methods and handle different instruments in the laboratory.
	3	Students will understand the concepts of Ion exchange and solvent extraction techniques.
	4	Students will understand the concepts of Colloids and surfactants and the application of surfactants
	5	Students will be aware of the significance of active methylene group during organic synthesis. Moreover, on the basis of Huckel's rule, students will be able to differentiate between aromatic and non-aromatic compounds.
	6	Students will understand the concepts of catalysis,Acid-Base catalysis and mechanism. Enzyme catalysis. Characteristics and mechanism of enzyme catalysis.

CHC403 Chemical Engineering Thermodynamics II

Name of the course	CO	Course outcome (CO)
Chemical Engineering Thermodynamics II	1	The student learn the application of First law and second law
	2	The students will be able to solve the problem of phase equilibrium and reaction equilibrium .
	3	The students learn to calculate the refrigerant flow rate for a given duty of refrigeration.
	4	The students will be able to solve the problem for estimating the compressor sizes and loads for refrigeration

	5	The calculation of phase equilibria and the understanding of it is a fundamental concept to design of mass transfer equipment.
	6	The student learn Methods for estimation of Thermodynamics properties

CHC404 Solid Fluid Mechanical Operations

Name of the course	**CO**	**Course outcome (CO)**
Solid Fluid Mechanical Operations	1	The student would understand the basic knowledge in particle technology (particle size, shape, specific surface) and concept of particle size measurement and distribution
	2	The student would understand the concept of size reduction equipments and its working principle
	3	The student would understand the concept of solid mixing, solid storage and solid conveying.
	4	The student would understand the concept of filtration.
	5	The student would understand the concept of hindered settling, sedimentation and particle mechanics.
	6	The student would understand the concept of solid mixing and solid-gas separation equipments.

CHC405 Mechanical Equipment Design

Name of the course	**CO**	**Course outcome (CO)**
Mechanical Equipment Design	1	Students will demonstrate ability to design various components of process Equipment as heads, shell, and flanges.
	2	Students will demonstrate ability to design of Chemical Equipment.
	3	Students will demonstrate understanding of design of storage vessel
	4	Students will demonstrate general understanding of fabrication techniques and Equipment testing as a designer.
	5	Students will demonstrate understanding of design of Agitator.
	6	Students will demonstrate understanding of design of Support

CHC406 Chemical Engineering Economics

Name of the course	CO	Course outcome (CO)
Chemical Engineering	1	Students should will be expose to market And demand driven economics in chemical industry.

Economics		
	2	Get an idea on the growth and development of futuristic planning.
	3	Students will be able to calculate the profitability, rate of return on investments and cost estimation.
	4	After acquiring the knowledge in this subject, students become familiar with various aspects related to economics and can apply them for economic evaluation of chemical process and decide its economical feasibility.
	5	The knowledge in this subject will make the students well aware about economic evaluation of dissertation work that they will undertake in final year of their curriculum.
	6	Students will learn to prepare realistic cost estimation to prepare plan and offer.

Third Year (Chemical Engineering)- Sem V

CHC501 Chemical Engineering Thermodynamics – II

Name of the course	CO	Course outcome (CO)
Chemical Engineering Thermodynamics – II	1	The student learn the application of First law and second law
	2	The students will be able to solve the problem of phase equilibrium and reaction equilibrium .
	3	The students learn to calculate the refrigerant flow rate for a given duty of refrigeration.
	4	The students will be able to solve the problem for estimating the compressor sizes and loads for refrigeration
	5	The calculation of phase equilibria and the understanding of it is a fundamental concept to design of mass transfer equipment.
	6	The student learn Methods for estimation of Thermodynamics properties

CHC502 Mass Transfer Operations – I

Name of the course	CO	Course outcome (CO)
Mass Transfer Operations – I	1	Demonstrate the knowledge of mass transfer by applying principles of diffusion
	2	Determine mass transfer coefficient and gain the knowledge of interphase mass transfer
	3	Understand the concept and operation of various types of gas liquid

		contact equipments
	4	Determine HTU,NTU and HETP and height of packed bed used for absorption operation
	5	Determine HTU,NTU and HETP and height of packed bed used for water coolers, cooling towers on the basis of humidification operation
	6	Find the rate of drying and time of drying in batch drying and continuous drying operation

CHC503 Heat Transfer Operations I

Name of the course	CO	Course outcome (CO)
Heat Transfer Operations I	1	Students will understand the basic concepts of conduction, convection and radiation heat transfer.
	2	Students will understand how to formulate and be able to solve one and two dimensional conduction heat transfer problems. Convection effects will be included as boundary conditions.
	3	Students will understand the fundamentals of the relationship between fluid flow, convection heat transfer and mass transfer.
	4	Students will apply empirical correlations for both forced and free convection to determine values for the convection heat transfer coefficient. They will then calculate heat transfer rates using the coefficients.
	5	Students will understand the basic concepts of radiation heat transfer to include both black body radiation and gray body radiation.
	6	Students will be able to evaluate radiation view factors using tables and the view factor relationships.

CHC504 Chemical Reaction Engineering - I

Name of the course	CO	Course outcome (CO)
Chemical Reaction Engineering - I	1	Students will come to know various types of reactions and will able to find out order of reaction and reaction rate constant
	2	Students will understand the concept of activation energy and will able to find out activation energy by using different laws.
	3	Students will able to derive the integrated rate equation of different order reaction and will able to find out rate constant from integrated rate equation.
	4	Students will able to apply different methods of analysis to find the kinetic parameters

	5	Students will understand the different types of reactors (Batch reactor / CSTR / PFR) and will able to develop the design equations.
	6	Students will able to find out stable operating conditions and understand the concept of optimum temperature progression.

CHC505 Chemical Technology

Name of the course	CO	Course outcome (CO)
Chemical Technology	1	The students will have knowledge of the major Chemical Process Industries and Industrially Important Products.
	2	The student will have understanding of the Natural Product Industries and Chloro-Alkali Industries.
	3	The studeent will have knowledge of the Basic Building Blocks of the Petrochemical Industry.
	4	The student will have understanding of the Synthesis of Important Heavy Organic Chemicals and Intermediates.
	5	The student will have knowledge of the processes used for the Synthesis of Polymers.
	6	The student will have understanding of the processes used for the Manufacture of Acids and Fertilizers.

CHC506 Business Communication & Ethics

Name of the course	CO	Course outcome (CO)
Business Communication & Ethics	1	Application of engineering knowledge in the professional areas with linguistic competence
	2	Ability to have analytical skills, power of judgement and negotiation skills in any professional arena.
	3	Possession of an entrepreneurial approach in different context.
	4	Ability to succeed in competitive examination, self-analysis and various professional activities.
	5	Awareness of the significance of an engineer's social responsibilities and contribution sin a broader range at par with technological transformation and recent advancements.
	6	Demonstration of interpersonal skills in a wide spectrum as engineers to succeed in campus placements and any other interviews

Third Year (Chemical Engineering)- Sem VI

CHC601 Instrumentation

Name of the course	CO	Course outcome (CO)
Instrumentation	1	The student will be able to calculate the output of various measuring schemes
	2	The student will be able to select a DAQ card for any given application
	3	The student will be able to select the appropriate type of instrument for any application
	4	The student will be able to prepare a basic control scheme for process units
	5	The student will be able to write programs for a PLC
	6	The student will have the knowledge of different types of control valves and their characteristics

CHC602 Mass Transfer Operations II

Name of the course	CO	Course outcome (CO)
Mass Transfer Operations II	1	Students will able to understand equilibrium in all separation process
	2	Students will able to describe the mass transfer equipments
	3	Students will able to design distillation column
	4	Students will able to choose the separation operation which will be economical for the process
	5	Students will able to optimize the process parameters
	6	Students will able to understand membrane separation processes principle and working

CHC603 Heat Transfer Operations II

Name of the course	CO	Course outcome (CO)
Heat Transfer Operations II	1	Student will be able to design shell and tube heat exchangers - condenser, reboilers, evaporators, etc.
	2	Student will be able to design furnace
	3	Students will be able to know how heat exchanger design software work
	4	Student should able to design Automation of Engineering equipments
	5	Student will be able to draw and illustrate the process flow diagram for a given process

	6	Students will be demonstrating ability to design of Chemical Equipment.

CHC604 Chemical Reaction Engineering II

Name of the course	CO	Course outcome (CO)
Chemical Reaction Engineering II	1	Students will be able to develop kinetics and mechanism of various heterogeneous reactions.
	2	Students will be able to Design of solid catalysed fluid phase reactors.
	3	Students will be able Design of reactors for non-catalytic reactors.
	4	Students will be able to find Kinetics of fluid fluid reactions.
	5	Students will be able to understand the concept of Residence time distribution and characteristics of RTD.
	6	Students will understand the zero and one parameter model.

CHC605 Plant Engineering

Name of the course	CO	Course outcome (CO)
Plant Engineering	1	Students will demonstrate the knowledge of industrial safety, utilities and statistical analysis
	2	Students will know di_erent types industrial accident, industrial hygiene and risk analysis
	3	Students will know how to make e_cient use of steam and boilers in chemical industries
	4	Students will have deep knowledge of working various compressors and humidi_cation and dehumidication operations.
	5	Students will be able to _nd refrigeration e_ect for di_erent refrigeration system
	6	Students will have knowledge of vacuum systems and vacuum operations, venting and aring and carry out statistical analysis of experimental results.

CHE606 Advanced Materials (Elective-I)

Name of the course	CO	Course outcome (CO)
Advanced Materials	1	Student will identify various types of advanced materials such as

(Elective-I)		polymers, ceramics and composites.
	2	The student will have understanding of the properties of various polymeric, ceramic and metallic materials and their applications in various fields.
	3	The student will have knowledge of different types of composite materials, their properties and applications.
	4	The student will have understanding of the fabrication of various composite material.
	5	The student will have knowledge of the types of nanotubes and nanosensors and their applications.
	6	The student will have understanding of the thin film coating methods and their applications in various fields.

Final Year (Chemical Engineering)- Sem VII

CHC701 Process Equipment Design

Name of the course	CO	Course outcome (CO)
Process Equipment Design	1	Student will demonstrate ability to understand economical aspect of corrosion.
	2	Students will demonstrate ability to understand design aspect to minimize corrosion.
	3	Students will demonstrate ability to understand electrochemical aspect of corrosion
	4	Students will understand the principal engineering material and their corrosion properties
	5	Students will demonstrate ability to corrosion testing and inspection.
	6	Students will demonstrate ability to corrosion prevention in different environment.

CHC702 Process Engineering

Name of the course	CO	Course outcome (CO)
Process Engineering	1	Ability to apply knowledge of mathematics, science and engineering.
	2	Ability to design a system, a component, or a process to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.
	3	Understand the function on multi disciplinary teams.

	4	Ability to identify, formulate and solve engineering problems.
	5	Understanding of professional and ethical responsibility and engage themselves in lifelong learning.
	6	Understand to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CHC703 Process Dynamics & Control

Name of the course	CO	Course outcome (CO)
Process Dynamics & Control	1	The student will be able to design stable controllers, for important chemical processes
	2	The student will be able to model dynamical systems and study their responses in Time, Laplace and Frequency domains.
	3	The student will be able to design controllers.
	4	The student will be able to understand and analyze stability characteristics of dynamic systems.
	5	The student will be able to understand frequency response of dynamic systems.
	6	The student will be able to understand dynamic behavior of process systems and equipments.

CHE704 Petroleum Refining and Technology (Elective II)

Name of the course	CO	Course outcome (CO)
Petroleum Refining and Technology (Elective II)	1	Students will know the importance and origin of petroleum, exploration techniques, types and constituents of crude, upstream and downstream petroleum industry in India.
	2	Students will be provided information on properties, composition and characterization of crude, crude distillation curve, important products and their test methods.
	3	Student will be given the understanding of the separation of well fluid, dehydration, desalting and heating of crude, refinery flow diagram, its processes and products i.e. LPG, gasoline, kerosene, diesel, lube oil etc., ADU, VDU and gasoline blending etc.
	4	Students will be provided in-depth knowledge of various treatment techniques for the purification of gasoline, kerosene, lube oil and wax; knowledge of different additives, solvents and by products.

	5	Students will be facilitated the knowledge of catalytic cracking, FCC, catalytic reforming, alkylation, isomerization, hydrogen processes- hydro cracking, hydro-desulfurization, polymer gasoline.
	6	Students will be made familiar with the source of asphalt, air blowing bitumen, bio-refinery, environmental issues in petroleum industry, and alternate source of energy i.e. bio- diesel, heavy oil and shale's gas etc.

Final Year (Chemical Engineering)- Sem VIII

CHC801 Modelling, Simulation & Optimization

Name of the course	CO	Course outcome (CO)
Modelling, Simulation & Optimization	1	The student will be able to write and solve linear and non-linear mass and energy balance equations for individual as well as multiple units.
	2	The student will be able to carry out sequential and equation oriented simulation of complete flow sheets.
	3	The student will be able to understand frequency response of dynamic systems.
	4	The student will be able to carry process Simulation, flash Calculation, distillation Calculations,
	5	The students will be able to solve the systems of Non Linear Equations,
	6	The students will be able to write recycle partitioning and tearing, simulation flow sheet and Constrained Non-Linear Programming.

CHC802 Project Engineering & Entrepreneurship Management

Name of the course	CO	Course outcome (CO)
Project Engineering & Entrepreneurship Management	1	The student will have the knowledge of project, its definition, concept, features, various scientific aspects of project management, project life cycle, role, responsibilities demands on project manager.
	2	Student will understand about various types of feasibility reports, project selection criteria, project licensing, basic and detailed engineering, and various types of cost estimates, guarantees, liabilities and risk insurance.
	3	Students will be aware of various clearances of a project, IPR, patents, LOI, project license, various forms of project, project team, responsibilities of various members. They will have the knowledge of WBS, selection criteria of project, contractor and consultant.
	4	Student will have the knowledge of project scheduling and its execution by CPM, PERT, GANTT chart, LOB, ABC and VED analysis, EOQ, CAT

		vs RAT.
	5	Students will acquire knowledge of project monitoring and control through time and cost control tools, fund flow control techniques and will have knowledge of project commissioning, start up and close out.
	6	Student will get knowledge about entrepreneurial aspects- definition, concept characteristics and factors effecting entrepreneurship. They will know classification and types of entrepreneurship based on business.

CHC803 Environmental Engineering

Name of the course	CO	Course outcome (CO)
Environmental Engineering	1	Students should be able to understand the scope of subjects in Chemical Industry.
	2	Students should be able to apply the Environmental Engineering concepts to control and management of various types of pollutants.
	3	Students should be able to to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.
	4	Ability to identify, formulate and solve environmental engineering problems.
	5	Students will understand the fundamentals of the relationship between fluid flow, convection heat transfer and mass transfer.
	6	Understand the function on multi disciplinary teams.

CHC804 Energy System Design

Name of the course	CO	Course outcome (CO)
Energy System Design	1	Student will know the global energy scenario.
	2	Students will demonstrate ability to do energy audit.
	3	Students will demonstrate ability to develop energy efficient technologies.
	4	Students will demonstrate ability to do energy integration in process industries.
	5	Students will demonstrate ability to do heat integration in process units.
	6	Students will demonstrate ability to understand and implement the concept of cogeneration and waste heat recovery.

CHE805 Advanced Separation Technology (Elective III)

Name of the course	CO	Course outcome (CO)
Advanced Separation Technology (Elective III)	1	The graduates are expected to have ability to apply knowledge of mathematics, science and engineering.
	2	The graduates are expected to have ability to design a system, a component, or a process to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.
	3	The graduates are expected to possess ability to identify, formulate and solve engineering problems.
	4	The graduates are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
	5	The graduates are expected to Apply Basic concept of chromatography, Adsorption.
	6	The graduates are expected to Apply Basic concept of Membrane Separation and Foam fractionation.

ME- Sem I

CHC101 Advanced Fluid Dynamics

Name of the course	CO	Course outcome (CO)
Advanced Fluid Dynamics	1	To learn the flow behaviour of Newtonian and non-Newtonianfluid through different dimensional passages
	2	To study flow behaviour of compressible fluids and multiphase mixtures
	3	To learn the design of stirred tank and different types of mixing equipments.
	4	Study of mechanism of fluidization and flow through Jet and nozzle.
	5	To understand the principles of computational fluid dynamics.
	6	To understand the principles of computational fluid dynamics.

CHC102 Advanced Chemical Reaction Engineering

Name of the course	CO	Course outcome (CO)

Advanced Chemical Reaction Engineering	1	The student will have knowledge of the performance, characteristics, kinetics and design of multiple reactions.
	2	The student will have the ability to perform residence time analysis of ideal and non-ideal chemical reactors.
	3	The student will have the ability to develop rate equations for fluid-solid reactions.
	4	The student will have understanding of the external diffusion effects on heterogeneous reactions and of diffusion and reaction in porous catalysts.
	5	The student will have the ability to design heterogeneous catalytic reactors.
	6	The student will have understanding of fluid-fluid reactions and the ability to design reactors for fluid-fluid reactions.

CHC103 Advanced Thermodynamics

Name of the course	**CO**	**Course outcome (CO)**
Advanced Thermodynamics	1	Gain the knowledge of classical thermodynamics with emphasis on basic concepts, laws and thermodynamic relationship
	2	Gain the knowledge of advanced thermodynamics especially in chemical engineering related fields
	3	Able to apply these thermodynamics principles o solve problems encountered in chemical engineering and related researches
	4	Able to apply UNIFAC and UNIQUAC method for estimation of activity coefficients essential to compute the composition in vapour liquid equilibrium.
	5	Gain the knowledge about the behavior of fugacities of different components in liquid mixture, their significance and application.
	6	Gain the knowledge of Lattic theory and different models developed

CHDLO1012 :Corrosion in Industries and its control

Name of the course	CO	Course outcome (CO)
Corrosion in Industries and its control	1	Student will demonstrate ability to understand economical aspect of corrosion.
	2	Students will demonstrate ability to understand design aspect to minimize corrosion.
	3	Students will demonstrate ability to understand electrochemical aspect of corrosion
	4	Students will understand the principal engineering material and their corrosion properties
	5	Students will demonstrate ability to corrosion testing and inspection.
	6	Students will demonstrate ability to corrosion prevention in different environment.

ILO1015: Operation Research

Name of the course	CO	Course outcome (CO)
Operation Research	1	Student will able to understand the understand the theoretical workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness.
	2	Student will able to perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change.
	3	Student will able to solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems.
	4	Student will able to understand the applications of integer programming and a queuing model and compute important performance measures
	5	Student will able to Understand the mathematical tools that are needed to solve optimization problems.
	6	Student will use mathematical software to solve the proposed models.

ME- Sem II

CHC201 Process Heat Transfer

Name of the course	CO	Course outcome (CO)
Process Heat Transfer	1	Student able to calculate heat transfer coefficient of non Newtonian fluids.
	2	Student able to calculate the size requirements of reboilers, condensers and

		evaporators.
	3	Student able to design a fluidized bed system for different applications.
	4	Student able to design aspects of condensers, reboilers and evaporators
	5	Student able to calculate heat transfer in dilute phase transport
	6	Student able to design the methods for furnaces, pipe still, thermo siphoning and other industries.

CHC202 Advanced Mass Transfer Operation

Name of the course	**CO**	**Course outcome (CO)**
Advanced Mass Transfer Operation	1	Understand Equilibrium in all separation processes
	2	Describe the mass transfer equipments
	3	Design distillation column
	4	Choose the separation operation which will be economical for the process
	5	Understand membrane separation processes principle and working
	6	Design of absorption equipments

CHC203 Advanced Process Control and Dynamics

Name of the course	CO	Course outcome (CO)
Advanced Process Control And Dynamics	1	Understand Conventional Feed Back Controller design and able to do stability analysis using Niquist and Bode stability criterion
	2	Able to design of more complex control structures
	3	Gain the knowledge of controller design for processes with difficult dynamics and non-linear systems
	4	Able to do loop paring for nonlinear systems, loop pairing for non square systems and decoupling in multivariable regulatory control systems
	5	Will have knowledge of sampling, signal conditioning and basic concepts of Z-transforms for discrete–time system.
	6	Able to understand design of digital controllers and model predictive control

CHDLO2025: Industrial Pollution Control and Prevention

Name of the course	CO	Course outcome (CO)
Industrial Pollution Control and Prevention	1	Student will able to understand the different types of wastes generated in an industry, their effects on living and non-living things.
	2	Student will able to understand environmental regulatory legislations and standards and climate changes
	3	Student will able to understand about the quantification and analysis of wastewater and treatment.
	4	Student will able to understand the different processes involved in conversion of highly polluted water to potable standards.
	5	Student will able to Understand about analysis and quantification of hazardous and nonhazardous solid waste wastes, treatment and disposal.
	6	Student will able to understand the different unit operations and unit processes

ILO2026**:** Research Methodology

Name of the course	CO	Course outcome (CO)
Research Methodology	1	Student will able to prepare a preliminary research design for projects in their subject matter areas
	2	Student will able to accurately collect, analyze and report data
	3	Students will demonstrate present complex data or situations clearly
	4	Students will understand the Research and Research Process
	5	Students will identifying problems for research and develop research strategies
	6	Students will familiarize with the techniques of data collection, analysis of data and interpretation

(V) DEPARTMENT OF CIVIL ENGINEERING

Second Year (Civil Engineering)- Sem III

CE-C 301 - Applied Mathematics – III

Name of the Course	CO	Course Outcome (CO)

Applied Mathematics – III	1	Solve the Ordinary and Partial Differential Equations using Laplace Transformation.
	2	Solve Ordinary and Partial Differential Equations using Fourier series
	3	Solve initial and boundary value problems involving ordinary differential equations
	4	Fit the curve using concept of correlation and regression
	5	Apply bilinear transformations and conformal mappings
	6	Identify the applicability of theorems and evaluate the contour integrals.

CE-C 302 Surveying – I

Name of the Course	**CO**	Course Outcome (CO)
Surveying – I	1	Apply principles of surveying and leveling for civil engineering works
	2	Measure vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems
	3	Perform various practical and hence projects using different surveying instruments.
	4	Apply geometric principles for computing data and drawing plans and sections
	5	Analyze the obtained spatial data and compute areas and volumes and represent 3D data on plane surfaces (2D) as contours
	6	

CE-C 303 Strength of Materials

Name of the Course	CO	Course Outcome (CO)
Strength of Materials	1	Understand and determine the engineering properties for metals and non-metals.
	2	Understand the concepts of shear force, bending moment, axial force for statically determinate beams and compound beams having internal hinges; and subsequently, its application to draw the shear force, bending moment and axial force diagrams
	3	Analyze the flexural members for its structural behavior under the effect of flexure (bending), shear and torsion either independently or in combination thereof.
	4	Study the behavior of the structural member under the action of axial load, bending and twisting moment
	5	Study the deformation behavior of axially loaded columns having different end conditions and further, evaluate the strength of such columns
	6	The successful completion of the course will equip the students for undertaking the courses dealing with the analysis and design of determinate and indeterminate structures.

CE-C 304 Engineering Geology

Name of the Course	CO	Course Outcome (CO)
Engineering Geology	1	Understand the significance of geological studies for safe, stable and economic design of any civil engineering structure
	2	Demonstrate the knowledge of geology to explain major geological processes such as formation of mountain, ocean and the occurrence and distribution of earthquakes and volcanoes
	3	Explain various geological structures like folds, faults, joints, unconformity, their origin and distribution which are very essential in the design and construction of dams, tunnels and any other major civil engineering project.
	4	Understand methods of surface and subsurface investigation, advantages and disadvantages caused due to geological conditions

		during the construction of dam and tunnel.
	5	Understand the causes and prevention of natural hazard like earthquake, landslide, volcano etc. will help student to meet the specific needs with suitable considerations for public health and safety.
	6	Prepare effective reports mentioning advantages and disadvantages caused due to geological condition and can evaluate any site for civil engineering project

CE-C 305 Fluid Mechanics– I

Name of the Course	CO	Course Outcome (CO)
Fluid Mechanics– I	1	Define various properties of fluids, state and explain different types of laws and principles of fluid mechanics.
	2	Interpret different forms of pressure measurement and Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface
	3	Compute force of buoyancy on a partially or fully submerged body and analyse the stability of a floating body
	4	Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow.
	5	Derive Euler's Equation of motion and Deduce Bernoulli's equation.
	6	Measure velocity and rate of flow using various devices

Second Year (Civil Engineering)- Sem IV

CE-C 401Applied Mathematics -IV

Name of the Course	CO	Course Outcome (CO)
Applied Mathematics - IV	1	Solve the system of linear equations using matrix algebra with its specific rules
	2	Illustrate basics of vector calculus
	3	Apply the concept of probability distribution and sampling theory to engineering problems
	4	Apply the concept of probability distribution and sampling theory to engineering problems.
	5	Apply principles of vector calculus to the analysis of engineering problems
	6	Identify, formulate and solve engineering problems
		Illustrate basic theory of correlations and regression

CE-C 402 Surveying – II

Name of the Course	CO	Course Outcome (CO)
Surveying – II	1	Operate Total Station & GPS for desired accuracy in surveying and establish survey control of determined accuracy using Total Station, GPS, GIS and remote sensing.
	2	Set out various types of curves by linear and angular methods
	3	Compute setting out data from survey and design information.
	4	Generate and manipulate field survey data and incorporate design data using specialised software's.
	5	Appreciate the role of various governmental authorities in maintaining cadastral survey records.
	6	

CEC 403 Structural Analysis – I

Name of the Course	CO	Course Outcome (CO)
Structural Analysis – I	1	Understand the behavior of various statically determinate structures including compound structures having an internal hinge for various loadings.
	2	The knowledge gained in this subject shall also be useful for application in the structural design in later years
	3	Analyze these structures to find out the internal forces such as axial force, shear force, bending moment, twisting moments, etc
	4	Evaluate the displacements / deflections in beams and frames under the action of loads
	5	They will be able to obtain the response of the beams under the action of moving loads.
	6	Analyze the structures such as arches and suspension bridges and study the behavior of eccentrically loaded columns.
	7	Analyze the section with respect to unsymmetrical bending and shear center
	8	Demonstrate the ability to extend the knowledge gained in this subject in the subjects Structural Analysis-II and elective subjects such as Advanced Structural Analysis and Advanced Structural Mechanics in the higher years of their UG programme where they will be dealing with the indeterminate structures.

CE-C 404 Building Design and Drawing

Name of the Course	CO	Course Outcome (CO)

Building Design and Drawing	1	Students will be able to list down the types of structures and its various components (for eg. doors, windows, staircase, foundations etc Students will be able to calculate and analyze various technical details of a building (for eg. carpet area, FSI etc.) from its drawings.
	2	Students will be able to explain various concepts pertaining to building design and drawing (for eg principles of planning, architectural planning, green buildings etc.)
	3	Students will be able to apply principles of planning, architectural planning and building bye laws while designing and preparing building drawings.
	4	Students will be able to design various components of buildings (for eg. staircases etc.) as well as buildings as a whole, given the requirements of the building owner and local D.C. laws.
	5	Students will be able to prepare drawings (for eg. plans, elevation, perspective views etc.) of the designed components of buildings as well as buildings as a whole
	6	

CE-C 405 Building Materials and Construction Technology

Name of the Course	CO	Course Outcome (CO)
Building Materials and Construction Technology	1	Identify and list the various building materials, their properties and symbols
	2	Identify the properties of ingredients of concrete, interpret and design concrete mix for various grades
	3	Explain and interpret manufacturing process of basic construction materials and understand various masonry

		construction and finishes.
	4	Perform tests on various materials

CEC 406 Fluid Mechanics – II

Name of the Course	CO	CO Code	Course Outcome (CO)
Fluid Mechanics – II	1	**CEC 406.1**	On completion of this course the student will be able to: Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses.
	2	**CEC 406.2**	Solve pipe network problems by Hardy cross method
	3	**CEC 406.3**	Distinguish the types of compressible flow and understand concept of boundary layer theory
	4	**CEC 406.4**	Evaluate pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe.
	5	**CEC 406.5**	Establish Prandtl's mixing theory and solve turbulent flow problems

Third Year (Civil Engineering)- Sem V

CE – C501 Structural Analysis –II

Name of the Course	CO	Course Outcome (CO)
Structural Analysis –II	1	To revise the various concepts involved in the analyses of the structures studied in the subject Structural Analysis-I.
	2	To analyze the statically determinate structures with reference to the variation in the temperature.
	3	To understand the concept of static and kinematic indeterminacy (degrees of freedom) of the structures such as beams rigid pin jointed frames.
	4	To understand the concepts/ broad methods, sub-methods involved in the analysis of indeterminate structures.

	5	To apply these methods for analyzing the indeterminate structures to evaluate the response of such structures in the form of bending moment, shear force, axial force etc.
	6	To study the analyses of two hinged arches.

CE-C502 Geotechnical Engineering -I

Name of the Course	**CO**	Course Outcome (CO)
Geotechnical Engineering -I	1	To study the composition, types relationships involving weight, volume weight-volume of soil.
	2	To study the index properties of soil that is indicative of the engineering properties.
	3	To characterize the soil based on size, shape, index properties plasticity.
	4	To classify the soil based on different classification systems.
	5	To study the properties of soil related to flow of water
	6	To understand the concept of total stress, effective stress pore water pressure in soil.
	7	To understand the load-deformation process in soils through compaction consolidation.
	8	To study the shear strength of soil.
	9	To understand the techniques of site exploration, assessing the subsoil conditions the engineering properties of the various strata method of reporting.

CE- 503 - Building Design & Drawing – II

Name of the Course	CO Code	Course Outcome (CO)

Building Design & Drawing – II	CE- 503.1	To understand the Planning concepts, rules, regulations, various bye-laws of local administration/authorities with reference to all types of public buildings.
	CE- 503.2	To understand the application of bye-laws in Planning, Designing Drawing of all types of public buildings.
	CE- 503.3	To understand all the concepts involved in drawing the different Perspective drawings for public buildings, workshops.
	CE- 503.4	To prepare various types of drawings for the public building structures planned designed, satisfying the functional market requirements.
	CE- 503.5	To study & apply the provisions made in the relevant Indian Specifications pertaining to the practice for public buildings, the society needs for over all development.

CE-C504- Applied Hydraulics – I

Name of the Course	**CO**	Course Outcome (CO)
Applied Hydraulics – I	1	To study hydraulic machines like centrifugal pumps, reciprocating pumps and turbines.
	2	To study devices based on the principals of fluid statics fluid kinematics
	3	To study the mathematical technique used in research work for design for conducting model tests.
	4	To impart the dynamic behavior of the fluid flow analyzed by the Newton's second law of motion.

CE-C505- Transportation Engineering – I

Name of the Course	**CO**	**Course Outcome (CO)**
Transportation Engineering – I	1	Understand the knowledge of various systems of railway, airport, water transportation.
	2	Understand the design concept of railway track, runway, taxiways, etc.
	3	Apply the concept of geometric design of railway track, runway, taxiway, etc.
	4	Apply the knowledge of various signalling system for railway engineering, air traffic control, navigational aids.

	5	Understand the concepts of bridge engineering including site selection for the bridges, different types of bridges in the classified manner, bridge hydrology, and various components of the bridge structures.

CE-C502 Geotechnical Engineering –I Lab

Name of the Course	CO	Course Outcome (CO)
Geotechnical Engineering –I Lab	1	To Determine moisture content of soil
	2	To Determine the Field density of soils by sand replacement and corecutter method
	3	To determine the grading curve for soil by sieve analysis
	4	To determine the specific gravity of soil by pycnometer
	5	To determine the Atterberg's limits by laboratory methods
	6	To determine the Permeability of soil by laboratory tests
	7	To determine the Optimum moisture content of soil

CE- 503 - Building Design & Drawing – II Lab

Name of the Course	CO	Course Outcome (CO)
Building Design & Drawing – II Lab	1	To understand principles of planning, designing of public building
	2	To plan the public building according to required design and application of bylaws
	3	To understand the different local authorities for the architectural drawing
	4	To prepare different types of drawing showing complete details with respective public building

CE-C504- Applied Hydraulics – I Lab

Name of the Course	CO	Course Outcome (CO)
Applied Hydraulics – I Lab	1	To study the impact of jet (FLAT VANE)
	2	To study the impact of jet (HEMISPHERICAL VANE)
	3	To study the impact of jet (INCLINED VANE)
	4	Cenrifugal pump
	5	To study the Pelton wheel turbine (FULL GATE OPEN)
	6	To study the Pelton wheel turbine (HALF GATE OPEN)

Third Year (Civil Engineering)- Sem VI

CE –C602 - Design and Drawing of Steel Structure

Name of the Course	CO	Course Outcome (CO)
Design and Drawing of Steel Structure	1	To understand the design concept of design of tension and compression member
	2	To understand the design concept of laterally supported and unsupported beams
	3	To understand the concept of plastic analysis of simple beam
	4	To understand the design concept of welded plate girder

CE-C603 - Applied Hydraulics – II

Name of the Course	CO	Course Outcome (CO)
Applied Hydraulics – II	1	To understand the flow phenomena (e.g. hydraulic jump, backwater waves, critical depth, etc) using experiments.
	2	Understand the impact of engineering solutions for boundary

		layer theory in the context of submerged bodies.
	3	Develop the understanding of the design and measurement of flow velocity in open channel.
	4	Understand the different slope profiles and its effect on the flow characteristics
	5	Study the specific energy it's applications

CE-C604- Transportation Engineering. – II

Name of the Course	CO Code	Course Outcome (CO)
Transportation Engineering. – II	1	To understand the Basic concept about highway engineering.
	2	To understand the Types of pavements different elements in each type.
	3	To understand the Materials used for highway construction
	4	To understand the Method of design of flexible rigid pavement.
	5	To understand the Construction & maintenance of different type of pavement
	6	To understand the Different types of traffic control systems

CE-C605- Environmental Engineering – I

Name of the Course	CO	Course Outcome (CO)
Environmental Engineering – I	1	To prepare students who can accomplish planning, design & construction of water systems & related infrastructural facilities.
	2	To give a practical orientation to so that they can give practical solutions to environmental problems in our society.
	3	To inculcate the students with sound theoretical knowledge in engineering sciences as well as in research consultancy skills.
	4	To impart positive responsive vocational attitudes, initiative creative thinking in their mission as engineers

CE-C606- Theory of Reinforced and Prestressed Concrete

Name of the Course	CO Code	Course Outcome (CO)
Theory of Reinforced and Prestressed Concrete	1	To study the analysis & design of various elements of the reinforced concrete structures such as beam, slab, column, footings using the concept of working stress method.

CE-C603 - Applied **Hydraulics – II Lab**

Name of the Course	CO	Course Outcome (CO)
Applied Hydraulics – II Lab	1	To determine chezy's constant
	2	To study the phenomenon of hydraulic jump
	3	To Determine the coeeficient of discharge of the Venturiflume.
	4	To determine co-efficient of discharge for the standing wave flume or modular flume
	5	To study the phenomenon of broad crested weir and determine the value of co-efficient of discharge.
	6	To determine the value of co-efficient of discharge for the Spillway.

CE-C604- Transportation Engineering. – II(LAB)

Name of the Course	CO	Course Outcome (CO)
Transportation Engineering – II LAB	1	To determine the shape test on aggregates
	2	To determine the impact test on aggregates
	3	To determine the abration test on aggregates
	4	To determine the crushing value test on aggrgates
	5	To determine the penetration test on bitumen

	6	To determine the softning point test on bitumen
	7	To determine the ductility test
	8	To determine the viscosity test on bitumen

CE-C605- Environmental Engineering – I Lab-I

Name of the Course	**CO**	**Course Outcome (CO)**
Environmental Engineering – I Lab-I	1	To Determine the Alkalinity in water.
	2	To Determine the Hardness of water.
	3	To Determine the pH of water.
	4	To Determine the Turbidity of water. ,
	5	To Determine the Optimum dose of coagulant by using Jar test Apparatus.
	6	To Determine the Residual chlorine from water
	7	To Determine the of pH
	8	To Determine the moisture content
	9	To Determine the Most probable number

CE-C605- GeotechnicalEngineering – II

Name of the Course	**CO**	**Course Outcome (CO)**
GeotechnicalEngineering – II	1	To understand the importance and basics of foundation engineering in the civil engineering projects
	2	To study the classical theories of earth pressure, load bearing capacity and settlement of foundations.

	3	To study the geotechnical aspects of foundations in view of safety and economy.
	4	To understand the use of various BIS codes in the geotechnical design of foundation

CE-C605- Geotechnical Engineering – II (LAB)

Name of the Course	CO	Course Outcome (CO)
GeotechnicalEngineering – II (LAB)	1	To determine the California bearing ratio
	2	To determine the settlements due to primary consolidation of soil by conducting one dimensional test.
	3	To determine the shearing strength of the soil using the direct shear apparatus
	4	To determine shear parameters of cohesive soil
	5	To find the shear of the soil by Undrained Triaxial Test
	6	To find shear strength of a given soil specimen.

Fourth Year (Civil Engineering)- Sem VII

CE-C701 - Limit State Method for Reinforced Concrete Structures

Name of the Course	CO	Course Outcome (CO)
Limit State Method for Reinforced Concrete Structures	1	Understand the pros and cons of the ULM , LSM and Working Stress method (WSM)
	2	Understand the various clauses specified in IS: 456-2000 for designing structural members with the safety and economy
	3	Understand the application and effectiveness of the LSM to the considerable extent along with the application of ULM in the limited extent.

CE-C701 - Limit State Method for Reinforced Concrete Structures Tutorial

Name of the Course	CO	Course Outcome (CO)
Limit State Method for Reinforced Concrete Structures	1	Understand the pros and cons of the ULM , LSM and Working Stress method (WSM)
	2	Understand the various clauses specified in IS: 456-2000 for designing structural members with the safety and economy
	3	Understand the application and effectiveness of the LSM to the considerable extent along with the application of ULM in the limited extent.

CE-C702- Quantity Survey Estimation and Valuation

Name of the Course	CO	Course Outcome (CO)
Quantity Survey Estimation and Valuation	1	Read, understand and interpret plans, sections, detailed drawings and specifications for a construction project.
	2	Prepare approximate and detailed estimates based on the quantity survey of the available general and detailed drawings
	3	Understand the process of arbitration.
	4	Understand the role of a valuer and assess the value of a property.
	5	Draft tenders, prepare valid contract documents

CE-C702- Quantity Survey Estimation and Valuation Tutorial

Name of the Course	CO	Course Outcome (CO)
Quantity Survey Estimation and Valuation	1	Draft specifications, make bar bending schedules and draw mass haul diagrams.
	2	Have Knowledge about the current market rates for labour and material required for construction
	3	Perform rate analysis and compare with DSR.

CE-C703- Irrigation Engineering

Name of the Course	CO	Course Outcome (CO)
Irrigation Engineering	1	To collect the data for irrigation system.
	2	To calculate the yield from catchments.
	3	To calculate the capacity of Canals.
	4	To calculate the storage capacity of reservoirs
	5	To decide the section of Dams, Weirs and Barrages.
	6	To classify the Canals and design the Canals

CE-C70 -Environmental Engineering – II

Name of the Course	CO	Course Outcome (CO)
Environmental Engineering – II Lab	1	To ensure the safe handling and treatment of wastewater and sewage.
	2	To conduct quality control tests on samples obtained from sewer water, soil, nearby rivers and groundwater.
	3	To design the treatment facilities and assess the guidelines for disposing of waste.
	4	To formulate approaches to treat waste water in most effective manner.

CE-C701 -Environmental Engineering – II Lab

Name of the Course	CO	Course Outcome (CO)
Environmental Engineering – II Lab	1	Determination of Total Solids, suspended solids, dissolved solids, volatile solids
	2	Determination of Bio chemical Oxygen Demand of sewage sample
	3	Determination of Chemical Oxygen Demand of sewage sample
	4	Determination of pH of sewage

CE-E705 - Solid Waste Management

Name of the Course	CO	Course Outcome (CO)
Solid Waste Management	1	Able to understand the various methods of disposal of solid waste.
	2	Better understanding of the nature and characteristics of solid waste and regulatory requirements regarding solid waste management and further they shall have an ability to plan waste minimization
	3	To contribute practical solutions to environmental problems in our society

CE-E705 - Prestressed Concrete

Name of the Course	CO	Course Outcome (CO)
Prestressed Concrete	1	To understand the concept of pre-stressing, behavior of the pre-stressed structures vis- à-vis that of the RCC structure.
	2	To take the decision with respect to the choice of pre-stressed section over RCC
	3	To understand the application of these techniques in civil engineering construction, especially in mass housing, railway sleepers, transmission of poles, bridges, etc.

	4	To analyze the various pre-stressed components of the structures and design the same.

Fourth Year (Civil Engineering)- Sem VIII

CE-C801- Design and Drawing of Reinforced Concrete Structures

Name of the Course	CO	Course Outcome (CO)
Design and Drawing of Reinforced Concrete Structures	1	To independently or as a member of the team design the structures using structural analysis and design knowledge for safety, serviceability and economy.
	2	The student shall be able to design different types of water tank, retaining wall by limit state method
	3	The student shall be able to design a residential and industrial buildings by relevant IS code.

CE-C802 - Construction Engineering

Name of the Course	CO	Course Outcome (CO)
Construction Engineering	1	To know the different types of standard / special equipment used in the construction industry and select the appropriate equipment.
	2	To determine the optimal use of the equipment, owning, operating and maintenance and repair costs of the equipment.
	3	To decide judiciously whether the equipment should be purchased or hired, repaired or sold
	4	To select the alignment for tunnels, various methods of tunneling in soft soils as well as in hard rock, sequence of operations to be followed along with the various tunneling machines.
	5	To decide the ground improvement and soil stabilization

		methods such as sand drains and stone columns, use of geo-synthetics and chemicals based on the suitability of the site conditions.
	6	To suggest mass concreting, vacuum concreting and modern slip forms techniques.

CE-C803 - Construction Management

Name of the Course	CO Code	Course Outcome (CO)
Construction Management	**1**	To understand and apply the knowledge of management functions like planning, scheduling, executing and controlling to construction projects.
	2	To demonstrate their capability for preparing the project networks to work out best possible time for completing the project.
	3	To understand and exercise the time- cost relationship in practices.
	4	To implement the safety as well as quality aspects during the execution of civil engineering project.
	5	The course will inculcate the managerial skills among the students which will be helpful for them in future during actual execution of projects

CE-804 - Design of Hydraulic Structures

Name of the Course	CO Code	Course Outcome (CO)
		Select the site for dam with preliminary and final investigations, fix storage capacity, analyze reservoir

Design of Hydraulic Structures	**1**	losses, and estimate sedimentation in reservoirs
	2	Analyze forces acting on gravity dam its failure and carry out stability analysis of gravity dams.
	3	Understand forces on an arch and buttress dams and its design
	4	Understand details of construction and maintenance of earth fill and rock fill dams including stability analysis criteria
	5	Understand design principles of spillways, energy dissipation works and flood control works.
	6	Design small bridges and culverts and its principles of hydraulic design.

CE-E804 - Industrial Waste Treatment

Name of the Course	CO Code	Course Outcome (CO)
Industrial Waste Treatment	1	An ability to understand the industrial waste sources, effects and its treatment.
	2	The various methods of disposal of industrial waste
	3	Understanding of the nature and characteristics of industrial waste and regulatory requirements regarding industrial waste treatment and lastly, they will have an ability to plan industrial waste minimization.

ME Structure Engineering

STR-C101 Theory of Elasticity, Plasticity and Stability

Name of the Course	CO Code	Course Outcome (CO)
Theory of Elasticity, Plasticity and Stability	1	Understand the importance of the concepts of theory of elasticity and plasticity..
	2	Understand the concept of geometric non-linearity and the difference between various failure mechanisms

	3	Perform non-linear analysis on various structural members

STR-C102 Foundation Analysis and Design

Name of the Course	**CO Code**	**Course Outcome (CO)**
Foundation Analysis and Design	1	Ability to identify, formulate and solve geotechnical engineering problems 4
	2	Ability to design a suitable foundation system from economic and safe aspects
	3	Ability to design machine foundations
	4	Ability to design of marine sub structures
	5	Ability to relate easily to allied subjects such soil dynamics; advanced engineering geology, rock mechanics etc.

STR-C103 Advanced Prestressed Concrete Structures

Name of the Course	**CO Code**	**Course Outcome (CO)**
Advanced Prestressed Concrete Structures	1	To understand the concept of pre-stressing, behavior of the pre-stressed structures vis-à-vis that of the RCC structure.
	2	To take the decision with respect to the choice of pre-stressed section over RCC.
	3	To understand the application of these techniques in civil engineering construction
	4	To analyze the various pre-stressed components of the structures and design the same

STR-DLO 1016 Analysis and Design of Multistoryed Buildings (Department Level Optional Course)

Name of the Course	**CO Code**	**Course Outcome (CO)**
Analysis and Design of Multi-storeyed Buildings	1	To present methods of static and dynamic wind analysis of multistoried buildings
	2	To design the structures using structural analysis independently or as a member of the team with respect to knowledge for safety, serviceability and economy.

	3	To design multi-storeyed buildings by relevant Indian Codes/Standards for RCC and PSC structures.
	4	To identify preliminary sizing for mathematical modeling of RC/steel structures, various shear wall analysis and design for Fire Resistant.

STR-ILO1015 Operations Research (Institute Level Optional Course)

Name of the Course	**CO Code**	**Course Outcome (CO)**
Operations Research	1	Understand the theoretical workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness.
	2	Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change
	3	Solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems
	4	Understand the applications of integer programming and a queuing model and compute important performance measures

Sem-II

STR- C201 Finite Element Analysis

Name of the Course	**CO Code**	**Course Outcome (CO)**
Finite Element Analysis	**1**	To understand the basics, advantages and significance of finite element analysis..
	2	To study the various methods used in finite element formulation.
	3	To compute stresses and strains in simple structural elements using finite element methods.

	4	To understand geometric non-linearity, material non-linearity in two dimensional elements and general formulation of a physically non-linear problem
	5	To employ finite element analysis methods on selected real world problems.

STR- C202 Structural Dynamics

Name of the Course	**CO Code**	**Course Outcome (CO)**
Structural Dynamics	**1**	To expose the students to understand the basic theory of structural dynamics, structural behavior under vibratory load and the effect of damping.
	2	To study the difference between static load and different types of dynamic loads.
	3	To study the free vibration analysis of SDOF systems, concept of damping anddynamic analysis of SDOF system subjected to different dynamic loads.
	4	To study the dynamic degrees of freedom and calculation of the frequencies and mode shapes for lumped mass for discrete MDOF systems,
	5	To study the modal analysis of MDOF systems and analysis of systems with distributed mass for continuous system.
	6	To study the random vibrations, probabilistic theory, random process and related parameters.
	7	To study the stochastic response analysis of linear SDOF systems.

STR- C203 Advanced Design of Concrete Structures

Name of the Course	**CO Code**	Course Outcome (CO)
Advanced Design of Concrete Structures	**1**	To understand the design philosophy of two way slab using ultimate load method.
	2	To study the concept of the design of flat slab, flat plate slab

	3	To study the analysis of the beams curved in plan and extend its application for the design of such beams.
	4	To understand the design concept for special foundations such as strip footing, raft foundations and pile foundations including pile cap along with that for storage structures such as bunkers and silos.
	5	To understand the concept for the design of miscellaneous structures.
	6	To get acquainted with the analysis and design of concrete pavements for highways using IRC: 58-2015 including the design of joints therein

STR-DLO 2016 Earthquake Engineering

Name of the Course	**CO Code**	**Course Outcome (CO)**
Earthquake Engineering	**1**	To study the importance of the earthquake engineering
	2	To study the different types of dynamic loads, concept of damping, and analysis of SDOF system subjected to different types of dynamic loads.
	3	To calculate frequency and mode shapes for the MDOF system, analysis of MDOF system subjected to different types of dynamic loads
	4	To study the causes of earthquake, types of earthquakes, seismic waves, structure of earth, and measurement of earthquake magnitude and intensity
	5	To study the concept of Response Spectrum, ground motion parameters, characteristics of response spectrum, and various methods to construct response spectrum
	6	To analyze the structure subjected to ground motion as per codal provisions of IS:1893-2002 and calculation of earthquake loads/forces. Importance of ductility in earthquake resistant design of structure and codal provision of IS: 13920.

	7	To perform the basic experiments in structural dynamics on SDOF and MDOF system6

STR-ILO2016 Research Methodology

Name of the Course	**CO Code**	**Course Outcome (CO)**
Research Methodology	**1**	. To understand Research and Research Process
	2	To acquaint students with identifying problems for research and develop research
	3	To familiarize students with the techniques of data collection, analysis of data and interpretation

(VI) DEPARTMENT OF COMPUTER ENGINEERING

Program Specific Outcomes (PSOs)

PSO1	Acquire skills to design, analyse and develop algorithms and implement them using high-level programming languages
PSO2	Contribute their engineering skills in computing and information engineering domains like network design and administration, database design and knowledge engineering.
PSO3	Develop strong skills in systematic planning, developing, testing implementing and providing IT solutions for different domains which helps in the betterment of life.

CSC301-Applied Mathematics-III

Name of the Course	**CO Code**	**Course Outcome (CO)**
Applied Mathematics-III	1	Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic function
	2	Plot the image of the curve by a complex transformation from z-plane to w-plane.

	3	Expand the periodic function by using Fourier series and complex form of Fourier series
	4	Understand the concept of Laplace transform and inverse Laplace transform of various functions and its application to solve ordinary differential equations.
	5	Apply the concept of Z- transformation and its inverse of the given sequence.
	6	Apply the concept of Correlation and Regression to the engineering problems.

CSC302-Digital Logic Design and Analysis

Name of the Course	CO Code	Course Outcome (CO)
Digital Logic Design and Analysis	1	To understand different number systems and their conversions.
	2	To analyze and minimize Boolean expressions.
	3	To design and analyze combinational circuits.
	4	To design and analyze sequential circuits
	5	To understand the basic concepts of VHDL.
	6	To study basics of TTL and CMOS Logic families.

CSC303-Discrete Mathematics

Name of the Course	CO Code	Course Outcome (CO)
Discrete Mathematics	1	Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving
	2	Ability to reason logically
	3	Ability to understand relations, Diagraph and lattice.
	4	Ability to understand use of functions, graphs and their use in programming applications
	5	Understand use of groups and codes in Encoding-Decoding
	6	Apply discrete structures into other computing problems such as formal specification, verification, artificial intelligence, cryptography, Data Analysis and Data Mining etc.

CSC304-Electronic Circuits and Communication Fundamentals

Name of the Course	CO Code	Course Outcome (CO)
	1	To understand the use of semiconductor devices in circuits and analyze them.

Electronic Circuits and Communication Fundamentals	2	To understand importance of oscillators and power amplifiers in communication system
	3	To understand basic concepts of operational amplifier and their applications
	4	To understand the fundamental concepts of electronic communication
	5	To apply knowledge of electronic devices and circuits to communication applications.
	6	To study basic concepts of information theory.

CSC305- Data Structure

Name of the Course	**CO Code**	**Course Outcome (CO)**
Data Structure	1	Students will be able to implement various linear and nonlinear data structures.
	2	Students will be able to handle operations like insertion, deletion, searching and traversing on various data structures.
	3	Students will be able to select appropriate sorting technique for given problem.
	4	Students will be able to select appropriate searching technique for given problem.
	5	Students will be able to apply the learned concepts in various domains like DBMS and Compiler Construction.
	6	Students will be able to choose appropriate data structure for specified problem domain.

CSL301 - Digital System Lab

Name of the Course	**CO Code**	**Course Outcome (CO)**
Digital System Lab	1	Understand the basics of various digital components.
	2	Understand the principles of design of combinational logic and sequential logic circuits using basic components.
	3	Recognize the importance of digital systems in computer architecture.
	4	Design and simulate the basic digital circuit.

CSL302 - Basic Electronics Lab

Name of the Course	**CO Code**	**Course Outcome (CO)**
Basic Electronics Lab	1	Understand the basics of various semiconductor devices, electronic components and instruments.
	2	Understand the working of electronic circuits using components
	3	Recognize the importance of electronic circuits in electronic communications.

	4	Study the fundamental concepts of various modulation methods.

CSL303 - Data Structures Lab

Name of the Course	CO Code	Course Outcome (CO)
Data Structures Lab	1	Students will be able to implement various linear and nonlinear data structures.
	2	Students will be able to handle operations like insertion

CSL304- Object Oriented Programming Methodology (JAVA) Lab

Name of the Course	CO Code	Course Outcome (CO)
Object Oriented Programming Methodology (JAVA) Lab	1	To apply fundamental programming constructs.
	2	To illustrate the concept of packages, classes and objects.
	3	To elaborate the concept of strings arrays and vectors.
	4	To implement the concept of inheritance and interfaces.
	5	To implement the notion of exception handling and multithreading.
	6	To develop GUI based application.

CSC401-Applied Mathematics-IV

Name of the Course	CO Code	Course Outcome (CO)
Applied Mathematics-IV	1	Students in this course will be able to apply the method of solving complex integration, computing residues & evaluate various contour integrals.
	2	Demonstrate ability to manipulate matrices and compute Eigen values and Eigen vectors.
	3	Apply the concept of probability distribution to the engineering problems.
	4	Apply the concept of sampling theory to the engineering problems.
	5	Use matrix algebra with its specific rules to solve the system of linear equation, using concept of Eigen value and Eigen vector to the engineering problems
	6	Apply the concept of Linear & Non-Linear Programming Problem to the engineering problems

CSC402-Analysis of Algorithms

Name of the Course	CO Code	Course Outcome (CO)
Analysis of Algorithms	1	Analyze the running time and space complexity of algorithms
	2	Describe, apply and analyze the complexity of divide and conquer strategy
	3	Describe, apply and analyze the complexity of greedy strategy.
	4	Describe, apply and analyze the complexity of dynamic programming strategy
	5	Explain and apply backtracking, branch and bound and string matching techniques to deal with some hard problems
	6	Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete.

CSC403-Computer Organization and Architecture

Name of the Course	CO Code	Course Outcome (CO)
Computer Organization and Architecture	1	To describe basic structure of the computer system
	2	To demonstrate the arithmetic algorithms for solving ALU operations.
	3	To describe instruction level parallelism and hazards in typical processor pipelines.
	4	To describe superscalar architectures, multi-core architecture and their advantages
	5	To demonstrate the memory mapping techniques
	6	To Identify various types of buses, interrupts and I/O operations in a computer system

CSC404-Computer Graphics

Name of the Course	CO Code	Course Outcome (CO)
Computer Graphics	1	Understand the basic concepts of Computer Graphics.
	2	Demonstrate various algorithms for scan conversion and filling of basic objects and their comparative analysis.
	3	Apply geometric transformations, viewing and clipping on graphical objects.
	4	Explore solid model representation techniques and projections.
	5	Understand visible surface detection techniques and illumination models.

CSC405-Operating System

Name of the	CO Code	Course Outcome (CO)

Course		
Operating System	1	Understand role of Operating System in terms of process, memory, file and I/O management.
	2	Apply and analyse the concept of a process, thread, mutual exclusion and deadlock.
	3	Evaluate performance of process scheduling algorithms and IPC
	4	Apply and analyse the concepts of memory management techniques
	5	Evaluate the performance of memory allocation and replacement techniques
	6	Apply and analyze different techniques of file and I/O management.

CSL401 - Analysis of Algorithms Lab

Name of the Course	CO Code	Course Outcome (CO)
Analysis of Algorithms Lab	1	Analyze the complexities of various problems in different domains
	2	Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains
	3	Develop the efficient algorithms for the new problem with suitable designing techniques.
	4	Implement the Algorithm using different strategies

CSL402 - Computer Graphics Lab

Name of the Course	CO Code	Course Outcome (CO)
Computer Graphics Lab	1	Explore the working principle, utility of various input/ output devices and graphical tools
	2	Implement various output and filled area primitive algorithms using C/ OpenGL
	3	Apply transformation and clipping algorithms on graphical objects.
	4	Implementation of curve and fractal generation
	5	Develop a graphical application based on learned concept.

CSL403 - Processor Architecture Lab

Name of the Course	CO Code	Course Outcome (CO)
Processor Architecture Lab	1	Assemble personal computer
	2	Design the basic building blocks of a computer: arithmetic-logic unit, registers, central processing unit, and memory
	3	Implement various algorithms like Booth's algorithm for arithmetic operations

	4	Describe various I/O buses with merits and demerits.

CSL404- Operating System Lab

Name of the Course	CO Code	Course Outcome (CO)
Operating System Lab	1	Understand basic operating system commands.
	2	Understand and explore various system calls
	3	Write shell scripts and shell commands using kernel APIs
	4	Implement and analyze different process scheduling algorithms
	5	Implement and analyze different memory management algorithms.
	6	Evaluate process management techniques and deadlock handling using simulator

CSL405- Open Source Technology Lab

Name of the Course	CO Code	Course Outcome (CO)
Open Source Technology Lab	1	To understand basic concepts in python and perl.
	2	To explore contents of files, directories and text processing with python
	3	To develop program for data structure using built in functions in python.
	4	To explore django web framework for developing python based web application
	5	To understand file handling and database handling using perl
	6	To explore basics of two way communication between client and server using python and perl

CPC501- Microprocessor

Name of the	CO Code	Course Outcome (CO)

Course		
Microprocessor	1	Write programs to run on 8086 microprocessor based systems.
	2	Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor.
	3	Understand and devise techniques for faster execution of instructions improve speed of operations and enhance performance of microprocessors.
	4	Distinguish between RISC and CISC processors.
	5	Understand multi core processor and its advantages.

CPC502 - Operating System

Name of the Course	CO Code	Course Outcome (CO)
Operating System	1	Appreciate the role of operating system as System software.
	2	Compare the various algorithms and comment about performance of various algorithms used for management of memory , CPU scheduling, File handling and I/O operations
	3	Apply various concept related with Deadlock to solve problems related with Resources allocation, after checking system I Safe state or not.
	4	To appreciate role of Process synchronization towards increasing throughput of system.
	5	Describe the various Data Structures and algorithms used by Different OS like Windows XP, Linux and Unix pertaining with Process, File, I/O management.
	6	To control the behaviour of OS by writing Shell scripts.

CPC503- Structured and Object Oriented Analysis and Design

Name of the Course	CO Code	Course Outcome (CO)
Structured and Object Oriented Analysis and Design	1	Understand and apply techniques to get the system requirements and present it in standard format.
	2	Apply key modeling concepts to both the traditional structured approach and the object-oriented approach.
	3	Construct the candidate system following design methodology.

CPC504- Computer Networks

Name of the Course	CO Code	Course Outcome (CO)
Computer Networks	1	To learn the concept of network and communication between layers
	2	To learn and understand the guided and unguided Media for Transmission.

	3	To understand the Error Detection and Correction techniques and Flow Control.
	4	To understand the IP addressing
	5	It is expected to know the details of layers along with the functionalities like: How each layer works.
	6	To know how each layer communicates with other layers?

CPL502- Business Communication & Ethics

Name of the Course	CO Code	Course Outcome (CO)
Business Communication & Ethics	1	communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities
	2	Participate and succeed in Campus placements and competitive examinations like GATE, CET.
	3	Possess entrepreneurial approach and ability for lifelong learning.
	4	Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.

CPC601- System Programming Compiler Construction

Name of the Course	CO Code	Course Outcome (CO)
System Programming Compiler Construction	1	Identify different system software
	2	Use Lex tool used for generating lexical analyser.
	3	Write macros as and when required to increase readability and productivity
	4	Design hand written lexical analyzer
	5	Design new language structures with the help of grammars
	6	Appreciate the role of Operating System functions such as memory management as pertaining to run time storage management
	7	Appreciate role of Intermediate Code Generation in connection with language designing
	8	Apply optimization principles on given code
	9	Implement various parser types and use YACC.

CPC602 - Software Engineering

Name of the Course	CO Code	Course Outcome (CO)
Software Engineering	1	Students will demonstrate basic knowledge in software engineering.
	2	Students will be able to plan, design, develop and validate the software project.
	3	Students will be applying advance software methodology to create high quality WebApps.

	4	Students will have an understanding of impact of sound engineering principles.

CPC603- Distributed Databases

Name of the Course	CO Code	Course Outcome (CO)
Distributed Databases	1	Design and implement distributed database for enterprise application.
	2	Provides solutions for heterogeneous database
	3	Use XML for schema integration.

CPC604- Mobile Communication and Computing

Name of the Course	CO Code	Course Outcome (CO)
Mobile Communication and Computing	1	Understand GSM and CDMA Cellular architecture.
	2	Setup and configure wireless access points.
	3	Use Network Simulator tool to simulate mobile network.
	4	Implement small android based applications.

CPE6012- Software Project Management

Name of the Course	CO Code	Course Outcome (CO)
Software Project Management	1	Learner will be able to define characteristics of a project
	2	Learner will be able to appreciate project management principles, risk in environment and the management challenges for effective project management.
	3	Learner will be able to apply the project management principles across all phases of a project
	4	Learner will be able to demonstrate use of tools and techniques for the management of a project plan, monitor and controlling a project schedule and budget, tracking project progress.

CPL605- Network Programming Laboratory

Name of the Course	CO Code	Course Outcome (CO)
Network Programming Laboratory	1	Configure Linux Network
	2	View and edit routing tables
	3	Configure Linux Router

	4	Configure Linux FTP server
	5	Install and Configure DNS server
	6	Install and configure web server

COS-CPC701 - Digital signal processing

Name of the Course	CO Code	Course Outcome (CO)
Digital signal processing	1	To understand the concept of DT Signal and perform signal manipulation.
	2	To perform analysis of DT system in time domain.
	3	To develop FFT flow-graph and Fast DSP Algorithms.
	4	To design DSP system for Real Time Signal Processing.
	5	Familiar with current research issues and directions of Signal Processing.

CPC702 - Cryptography and System Security

Name of the Course	CO Code	Course Outcome (CO)
Cryptography and System Security	1	Understand the principles and practices of cryptographic techniques.
	2	Understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for given application.
	3	Appreciate the application of security techniques and technologies in solving real-life security problems in practical systems.
	4	Design security protocols and methods to solve the specific security problems.
	5	Familiar with current research issues and directions of security.

CPC703-Artificial Intelligence

Name of the Course	CO Code	Course Outcome (CO)
Artificial Intelligence	1	Ability to develop a basic understanding of AI building blocks presented in intelligent agents
	2	Ability to choose an appropriate problem solving method and knowledge representation technique
	3	Ability to analyze the strength and weaknesses of AI approaches to knowledge– intensive problem solving.
	4	Ability to design models for reasoning with uncertainty as well as the use of unreliable information.
	5	Ability to design and develop the AI applications in real world scenario.

CPE7026- Enterprise Resource Planning and Supply Chain Management (ERP & SCM)

Name of the Course	CO Code	Course Outcome (CO)
Enterprise Resource Planning and Supply Chain Management (ERP & SCM)	1	To conceptualize the basic structure of ERP and SCM
	2	To identify implementation strategy used for ERP and SCM
	3	To apply design principles for various business module in ERP and SCM
	4	To apply different emerging technologies for implementation of ERP and SCM.

CPL701 - Network threats and attacks Laboratory

Name of the Course	CO Code	Course Outcome (CO)
Network threats and attacks Laboratory	1	Use network-based tools for network analysis
	2	Use techniques for Network scanning
	3	Identify network vulnerability
	4	Use tools to simulate intrusion detection system
	5	To understand and install a firewall

CPC801 - Data Warehousing and Mining

Name of the Course	CO Code	Course Outcome (CO)
Data Warehousing and Mining	1	Enable students to understand and implement classical algorithms in data mining and data warehousing; students will be able to assess the strengths and weaknesses of the algorithms, identify the application area of algorithms, and apply them.
	2	Students would learn data mining techniques as well as methods in integrating and interpreting the data sets and improving effectiveness, efficiency and quality for data analysis.

CPC802 - Human Machine Interaction

Name of the Course	CO Code	Course Outcome (CO)
Human Machine Interaction	1	To design user centric interfaces.
	2	To design innovative and user friendly interfaces.
	3	To apply HMI in their day-to-day activities.
	4	To criticise existing interface designs, and improve them
	5	To Design application for social and technical task

CPC803- Parallel and Distributed Systems

Name of the Course	CO Code	Course Outcome (CO)
Parallel and Distributed Systems	1	Apply the principles and concept in analyzing and designing the parallel and distributed system
	2	Reason about ways to parallelize problems.
	3	Gain an appreciation on the challenges and opportunities faced by parallel and distributed systems.
	4	Understand the middleware technologies that support distributed applications such as RPC, RMI and object based middleware.
	5	Improve the performance and reliability of distributed and parallel programs.

CPE8031 - Machine Learning

Name of the Course	CO Code	Course Outcome (CO)
Machine Learning	1	Ability to analyze and appreciate the applications which can use Machine Learning Techniques.
	2	Ability to understand regression, classification, clustering methods.
	3	Ability to understand the difference between supervised and unsupervised learning methods
	4	Ability to appreciate Dimensionality reduction techniques.
	5	Students would understand the working of Reinforcement learning.

CPE8035 - Big Data Analytics

Name of the Course	CO Code	Course Outcome (CO)
Big Data Analytics	1	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing
	2	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
	3	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
	4	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

CPL801 - Cloud Computing Laboratory

Name of the Course	CO Code	Course Outcome (CO)
Cloud Computing Laboratory	1	Appreciate cloud architecture
	2	Create and run virtual machines on open source OS
	3	Implement Infrastructure , storage as a Service
	4	Install and appreciate security features for cloud

M.E.. (COMPUTER ENGINEERING)

CSC101- Algorithm and Complexity

Name of the Course	CO Code	Course Outcome (CO)
Algorithm and Complexity	1	Able to prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains
	2	Able to apply the algorithms and design techniques to solve problems.

CSC 102- Advanced Computer Networking and Design

Name of the Course	CO Code	Course Outcome (CO)
Advanced Computer Networking andDesign	1	Understand the theoretical issues in protocol design and apply it to Quality of service in networks.
	2	Understand issues in the design of network processors and apply them to design network systems
	3	Simulate working of wired and wireless networks to understand networking concepts
	4	Develop solutions by applying knowledge of mathematics, probability, and statistics to network design problems.

	5	Understand the basics of software defined networking and explore research problems in that area.

CSC 103-Advanced Operating System

Name of the Course	CO Code	Course Outcome (CO)
Advanced Operating System	1	Apply the principles and concepts in analyzing and designing Advance Operating System.
	2	Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
	3	Analyze the performance and reliability of different Advanced Operating Systems.

COS-CSDLO1014 - Computational Intelligence

Name of the Course	CO Code	Course Outcome (CO)
Computational Intelligence	1	To explore the various computational Intelligence techniques
	2	To become familiarized with Neural Network, Fuzzy logic & evolutionary techniques
	3	To learn to apply computational Intelligence to different applications

Institute Level Elective ILO1017 Disaster management and Mitigation Measures

Name of the course	CO	Course outcome (CO)
Disaster management and Mitigation Measures	1	It enables students to understand about what disaster is and importance of disaster in human life
	2	It enables students to understand the difference between Natural disaster and manmade disaster
	3	It enables students to understand various disaster management, policy and administration

	4	It enables students to understand the role of various agencies to carry our disaster management
	5	It enables students to understand how financing and relief funds are mobilized during a disaster
	6	It enables students to understand the preventive and mitigation measures during a disaster

CSC 201- High Performance Computing

Name of the Course	CO Code	Course Outcome (CO)
High Performance Computing	1	Understand different parallel processing approaches and platforms involved in achieving High Performance Computing..
	2	Understand design Issues and limitations in Parallel Computing.
	3	Learn to programming using message passing paradigm using open source APIs, design algorithms suited for Multicore processor and GPU systems using OpenCL, OpenMP.
	4	Analyze and optimize performance parameters.
	5	Understand HPC enabled Advanced Technologies.

CSC202- Data Science

Name of the Course	CO Code	Course Outcome (CO)
Data Science	1	Learn the fundamentals of data science to enable, reproduce and scalable data from a variety of sources.
	2	Apply statistical methods, regression techniques, and machine learning algorithms to make sense out of data sets both large and small.
	3	Design, implement, and evaluate the core algorithms underlying an end-to-end data science workflow, analysis, and visualization of information derived from large datasets

	4	Apply “best practices" in data science with modern tools

CSC 203-Ethical Hacking and Digital Forensics

Name of the Course	CO Code	Course Outcome (CO)
Ethical Hacking and Digital Forensics	1	Understand the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world.
	2	Acquire knowledge of various digital forensic tools and ethical hacking.
	3	Interpret security issues in ICT world, and apply digital forensic tools for security and investigations.
	4	Achieve adequate perspectives of digital forensic investigation in various applications & devices like Windows/Unix system, mobile, email etc.
	5	Generate legal evidences and supporting investigation reports.

COS- CSDLO2023 - Advanced Soft Computing

Name of the Course	CO Code	Course Outcome (CO)
Advanced Soft Computing	1	To familiarize various soft computing techniques.
	2	To relate various soft computing techniques in practical scenario.
	3	To understand hybrid approach for application development.

COS- ILO2029 - Environmental Management

Name of the Course	CO Code	Course Outcome (CO)
Environmental	1	Understand the concept of environmental management
	2	Understand ecosystem and interdependence, food chain etc.

Management	3	Understand and interpret environment related legislations

(VII) DEPARTMENT OF ELECTRICAL ENGINEERING

Program Specific Outcomes (PSOs)

PSO1	Design and analyse the power system that efficiently generate, transmit and distribute electrical power.
PSO2	Design and simulate modern electric control system and its specification.
PSO3	Understand the principle and construction of electrical machine and application .

Course Objectives :-

Second Year (Electrical Engineering)- Sem III

EEC301- Applied Mathematics-III

Name of the Course	CO Code	Course Outcome (CO)
Applied Mathematics-III	1	To demonstrate basic knowledge of Laplace Transform.
	2	To demonstrate basic knowledge of Fourier series
	3	To demonstrate basic knowledge of Vector Algebra
	4	To learn different mathematical theorems related to electrical engineering
	5	To understand complex variable and its application in Electrical Engineering
	6	To demonstrate basic knowledge of Bessel Functions.

EEC302-Electronic Devices and Circuits

Name of the Course	**CO Code**	**Course Outcome (CO)**
Electronic Devices and Circuits	1	To Identify the different types of diodes and their applications in electronic circuits
	2	To analyze the dc and ac parameters of BJT JFET, and differential amplifiers

	3	To demonstrate and analyze the effects of various parameters on performance of BJT and JFET amplifier.
	4	To analyze the effects of negative feedback in BJT and JFET amplifiers.
	5	To identify the effects of cascading in BJT and JFET amplifiers.
	6	To analyze the different types of oscillators.

EEC303-Conventional and Non-Conventional

Power Generation

Name of the Course	CO Code	Course Outcome (CO)
Conventional and Non-Conventional Power Generation	1	To analyse the economics of power generation
	2	To illustrate, the operation of thermal power plant
	3	To describe, the classification of hydro power plant and significance of hydrograph
	4	To illustrate, the operation of nuclear power plant
	5	To compare the operation of Diesel and Gas Turbine power plant.
	6	To illustrate operation of various Non-Conventional Energy sources

EEC304-Electrical Network

(abbreviated as EN)

Name of the Course	CO Code	Course Outcome (CO)
	1	To analyze electrical network using different Network theorems.
	2	To analyze electrical network using Graph theory.

Electrical Network **(abbreviated as EN)**	3	To analyze the effect of switching conditions on Electrical networks using Differential equations.
	4	To analyze the effect of switching conditions on Electrical networks using Laplace Transform.
	5	To develop transfer function model of system using two port network parameters.
	6	To analyze time domain behavior from pole zero plot

EEC305-Electricaland Electronics Measurement (abbreviated as EEM)

Name of the Course	CO Code	Course Outcome (CO)
Electrical and Electronics Measurement (abbreviated as EEM)	1	To illustrate the working principle of measurement instruments.
	2	To analyse the working of various analog and digital instruments in electrical measurements.
	3	To analyse the concept of extension of range of meters used in electrical measurements.
	4	To analyse the performance of bridges used in electrical measurement process.
	5	To illustrate the need for calibration process in instruments.
	6	To analyse the performance of transducers involved in electrical measurement.

Second Year (Electrical Engineering)- Sem IV

EEC401-Applied Mathematics-IV

Name of the Course	CO Code	Course Outcome (CO)
-**Applied Mathematics-IV (abbreviated as AM-IV)**	1	Students will able to apply method of calculus of variations to specific systems, demonstrate ability to manipulate matrices

	2	Compute eigenvalues and eigenvectors.
	3	Identify and classify zeros, singular points, residues and their applications.
	4	Students will demonstrate an ability to identify formulate and solve elecommunication Engineering problem using applied mathematics.
	5	Students who can participate and succeed in competitive exams like GATE, GRE.
	6	Students will be able to make more efficient programs

EEC402 -Elements of Power (EPS)

Name of the Course	CO Code	Course Outcome (CO)
Elements of Power System	1	To illustrate the general structure of power system.
	2	To illustrate purpose of different mechanical components of overhead transmission lines.
	3	To determine transmission line parameters for different configurations.
	4	To analyze the performance of short, medium and Long transmission lines.
	5	To analyze the performance of transmission line for different loading conditions.
	6	To illustrate safety norms and regulations related to underground cables and grounding techniques.

EEC403 -Electrical Machine (EMC-I)

Name of the Course	CO Code	Course Outcome (CO)
	1	To analyze series parallel magnetic circuits to determine circuit parameters and losses.
	2	To illustrate principle of energy conversion in single and double excited machines.
	3	To understand the performance parameters of dc machines.

Electrical Machine-I (abbreviated as EMC-I)	4	To analyze the effect of performance parameters and application of dc motors.
	5	To analyze the performance of dc machines by conducting various test.
	6	To illustrate the principle of operation and applications of stepper motors

EEC404 -Signal Processing (SP)

Name of the Course	CO Code	Course Outcome (CO)
Signal Processing (abbreviated as SP)	1	Will be able to analyse the system in Time and Frequency domain through its respective tools.
	2	Will demonstrate knowledge of complex number.
	3	Will be able to analyse the system in Fourier series and ability to design electrical and electronics systems, analyse and interpretdata.
	4	Will be able to analyse Z transform.
	5	Will be able to analyse Frequency Domain Analysis of DT systems
	6	Will be able to analyse DTFT (Discrete time Fourier Transform)

EEC405 -Analog and Digital Integrated Circuits (abbreviated as ADIC)

Name of the Course	CO Code	Course Outcome (CO)
Analog and Digital Integrated Circuits	1	To illustrate various performance parameters and characteristics of operational amplifier.
	2	To illustrate various linear and non-linear application of operational amplifiers.
	3	To design and analyse linear voltage regulators and multivibrators.

(abbreviated as ADIC)	4	To do various conversion of number systems and illustrate logic families.
	5	To build, design and analyse combinational circuits.
	6	To build, design and analyse sequential circuits.

EEC406-Numerical Methods and Optimization Techniques

(abbreviated as NMOT)

Name of the Course	CO Code	Course Outcome (CO)
Analog and Digital Integrated Circuits **(abbreviated as ADIC)**	1	Will be capable of analyzing various techniques and choosing the best technique for any particular application.
	2	Will demonstrate knowledge of differential calculus, partial differentiation and its solution
	3	Curve Fitting Inter Polation
	4	Solution of ordinary differential equation
	5	One dimensional unconstrained Optimization
	6	Non-linear programming:

Third Year (Electrical Engineering)-Sem V

EEC501 –Protection Switchgear Engineering.

(abbreviated as PSE)

Name of the Course	CO Code	Course Outcome (CO)
Protection Switchgear Engineering.	1	Introduce students to power system protection and switchgear.
	2	To teach students theory and application of substation equipment such as isolator, earthing switch, contactor, fuses, and circuit breaker.
	3	To understand theory, construction and application of main type of relay

	4	To study protection schemes provided for generator transformer and induction motor.
	5	To study protection of transmission line such as feeder protection, bus zone protection ,and distance protection.
	6	To understand static numerical relay.

EEC502- Electrical Machine II

Name of the Course	CO Code	Course Outcome (CO)
Electrical Machine II	1	To study the construction and analyse the Phasor group and connection of three phase transformer
	2	Various concept of three phase transformer and its operation : - Connection Scott and open delta , parallel operation. - Harmonic study.
	3	Working and operation of three phase transformer is studied along with its T-N characteristic. Test to find out the efficiency and its application.
	4	Speed control of three phase Induction Motor and rotating methods are to be analysed.
	5	Working of 1phase Induction Motor is studied and its equivalent ckt is obtained by performing various test.
	6	To analyse starting method of 1phase Induction Motor and its application.

EEC503 - Electromagnetic Field and Waves

Name of the Course	CO Code	Course Outcome (CO)
Electromagnetic Field and Waves	1	Understand the basic concept of Electric and magnetic field

	2	Understand the basic concept of conductor, dielectric, inductance and capacitance.
	3	Gain knowledge of the nature of magnetic materials.
	4	Understand the concept of static and time varying field.
	5	Time varing electric magnetic Field.
	6	Simulation e- field distribution

EEC504- Power Electronics

Name of the Course	CO Code	Course Outcome (CO)
Power Electronics	1	Solid background in fundamental of thyristor (SCR)
	2	To study the basic operation of power semiconductor devices.
	3	To study the controlled rectifiers for R load, R-L load etc and it's control aspects which is used in practice.
	4	To study the single phase and three inverter and also understand PWM technique which it's control aspects in practice.
	5	To study the chopper technologies and it's control aspects which is used in practice
	6	To study the AC voltage controller also, Matrix converter and it's control aspects

EEC505-Communication Engineering

Name of the Course	CO Code	Course Outcome (CO)
Communication Engineering	1	Students will be familiar with the techniques involved in the field of Radio Communication
	2	Students will be able to detect and correct the errors that

		occur due to noise during transmission using channel coding techniques
	3	Students Family with Digital Communication :
	4	Students will be able to understand the significance of communication systems in power system such as PLCC.
	5	Study of different type Coding Techniques
	6	Study of different types of communication :

EEC506- Business Communication and Ethics

Name of the Course	CO Code	Course Outcome (CO)
Business Communication and Ethics	1	To be able communicate effectively in verbally and in written form.
	2	To be able to demonstrate knowledge of professional and ethical responsibility.
	3	Able to participate and success in campus placement and competitive examination like GATE, CET etc
	4	Possess entrepreneur approach and ability for lifelong learning.
	5	To have education necessary for understanding the impact of engineering solution on society.
	6	Demonstrate awareness of contemporary issue.

Third Year (Electrical Engineering)-Sem VI

EEC 601- Power System Analysis

Name of the Course	CO Code	Course Outcome (CO)
	1	Understanding of symmetrical fault analysis

Power System Analysis	2	Understanding of short circuit condition of synchronous machine and transformer
	3	Understanding of Unsymmetrical fault analysis
	4	Concepts of Power system Transients
	5	Phenomenon of corona and insulation co-ordination
	6	Study of uncompensated Transmission line

EEC602 - Electrical Machines-III
(Abbreviated as EMC-III)

Name of the Course	CO Code	Course Outcome (CO)
Electrical Machines-III (Abbreviated as EMC-III)	1	Students will be able to understand the engineering fundamentals ofsynchronous machines.
	2	Students will be able to understand the features ofsynchronous machines.
	3	Students will be able to understand the difference between synchronous motor and synchronous Generator.
	4	Gain an ability to design and conduct performance experiments,
	5	Students will be able to identify, formulate and solve machine related problems.
	6	Understand to user handly.

EEC603- Utilisation of Electrical Energy

Name of the Course	CO Code	Course Outcome (CO)
Utilisation of Electrical Energy	1	Recognize the need for technical change and ability to learn in the broadest knowledge of technical advancement

		in traction and other application
	2	To understand the starting and speed control of electric traction motor.
	3	To comprehend the differenet issues related illumination.
	4	To acquire knowledge about electric vehical and hybrid electric vehical.
	5	To study the various application of electrical energy such as refrigerator air conditioning etc.
	6	To acquire knowledge of construction, working application of various furnaces.

EEC604- Control System-I
(Abbreviated as CS-1)

Name of the Course	CO Code	Course Outcome (CO)
Control System-I (Abbreviated as CS-1)	1	Knowledge of basic concepts
	2	Knowledge Modeling in the frequency domain:
	3	Knowledge Modeling in the Time domain:
	4	Transient, Steady state and Stability analysis
	5	Knowledge of different techniques for analysing the performance of linear time invariant system
	6	Frequency Response techniques

EEC605- Microcontroller and its Application

Name of the Course	CO Code	Course Outcome (CO)
Microcontroller and its	1	To impact knowledge of microcontroller.

Application	2	To understand knowledge of PIC controller: PIC18.
	3	To impart knowledge of PIC microcontrollers along with the programming using assembly language.
	4	To impart knowledge of PIC microcontrollers along with the programming using C language.
	5	To understand knowledgeof parallel ports.
	6	To make the students aware of recent microcontroller based design.

EEC606- Project Management

(Abbreviated as PM)

Name of the Course	CO Code	Course Outcome (CO)
Project Management	1	Understanding Projects and Project management
	2	Project Selection & Appraisal:
	3	Project Planning
	4	Project Execution, Monitoring & Controlling:
	5	Project Closure & Termination:
	6	Contracts Management:

B. E. (Electrical Engineering)-Sem VII

EEC701-Power SystemOperation and Control

(Abbreviated as PSOC)

Name of the Course	CO Code	Course Outcome (CO)
Power System Operation and Control	1	Student should be capable to analyze power system problem and find out its solutions

(Abbreviated as PSOC)	2	Student should be capable to analyze Load Flow Studies:
	3	Student should be capable to analyze Economic System Operation:
	4	Student should be capable to analyze Automatic Generation and control
	5	Student should be capable to analyzeInter Change of Power and Energy
	6	.Student should be capable to analyzePower System Stability Voltage stability.

EEC702 High Voltage DCTransmission

(Abbreviated as HVDCT)

Name of the Course	CO Code	Course Outcome (CO)
High Voltage DCTransmission	1	To understand the basic of HVDC - Its limitation and advantage of AC and DC transmission. - Classify component and application.
	2	To analyse bridge rectifier and inverter - Effect of overlap angle - Equivalent ckt , multi bridge converter.
	3	To study the various modes of control of HVDC.
	4	Control implementation and scheme adopted for converter firing control.
	5	To evaluate various fault in DC transmission and to understand the problem proposed.
	6	To study and analyse various harmonics in HVDC Transmission and proposed means of reducing them.

EEC703- Electrical Machine Design

(Abbreviated as EMD)

Name of the Course	CO Code	Course Outcome (CO)

Electrical Machine Design	1	Analyse the aspects of electrical machine design with material required.
	2	Recall basic knowledge of transformer construction and design transformer
	3	Illustrate the performance of designed transformer
	4	Design a three phase Induction Motor
	5	Illustrate the performance of designed three phase Induction Motor
	6	Draw various parts of designed transformer and three phase Induction Motor .

EEC704 – Control System _ II

(Abbreviated as CS-II)

Name of the Course	CO Code	Course Outcome (CO)
– Control System _ II	1	Knowledge of different techniques for analyzing the performance of linear time invariant system.
	2	Demonstrate and understanding of the fundamental of control system.
	3	Determine the time and frequency domain responses of first and second system to step and sinusoidal input.
	4	Determine the stability of closed loop system.
	5	Determine and use models of physical system in forms suitable for use in the analysis and design of control system.
	6	Apply root locus technique to analyse and design control system.

EEE701-High voltage engineering

(Abbreviated as HVE)

Elective I

Name of the Course	CO Code	Course Outcome (CO)

	1	To understand the fundamental of properties of metal.
	2	To know the failure mechanism of material.
	3	To get appropriate and optimal design of material.
	4	Testing of different dielectric material.
	5	To be aware of major requirement dielectric material.
	6	To design plan and layout of HVE lab.

B. E. (Electrical Engineering)-Sem VIII

EEC801 -Design, Management and Auditing of Electrical System

Name of the Course	CO Code	Course Outcome (CO)
	1	To understand the fundamental of properties of metal.
	2	To know the failure mechanism of material.
	3	To get appropriate and optimal design of material.
	4	Testing of different dielectric material.
	5	To be aware of major requirement dielectric material.
	6	To design plan and layout of HVE lab.

EEC802- Drives and Control

Name of the Course	CO Code	Course Outcome (CO)
	1	Gain an ability to design and conduct performance experiments,
	2	Identify, formulate and solve drives related problems.

	3	Understanding of Electrical Drives
	4	Selection of Motor Power Rating:
	5	Controlling techniques of Electrical Drives:
	6	Understanding about AC Drives and controlling concepts.

EEC803- Power System Planning and Reliability

Name of the Course	CO Code	Course Outcome (CO)
Power System Planning and Reliability	1	Should be able to make a Generation System Model for the Power system in terms of frequency and duration of failure.
	2	Should be able to calculate reliability indices of the power system based on system model and the load curve.
	3	Students should be able to understand about load forecasting and system planning
	4	Students should be able to understand Reliability of Systems:
	5	Students should be able to understand Generating Capacity
	6	Should be able to plan a small Generation and Transmission system, predict its behavior, and do the required change in order to achieve reliability.

(VIII) Department of Electronics and Telecommunication Department

The programme specific outcome are as below:-

Program Specific Outcomes (PSOs)

PSO1	Analyze specific engineering problems and design analog & digital systems for a given specification and function.

PSO2	Implement functional blocks of hardware-software co-designs for signal processing and communication applications USING applying modern tools FOR Public Domain Applications.
PSO3	Associate the learning from the courses to arrive at solutions to real world problem.

Second Year (E & TC)- Sem III

ECC301- Applied Mathematics-III

Name of the course	CO code	Course outcome (CO)
Applied Mathematics-III	1	Analyze the basic concepts of Laplace transform and its importance in real time application.
	2	Understand the methodologies used in regaining the original signals using Inverse Laplace Transform.
	3	Understand the use of Fourier Series and its application of Mathematics in Telecommunication Engineering. Also to understand the basics of Fourier Integrals.
	4	Understand the importance of Vectors and the various algebraic methods to solve the vector functions
	5	Understand the concepts required to solve the various integrals used in vector functions
	6	Analyze the basic concepts of Complex variable and also to understand the basics of Bessel Function and Model the problems of the field of Electronics and Telecommunication and solve it.

ECC302 Electronics Devices and Circuits I

Name of the course	CO code	Course outcome (CO)
Electronic Devices & Circuits -I	1	Students have an overview of various types of passive and active elements.
	2	Students understand the current voltage characteristics of semiconductor.
	3	Students analyze dc circuits.
	4	Students relate ac models of semiconductor devices with their physical operation.
	5	Students will be able to design and analyze electronic circuits.
	6	Students evaluate the time and frequency response of Continuous and Discrete time, system which is useful in understanding behavior of Electronics circuits and Communication systems.

ECC303 Digital System Design

Name of the course	CO code	Course outcome {CO}
Digital System Design	1	Develop a digital logic and apply it to solve real life problems.
	2	Analyze, design and implement combinational logic circuits.
	3	Classify different semiconductor memories.
	4	Analyze, design and implement sequential logic circuits.
	5	Analyze digital system design using PLD.
	6	Simulate and implement combinational and sequential circuits using VHDL systems.

ECC304 Circuit Theory and Network

Name of the course	CO code	Course outcome (CO)
Circuit Theory and Network	1	To Apply their knowledge in analyzing Circuits by using network theorems.
	2	To Apply the time method of analysis
	3	To be able to find circuit response using Laplace transform
	4	Find the various parameters of two port network
	5	Apply network topology for analyzing the circuit
	6	Synthesize the network using passive elements

ECC305 Electronic Instruments and Control

Name of the course	CO code	Course outcome (CO)

Electronic Instruments and Control	1	Maintain various type of measuring instruments using various electrical parameters like accuracy, precison and resolution
	2	Understand principle of operation for various sensor And select appropriate transducer for measuring physical phenomena.
	3	Describe functional block diagram of Data Acquisition System
	4	Demonstrate understanding of fundamentals of control system
	5	Apply root locus technique to analyse and design control sytstem
	6	Calculate time domain and frequency domain parameter for given system

ECL303 OOP using JAVA laboratory

Name of the course	**CO code**	**Course outcome {CO}**
OOP using JAVA laboratory	1	Students will be able to code a program using JAVA constructs.
	2	Students will be able to understand fundamental features of an object oriented language: object, classes and Interfaces, Exceptions and libraries of object collections.
	3	Students will be able to develop a program that efficiently implements the algorithm for given tasks.
	4	Students will be able to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
	5	Students will be able to utilize the knowledge acquired in this course to develop higher level algorithms.
	6	Students will be able to test and prepare a professional looking package for each business project using java doc.

TE E & TC –Semester V- Course outcome (CO)

ETC501 Microcontrollers and Applications

Name of the course	CO code	Course outcome (CO)
Microcontrollers and Applications	1	To Understand basic terminology and describe the operation of a microcontroller based system
	2	To Understand the microcontroller architecture and usages of the instruction set of the representative microcontrollers.
	3	To Understand input/output and interrupt operations in a microcontroller system. And also interpret, construct simple programs for microcontroller applications.
	4	To Understand the ARM7 (TDMI) Architecture
	5	To Understand Arithmetic, logical, and stack operation, loops of ARM7 and design simple program based on system
	6	To Understand application based on ARM 7 ADC, DAC, Port

ETC502 Analog Communication

Name of the course	CO code	Course outcome (CO)
Analog Communication	1	The different modulation and demodulation techniques used in analog communication.
	2	Identify and solve basic communication problems, analyze transmitter and receivers.
	3	Detect the errors that occur due to noise during transmission
	4	Compare and contrast advantages and limitations of analog communication systems.
	5	Understand the Sampling techniques, aliasing error, and aperture effect
	6	Understand the Pulse Modulation and Demodulation

ETC503 Random Signal Analysis

Name of the course	CO code	Course outcome (CO)
Random Signal Analysis	1	Students have an overview of Random Variables and Random Process.
	2	Students get an idea of PDF, CDF, PMF as well as marginal an conditional PDF, CDF and PMF
	3	Students become aware of probability an expectation computations using importance discrete and Continuous Random Variable Types
	4	Students get an idea of various random processes and determine whether a given a process is stationary or wide sense stationary
	5	Students become aware of the response of a linear time invariant system to such a random process
	6	Students will understand the basic concepts related to Markov Chain and Queuing theory and relate it to real world application

ETC504 RF Modelling and Antenna

Name of the course	CO code	Course outcome (CO)
RF Modelling and Antenna	1	Understand the fundamentals and behaviour of Active and Passive components in RF range.
	2	Analyze and Design RF Filters
	3	Understand the concept and analyze the radiation mechanism of Antenna
	4	Demonstrate knowledge of Antennas in communication system
	5	Ability to discriminate between antennas on the basis of their electrical performance
	6	Discriminate various antennas on the basis of their electrical performance

ETC505 Integrated Circuit

ETC506 Business Communication and Ethics

Name of the course	CO code	Course outcome (CO)
Business Communication and Ethics	1	Communicate effectively in both verbal and written form.
	2	Demonstrate knowledge of professional and ethical responsibilities.
	3	Participate and succeed in Campus placements.
	4	Participate and succeed in competitive examinations like GATE, CET.
	5	Possess entrepreneurial approach and ability for life-long learning.
	6	Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.

Name of the course	CO code	Course outcome {CO}
Integrated Circuits	1	Understand the fundamentals and areas of applications for the Integrated Circuits.
	2	Analyze important types of integrated circuits of day-to-day requirements.
	3	Demonstrate the ability to design practical circuits that perform the desired operations
	4	Understand the differences among theoretical, practical & simulated results in integrated circuits.
	5	Choose the appropriate integrated circuit modules to build a given application.
	6	Understand the design and working of integrated circuits.

BE E & TC –Semester VII- Course outcome (CO)

ETC701 Image and Video Processing

Name of the course	CO code	Course outcome (CO)
Image and Video	1	Understand image formation and the role human visual system plays in perception of gray and color image data.

Processing	2	Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing, compression and analysis.
	3	Learn and understand the Image Enhancement in the Spatial Domain.
	4	Learn and understand the Image Enhancement in the Frequency Domain
	5	Understand the Image Restoration, Compression, Segmentation, Recognition, Representation and Description.
	6	Acquire an appreciation for the image processing issues and techniques and be able to apply these techniques to real world problems.

ETC702 Mobile Communication

Name of the course	**CO code**	**Course outcome (CO)**
Mobile Communication	1	Understand terminology and basics concepts of mobile communication.
	2	Understand 2G, GSM, CDMA concepts and architecture, frame structure, system capacity, services provided.
	3	Study evolution of mobile communication generations 2G, 2.5G, 3G and I S-95with their characteristics and limitations
	4	Understand generations 3.5G, 4G (LTE), forward and reverse channels.
	5	Understand emerging technologies required for fourth generation mobile systems such as SDR, MIMO etc.
	6	Understand different indoor and outdoor propagation models related to losses and different types of fading.

ETC703 Optical Communication Networks

Name of the course	**CO code**	**Course outcome (CO)**
Optical Communicati	1	Apply the fundamental principles of optics and light wave to design optical fiber communication systems.

on Networks	2	Identify structures, functions, materials, and working principle of optical fibers, light sources, couplers, detectors, and multiplexers.
	3	Design optical fiber communication links using appropriate optical fibers, light sources, couplers, detectors, and multiplexers.
	4	Explore concepts of designing and operating principles of modern optical communication systems and networks.
	5	Apply the knowledge developed in-class to contemporary optical fiber communication research and industrial areas.
	6	Design Optical access network, design power links of optical network using optical amplifiers, optimize optical network & optical safety and service interface

ETC704 Microwave and Radar Engineering

Name of the course	CO code	Course outcome (CO)
Microwave and Radar Engineering	1	Analyze the microwave passive circuit components
	2	Design the tuning and matching networks
	3	Identify the state of art in microwave tubes and semiconductors
	4	Microwave components uses in real life.
	5	Analyze Microwave active and passive components and their implementation in research area
	6	Apply the microwave devices and RADAR for industrial and scientific purposes

ETE705 Data Compression and Encryption

Name of the course	CO code	Course outcome (CO)
Data Compression	1	Students have an overview of Implement text, audio and Image compression techniques.

and Encryption	2	Students get an idea about JPEG,JEPG2000, H.264
	3	Students get an idea of different types of cryptography.
	4	Students become aware of Understand symmetric and asymmetric key cryptography schemes
	5	Students get an idea of various to Digital Immune systems, biometric authentication
	6	Students become aware of working principles of network security and ethical hacking

E & TC –Semester IV- Course outcome (CO)

ECC401 Applied Mathematics-IV

Name of the course	CO code	Course outcome (CO)
Applied Mathematics-IV	1	Understand the basics of Euler's Lagrange's Equation and its importance in Industries
	2	Analyze the advanced algebraic equations in vector spaces
	3	Understand the importance of Probability and its use in Biomedical Engineering
	4	Understand the methods of storing a set of data in Matrices and able to solve the various operations in it
	5	Understand the Importance of Correlation and various methods for solving the correlation between two variables
	6	Analyze the various methods used to solve the integration problems for Complex Functions

ECC402 Electronics Devices and Circuits II

Name of the course	CO code	Course outcome (CO)
Electronic	1	Design and analyse the basic operations of MOSFET.

Devices & Circuits -II	2	Know about the multistage amplifier using BJT and FET in various configuaration to determine frequency response and concept of voltage gain.
	3	Know about two stage amplifier using BJT and FET in various configuaration to determine frequency response and concept of voltage gain.
	4	Know about different power amplifier circuits,their design and use in electronics and communication circuits
	5	Know the concept of feedback amplifier and their characteristics.
	6	Design the different oscillator circuits for various frequencies.

ECC403 Linear Integrated Circuit

Name of the course	**CO code**	**Course outcome (CO)**
Linear Integrated Circuits	1	Understand the fundamentals and areas of applications for the Integrated Circuits.
	2	Analyze important types of integrated circuits of day-to-day requirements.
	3	Demonstrate the ability to design practical circuits that perform the desired operations
	4	Understand the differences among theoretical, practical & simulated results in integrated circuits.
	5	Choose the appropriate integrated circuit modules to build a given application.
	6	Understand the design and working of integrated circuits.

ECC404 Signals and Systems

Name of the course	**CO code**	**Course outcome {CO}**
	1	Understand about various types of signals, classify them, analyze them, and perform various operations on them,
	2	Understand about various types of systems, classify them, analyze them, and perform various operations on them,

Signals and Systems	3	Understand use of transforms in analysis of signals and system in continuous time domain
	4	Understand use of transforms in analysis of signals and system in discrete time domain.
	5	Observe the effect of various properties and operations of signals and systems.
	6	Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behavior of electronic circuits and communication systems.

ECC405 Principle of Communication Engineering

Name of the course	**CO**	**Course outcome (CO)**
Principle of Communication Engineering	1	The different modulation and demodulation techniques used in analog communication.
	2	Identify and solve basic communication problems.
	3	Analyze transmitter and receivers.
	4	Compare and contrast advantages and limitations of analog communication systems.
	5	Understand the Sampling techniques, aliasing error, and aperture effect
	6	Understand the Pulse Modulation and Demodulation

TE E & TC –Semester VI- Course outcome (CO)

ETC601 Digital Communication

Name of the course	**CO code**	**Course outcome (CO)**
Digital Communication	1	Students have an overview of information theory and coding techniques.
	2	Students get an idea of minimum number of bits per symbol required to represent the source and the maximum rate at which a reliable communication can take place over the channel.

	3	Students can describe and determine the performance of different waveform techniques for the generation of digital representation of signals.
	4	Students get an idea of methods to mitigate inter symbol interference in baseband transmission system.
	5	Students can describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.
	6	Students become aware of various spreading techniques and determine bit error performance of various digital communication systems.

ETC602 Discrete Time Signal Processing

Name of the course	**CO code**	**Course outcome {CO}**
Discrete Time Signal Processing	1	Study of sinusoidal, periodic and aperiodic, exponential signals and its responses.
	2	Analyze DFT and FFT and to recover information from signal.
	3	Design and simulate digital filters..
	4	Understand multirate signal processing and its application
	5	Analysis of Finite Word length effects.
	6	Analysis of different applications of Digital Signal processing

ETC603 Computer Communication and Telecom Network

Name of the course	**CO code**	**Course outcome {CO}**
Computer Communication and Telecom Network	1	Assemble the components of a PC and install one or more network operating systems resulting in a functioning.
	2	Designed a small or medium sized computer network including media types, end devices, and interconnecting devices that meets a customer's specific needs.
	3	Performance basic configurations on routers and Ethernet switches.

	4	Learn to simulate computer networks and analyze simulation results.
	5	Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model.
	6	Develop knowledge and skills necessary to gain employment as computer network engineer and network administrator.

ETC604 Television Engineering

Name of the course	**CO code**	**Course outcome {CO}**
Television Engineering	1	Understand fundamental concepts of black and white television.
	2	Understand concepts of color television.
	3	Understand concepts of digital video
	4	Understand working principle of DTH
	5	Describe and differentiate working principle of latest digital TV, HDTV, WDTV.
	6	Understand use & working principles of latest display like LCD, LED, Plasma and large plate panel monitors.

ETC605 - Operating System

Name of the Course	**CO Code**	**Course outcome {CO}**
Operating System	1	Understand the role of an operating system, its function and issues
	2	Compare between different algorithms used for management and scheduling of processes, Memory and input-output operation
	3	Appreciate the role of various productivity enhancing tools.
	4	Understand the UNIX Operating System, its management and security measures.
	5	Compare between LINUX and Windows and basics of LINUX Operating System
	6	Attain the knowledge of various scheduling and algorithms regarding Real Time Operating Systems

ETC606 VLSI Design

Name of the course	CO code	Course outcome (CO)
VLSI Design	1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling
	2	Design MOSFET based logic circuit.
	3	Students able to Draw layout of a given logic circuit.
	4	Students able to Realize logic circuits with different design styles.
	5	Students Demonstrate an understanding of working principle of operation of different types of memories.
	6	Students able to Demonstrate an understanding of working principles of clocking, power reduction and distribution

BE E & TC –Semester VIII- Course outcome (CO)

ETC801 Wireless Network

Name of the course	CO code	Course outcome {CO}
Wireless Network	1	Comprehend the concepts of cellular systems
	2	Learn the planning and design concepts of Wide Area Wireless Network
	3	Understand the fundamental concepts of HSPA system
	4	Study and compare the emerging PAN technologies such as Zig-Bee, Bluetooth etc.
	5	Comprehend the concepts of Wireless Sensor Network
	6	Understand middleware protocols and Network management issues of sensor network.

ETC802 Satellite Communication And Network.

Name of the course	CO code	Course outcome (CO)

Satellite Communication And Network.	1	Students able to learn the dynamics of the satellite.
	2	Students able to understand the communication satellite design.
	3	Students able to understand how analog and digital technologies are used for satellite communication networks.
	4	Students able to learn the design of satellite links.
	5	Students study the design of Earth station and tracking of the satellites
	6	Students able to solve problems related to orbital mechanism, link budget design.

ETC803 Internet and Voice Communication

Name of the Course	CO Code	Course Outcome (CO)
Internet and Voice Communication	1	Implement local area networks using both static and dynamic addressing techniques including sub netting
	2	Install, configure, and troubleshoot server and client operating systems
	3	Disassemble, troubleshoot/debug, upgrade, replace basic components, and reassemble servers and client systems
	4	Explain the concept of encapsulation and its relationship to layering in the network models.
	5	Explain how TCP's byte-stream sliding window is related to a traditional packet-based sliding window algorithm.
	6	Explain the operation of the components of a router including, DHCP, NAT/PAT, Routing function, Switching function and describe how DNS works in the global Internet including caching and root servers

ETE802 Telecom Network Management

Name of the course	**CO code**	**Course outcome {CO}**
Telecom Network	1	Demonstrate broad knowledge of fundamental principles and technical standards underlying
	2	Understand basic of telecommunication, networking and information technologies.

Management	3	Architect and implement networked informative systems.
	4	Continuously improve their technology knowledge and communication skills.
	5	Anticipate the way technological change and emerging technologies might alter the assumptions Underlying architectures and systems.
	6	Understand TMN management services architecture and TNM implementation.

M.E. (Electronics and Telecommunication Engineering):-

Course Outcomes-

First Year- Sem –I

ETC101 Statistical Signal Processing

Name of the course	CO code	Course outcome (CO)
Statistical Signal Processing	1	Understand basics of linear algebra in communication engineering.
	2	Apply appropriate statistical tools for handling design and analysis of systems that involve randomness.
	3	Analyze random processes for LTI systems and estimation theory.
	4	Evaluate role of probability models in engineering design.
	5	Understand Random Variables and Processes
	6	Understand random signals

ETC102 Optical Communication Network

Name of the course	CO code	Course outcome {CO}
Optical Communication Network	1	Apply the fundamental principles of optics and light wave to design optical fiber communication systems.
	2	Identify the issues related to signal degradation due to multiplexing.
	3	Identify working principle of various components of all optical

		network.
	4	Explore concepts of designing and operating principles of modern optical communication systems and networks.
	5	Identify Signal Degradation and fading
	6	Understanding of Optical Fibers

ETC103 Modern Digital Signal Processing Applications

Name of the course	CO code	Course outcome (CO)
Modern Digital Signal Processing Applications	1	Implement adaptive filters for a given application.
	2	Study and apply the techniques of power spectrum estimation and wavelet theory for various applications.
	3	Apply Signal processing tools to biomedical signal processing
	4	Apply Signal processing tools to musical sound processing
	5	Study introduction to Adaptive systems
	6	Apply the techniques of Adaptive Signal Processing and Applications

ETDLO1011 Next Generation Networks

Name of the course	CO code	Course outcome (CO)
Next Generation Networks	1	Relate and compare the core differences between traditional and new telecommunication technologies
	2	Analyze, implement and apply the components of NGN architecture with NGN standards and architectures
	3	NGN Services:Technology,Business and Regulatory Aspects ---
	4	Mobile Next Generation Networks
	5	Transition to NGN and future evolution: NGN business challenges ,
	6	Future packet based network (IPv6 NGN) , NGN evolution

ILO1016 Cyber Security and Laws

Name of the course	CO code	Course outcome (CO)
	1	Understand the concept of cybercrime
	2	Understand the effect of cybercrime on outside world
	3	Interpret IT law in various legal issues

	4	Apply IT law in various legal issues
	5	Distinguish different aspects of cyber law
	6	Apply Information Security Standards compliance during software design and development

First Year- Sem –II

ETC 201 Modern Digital Communication

Name of the course	CO code	Course outcome (CO)
Modern Digital Communication5	1	Explain and implement different source coding techniques.
	2	Analyze waveform receivers for coherent communication.
	3	Analyze waveform receivers for non-coherent communication.
	4	Describe and design of band-limited channels
	5	Evaluate the detection and estimation of signals in the presence of noise.
	6	Explain the characteristics of fading channels.

ETC 202 Wireless Adhoc and Sensor Networks

Name of the course	CO code	Course outcome (CO)
Wireless Adhoc and Sensor Networks	1	Understand and explain the concept of adhoc networks and their applications.
	2	Understand and explain the concept of sensor networks and their applications.
	3	Set up and evaluate performance of various protocols in adhoc networks.
	4	Set up and evaluate performance of various protocols in wireless sensor networks.
	5	Understand TCP performance over adhoc network.
	6	Understand integration of MANET, cellular Network and WLAN.

ETC203 RF and Microwave Engineering

Name of the course	CO code	Course outcome (CO)
RF and Microwave Engineering	1	Characterize devices at higher frequencies.
	2	Design and analyze RF circuits and components.
	3	Design and analyze amplifiers at microwave frequencies.
	4	Design and analyze oscillators at microwave frequencies.
	5	Design and analyze mixers at microwave frequencies.
	6	Demonstrate skills of planning, design and deployment of microwave networks.

ETDLO2022 Network and Cyber Security

Name of the course	CO code	Course outcome (CO)
Network and Cyber Security	1	Describe security threats and apply security techniques using cryptosystems.
	2	Explain the key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.
	3	Build and configure firewall and intrusion detections systems' using GNU open source security tools.
	4	Incorporate approaches for incident analysis and response, for risk management.
	5	Incorporate approaches for best practices and digital evidence collection.
	6	Incorporate approaches for evidentiary reporting in forensic acquisition

ILO2023 Entrepreneurship Development and Management

Name of the course	CO code	Course outcome (CO)
Entrepreneurship Development and Management	1	Understand the concept of business plan
	2	Understand the concept of ownerships
	3	Interpret key regulations of entrepreneurship in India
	4	Interpret legal aspects of entrepreneurship in India
	5	Understand the Indian Environment for Entrepreneurship
	6	Understand government policies for entrepreneurs

(IX) DEPARTMENT OF INFORMATION TECHNOLOGY

Second Year (Information Technology) Sem – III

ITC301 Applied Mathematics III

Name of the course	CO	Course outcome (CO)
Applied Mathematics III	1	Apply the Set theory and Relation Concepts
	2	Apply the Functions and define the recursive functions.
	3	Apply Laplace Transform to different applications
	4	Apply Inverse Laplace Transforms to different application.
	5	Identify the Permutations and combinations To apply the concept of Probability in different practical situations
	6	To acquire the knowledge of Complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytical functions To apply the concept of Mapping in mathematical analysis

ITC302 Logic Design

Name of the course	CO	Course outcome {CO}
Logic Design	1	Understand the concepts of various components to design stable analog circuits.
	2	Represent numbers and perform arithmetic operations.

	3	Minimize the Boolean expression using Boolean algebra and design it using logic gates
	4	Analyze and design combinational circuit.
	5	Design and develop sequential circuits
	6	Translate real world problems into digital logic formulations using VHDL.

ITC303 Data Structures &Analysis

Name of the course	**CO**	**Course outcome (CO)**
Data Structures &Analysis	1	Select appropriate data structures as applied to specified problem definition.
	2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
	3	Students will be able to implement Linear and Nonlinear data structures.
	4	Implement appropriate sorting/searching technique for given problem.
	5	Design advance data structure using Non-Linear data structure.
	6	Determine and analyze the complexity of given Algorithms.

ITC304 Database Management System

Name of the course	CO code	Course outcome (CO)
Database Management System	1	Explain the features of database management systems and Relational database
	2	Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra
	3	Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
	4	Retrieve any type of information from a database by formulating complex queries in SQL.
	5	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

	6	Build indexing mechanisms for efficient retrieval of information from a database

ITC305 Principles ofCommunications

Name of the course	CO	Course outcome (CO)
Principles ofCommunications	1	Differentiate analog and digital communication systems
	2	Identify different types of noise occurred, its minimization and able to apply Fourier analysis in frequency & time domain to quantify bandwidth requirement of variety of analog and digital communication systems.
	3	Design generation & detection AM, DSB, SSB, FM transmitter and receiver.
	4	Apply sampling theorem to quantify the fundamental relationship between channel bandwidth, digital symbol rate and bit rate
	5	Explain different types of line coding techniques for generation and detection of signals.
	6	Describe Electromagnetic Radiation and propagation of waves.

ITL301Digital Design Lab

Name of the course	CO	Lab outcome {LO}
Digital Design Lab	1	Minimize the Boolean algebra and design it using logic gates.
	2	Analyze and design combinational circuit.
	3	Realize given function using combinational circuit.
	4	Design and develop sequential circuits
	5	Implement digital systems using programmable logic devices
	6	Translate real world problems into digital logic formulations using VHDL.

ITC302 Data Structures Lab

Name of the course	CO	Lab outcome {LO}
Data Structures Lab	1	Select appropriate data structures as applied to specified problem definition.
	2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. onvarious data structures.
	3	Students will be able to implement Linear and Non-Linear data structures
	4	Implement appropriate sorting/searching technique for given problem.
	5	Design advance data structure using Non-Linear data structure.
	6	Determine and analyze the complexity of given Algorithms.

ITL303SQL Lab

Name of the course	CO	Course outcome {CO}
SQL Lab	1	Construct problem definition statements for real life applications and implement a database forthe same.
	2	Design conceptual models of a database using ER modeling for real life applications and alsoconstruct queries in Relational Algebra.
	3	Create and populate a RDBMS, using SQL.
	4	Write queries in SQL to retrieve any type of information from a data base
	5	Analyze and apply concepts of normalization to design an optimal database
	6	Implement indexes for a database using techniques like B or B+ trees.

ITL304Java Programming Lab

Name of the course	CO	Course outcome {CO}
Java Programming	1	Implement Object Oriented programming concept using basic syntaxes of control Structures,strings and function for developing skills of logic building activity.

Lab	2	Identify classes, objects, members of a class and the relationships among them needed for afinding the solution to specific problem
	3	Demonstrates how to achieve reusability using inheritance, interfaces and packages anddescribes faster application development can be achieved.
	4	Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
	5	Identify and describe common abstract user interface components to design GUI in Javausing Applet & AWT along with response to events
	6	Identify, Design & develop complex Graphical user interfaces using principal Java Swingclasses based on MVC architecture

Second Year (Information Technology) Sem –IV

ITC401AppliedMathematics IV

Name of the course	CO	Course outcome (CO)
AppliedMathematics IV	1	Apply the Number Theory to different applications using theorem.
	2	Apply probability and understand PDF.
	3	Understand sampling theory and correlation.
	4	Apply the graphs and trees concepts to different applications.
	5	Understand group's theory.
	6	Understand the Lattice theory.

ITC402ComputerNetworks

Name of the course	CO	Course outcome (CO)
ComputerNetworks	1	Describe the functions of each layer in OSI and TCP/IP model.
	2	Explain the functions of Application layer and Presentation layer paradigms and Protocols.
	3	Describe the Session layer design issues and Transport layer services.
	4	Classify the routing protocols and analyze how to assign the IP addresses for the given network.

	5	Describe the functions of data link layer and explain the protocols.
	6	Explain the types of transmission media with real time applications.

ITC403 OperatingSystem

Name of the course	CO code	Course outcome (CO)
Operating System	1	Describe the important computer system resources and the role of operating system intheir management policies and algorithms.
	2	Understand the process management policies and scheduling of processes by CPU
	3	Evaluate the requirement for process synchronization and coordination handled byoperating system
	4	Describe and analyze the memory management and its allocation policies.
	5	Identify use and evaluate the storage management policies with respect to different storage management technologies.
	6	Identify the need to create the special purpose operating system.

ITC404 Computer Organization and Architecture

Name of the course	CO code	Course outcome (CO)
Computer Organization and Architecture	1	Describe basic organization of computer and the architecture of 8086 microprocessor.
	2	Implement assembly language program for given task for 8086 microprocessor
	3	Demonstrate control unit operations and conceptualize instruction level parallelism
	4	Demonstrate and perform computer arithmetic operations on integer and real numbers.
	5	Categorize memory organization and explain the function of

		each element of a memoryhierarchy.
	6	Identify and compare different methods for computer I/O mechanisms.

ITC405 Automata Theory

Name of the course	CO code	Course outcome (CO)
Automata Theory	1	Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.
	2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
	3	Understand, design, analyze and interpret Context Free languages, Expression and Grammars.
	4	Design different types of Push down Automata as Simple Parser.
	5	Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.
	6	Compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions

ITL401Networking Lab

Name of the course	CO	Course outcome {CO}
Networking Lab	1	Execute and evaluate network administration commands and demonstrate their use in different network scenarios
	2	Demonstrate the installation and configuration of network simulator.
	3	Demonstrate and measure different network scenarios and their performance behavior.
	4	Analyze the contents the packet contents of different protocols.

	5	Implement the socket programming for client server architecture.
	6	Design and setup a organization network using packet tracer.

ITL402Unix Lab

Name of the course	CO	Course outcome {CO}
Unix Lab	1	Identify the basic Unix general purpose commands.
	2	Apply and change the ownership and file permissions using advance Unix commands.
	3	Use the awk, grep, perl scripts.
	4	Implement shell scripts and sed.
	5	Apply basic of administrative task.
	6	Apply networking Unix commands.

ITL403Microprocessor programming Lab

Name of the course	CO	Course outcome {CO}
Microprocessor programming Lab	1	Apply the fundamentals of assembly level programming of microprocessors.
	2	Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
	3	Develop the assembly level programming using 8086 loop instruction set.
	4	Write programs based on string and procedure for 8086 microprocessor.
	5	Analyze abstract problems and apply a combination of hardware and software to address the problem
	6	Make use of standard test and measurement equipment to evaluate digital interfaces

ITL404Python Lab

Name of the course	CO	Course outcome {CO}
Python Lab	1	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
	2	Express different Decision Making statements and Functions
	3	Interpret Object oriented programming in Python
	4	Understand and summarize different File handling operations
	5	Explain how to design GUI Applications in Python and evaluate different database operations
	6	Design and develop Client Server network applications using Python

Third Year (Information Technology) Sem –V

TEITC501Computer Graphics & Virtual Reality

Name of the course	CO code	Course outcome (CO)
Computer Graphics & Virtual Reality	1	Students shall have understood basic concepts of computer graphics.
	2	Students shall have understood algorithms to scan convert the basic geometrical primitives, transformations.
	3	Students shall have understood algorithms to scanArea filling, clipping.
	4	Students shall have understood the fundamentals of animation,
	5	Students shall have understood Virtual reality ,the related technologies
	6	Students will learn basics of Virtual Reality Programming Language.

TEITC502 Operating System

Name of the course	CO	Course outcome (CO)
Operating System	1	Student will learn important computer system resources and their management policies, Algorithms used by operating systems
	2	Student will learn algorithms used by operating systems
	3	Student will understandwhat makes a computer system function and the primary PC components.
	4	Student will understand the working of an OS as a manager of various resources.
	5	Student will implementsome of the functions of OS such as scheduling policies.
	6	Student will implement page replacement algorithms, IPC

TEITC503Microcontroller & Embedded Systems

Name of the course	CO code	Course outcome (CO)
Microcontroller & Embedded Systems	1	Ability to understand basic structure embedded systems.
	2	Ability to understand basic structure microcontroller.
	3	Ability to understand basic concepts used in embedded system
	4	Ability to program microcontroller.
	5	Ability to design conceptual embedded system.
	6	Ability to understand basic concept of ARM7

TEITC504Advanced Database Management Systems

Name of the course	CO code	Course outcome (CO)
Advanced Database Management Systems	1	Construct complex queries using SQL to retrieve and manipulate information in a database.
	2	Design and implement full-fledged real life applications integrated with database systems.

	3	Clearly understand how databases are actually stored and accessed; How transaction ACID properties are maintained and how a database recovers from failures.
	4	Apply security controls to avoid any type of security incidents on vital database systems.
	5	Design advanced data systems using Object based systems or Distributing databases for better resource management.
	6	Understand the importance of enterprise data and be able to organize data to perform analysis on the data and take strategic decisions.

TEITC505Open Source Technologies

Name of the course	**CO code**	**Course outcome (CO)**
Open Source Technologies	1	To develop android applications.
	2	To install and work on Linux.
	3	To perform Shell Programming
	4	To Develop Android programming
	5	To perform shell programming
	6	To understand open source Tools

TEITC505Business Communication and Ethics*

Name of the course	**CO code**	**Course outcome (CO)**
Business Communication and Ethics*	1	Communicate effectively in both verbal and written form.
	2	Demonstrate knowledge of professional and ethical responsibilities
	3	Participate and succeed in Campus placements.
	4	Participate and succeed in competitive examinations like GATE, CET.
	5	Possess entrepreneurial approach and ability for lifelong

		learning.
	6	Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues

Third Year (Information Technology) Sem –VI

TEITC601 Software Engineering

Name of the course	CO code	Course outcome (CO)
Software Engineering	1	Meet the Information Technology Program Objectives of identifying and solving engineering problems
	2	To understand principles, concepts, methods, and techniques of the software engineering approach to producing quality software for large, complex systems.
	3	To function effectively as a member of a team engaged in technical work.
	4	To think critically about ethical and social issues in software engineering for different applications
	5	To understand various perspectives on software quality
	6	To understand Metrics for Process and Projects

TEITC602 Distributed Systems

Name of the course	CO code	Course outcome (CO)
Distributed Systems	1	The student gains clear understanding of fundamental principles of Distributed Systems along with design and implementation of key mechanisms, Clock Synchronization.
	2	The student understands Election Algorithms, Mutual Exclusion, Message Communication, Process and Resource Scheduling etc.
	3	The student understands the message communication, remote procedure call and Remote method invocation (RPC and RMI) along with group communication.
	4	Emphasis is on developing applications using current distributed computing

		technologies like EJB.
	5	Emphasis is on developing applications using current distributed computing technologies like CORBA and .NET.
	6	Student should be able to develop/design distributed system/applications for an enterprise using SOA

TEITC603 System And Web Security

Name of the course	CO code	Course outcome {CO}
System And Web Security	1	Differentiate between authentication and authorization;
	2	Explain the basic idea behind access control and compare the various access control policies and models.
	3	Explain the need for security protocols in the context of use with Internet-basedapplications
	4	Explain the basic idea behind firewalls and intrusion detection systems and how they work
	5	Explain malicious software and typical software solutions used in dealing with virusesand worms
	6	Understand and explain various issues related to program security and web security.

TEITC604 Data Mining and Business Intelligence

Name of the course	CO code	Course outcome (CO)
Data Mining and Business Intelligence	1	Demonstrate an understanding of the importance of data mining
	2	Demonstrate an understanding of the importance the principles of business intelligence
	3	Able to prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files.
	4	Implement the appropriate data mining methods like classification, clustering orassociation mining on large data sets.
	5	Define and apply metrics to measure the performance of various data mining

		algorithms.
	6	Apply BI to solve practical problems : Analyze the problem domain, use the datacollected in enterprise apply the appropriate data mining technique, interpret andvisualize the results and provide decision support.

TEITC605 Advanced Internet Technology

Name of the course	CO code	Course outcome (CO)
Advanced Internet Technology	1	Develop Keyword Generation, Using Google Analytics etc.
	2	To demonstrate Responsive Web Design.
	3	To demonstrate Amazon/Google or yahoo mashup.
	4	To enable students to determine SEO Objective
	5	To develop SEO plan prior to Site Development
	6	To understand the characteristic of RIA

Final Year (Information Technology) Sem –VII

BEITC701Software Project Management

Name of the Course	CO Code	Course Outcome (CO)
Software Project Management	1	Articulate similarities and differences between IT projects and other types of projects. Justify an IT project by establishing a business case
	2	Develop a project charter. Develop a work breakdown structure for an IT project Estimate resources (time, cost, human being, etc.)
	3	Establish task inter-dependencies, Construct and analyze a network diagram
	4	Identify IT project risks and develop risk mitigation strategies
	5	Ensure the quality of the project using various standards
	6	Demonstrate Team work and team spirit and how to overcome the conflicts

BEITC702Cloud Computing

Name of the course	CO code	Course outcome (CO)
Cloud Computing	1	Differentiate different computing techniques.
	2	Compare various cloud computing providers/ Software
	3	Handle Open Source Cloud Implementation and Administration.
	4	Handle Open Source Cloud Administration.
	5	Understand risks involved in cloud computing.
	6	To understand Virtualization concept

BEITC703Intelligent System

Name of the course	CO code	Course outcome {CO}
Intelligent System	1	Students will develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
	2	Students will be able to choose an appropriate problem-solving method and knowledge-representation scheme.
	3	Students will develop an ability to analyze and formalize the problem (as a state space, graph, etc.) and select the appropriate search method.
	4	Students will be able to develop/demonstrate/ build simple intelligent systems.
	5	Students will learn to define and simulate intelligence.
	6	Students will be able to develop/demonstrate/ build classical toy problems using different AI techniques

BEITC704Wireless Technology

Name of the course	CO code	Course outcome (CO)
Wireless Technology	1	Understand the new trends in mobile/wireless communications networks
	2	Understand the characteristics of mobile/wireless communication channels
	3	Understand the multiple radio access techniques
	4	Understand the multiuser detection techniques
	5	Understand various wireless networks and their technologies
	6	Understand need of securities and economies in wireless systems

BEITC705- E - COMMERCE AND E - BUSINESS

Name of the Course	CO Code	Course Outcome (CO)
E - Commerce and E - Business	1	Graduates will be able to design and conduct experiments.
	2	To understand technical aspect of E-commerce and E-Business
	3	To describe the process of E-commerce and E-business
	4	To understand Infrastructure design issues of E-commerce
	5	Graduates will be able to analyze and interpret the technological, user, network requirements for developing the various modules of e commerce/business site
	6	Graduates will be able to apply the knowledge gained and modern engineering tools in their application domain

Final Year (Information Technology) Sem –VIII

BEITC801Storage Network Management and Retrieval

Name of the course	**CO code**	**Course outcome {CO}**
Storage Network Management and Retrieval	1	Students will be able to evaluate storage architectures, including storage subsystems, SAN, NAS, and IP-SAN.
	2	Students will be able to define backup, recovery.
	3	To understand the information retrieval system as per different application in storage networks.
	4	Examine emerging technologies including IP-SAN.
	5	Define information retrieval in storage network.
	6	Identify different storage virtualization technologies.

BEITC802Big Data Analytics

Name of the course	**CO code**	**Course outcome {CO}**

Big Data Analytics	1	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
	2	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
	3	To have skills that will help students to solve complex real-world problems in for decision support.
	4	Interpret business models and scientific computing paradigms.
	5	Apply software tools for big data analytics.
	6	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc

BEITC803Computer Simulation and Modeling

Name of the course	**CO code**	**Course outcome {CO}**
Computer Simulation and Modeling	1	Understand the meaning of simulation and its importance in business, science, engineering, industry and services
	2	Identify the common applications of discrete-event system simulation. Practice formulation and modeling skills.
	3	Understand simulation languages. An ability to perform a simulation using spreadsheets as well as simulation language/package
	4	Ability to analyze events and inter-arrival time, arrival process, queuing strategies, resources and disposal of entities
	5	Ability to generate pseudorandom numbers using the Linear Congruential Method. Ability to perform statistical tests to measure the quality of a pseudorandom number generator
	6	Ability to define random variate generators for finite random variables. Ability to analyze and fit the collected data to different distributions

BEITC8046Software Testing & Quality Assurance

Name of the course	CO code	Course outcome (CO)
Software Testing & Quality Assurance	1	Identify the reasons for bugs and analyze the principles in software testing to prevent and remove bugs.
	2	Implement various test processes for quality improvement
	3	Apply the software testing techniques in commercial environments
	4	Provides practical knowledge of a variety of ways to test software and an understanding of some of the trade-offs between testing techniques.
	5	Familiar with the open source testing tools.
	6	Students will be able to write different test plans.

(X) Second Year (MECHANICAL ENGINEERING)- Sem III

MEC301Applied Mathematics III

Name of the course	CO	Course outcome (CO)
Applied Mathematics III	1	Demonstrate the ability of using Laplace Transform in solving the Ordinary Differential Equations and Partial Differential Equations
	2	Demonstrate the ability of using Fourier Series in solving the Ordinary Differential Equations and Partial Differential Equations
	3	Solve initial and boundary value problems involving ordinary differential equations
	4	Identify the analytic function, harmonic function, orthogonal trajectories
	5	Apply bilinear transformations and conformal mappings
	6	Identify the applicability of theorems and evaluate the contour integrals

MEC302 Thermodynamics

Name of the course	CO	Course outcome (CO)
Thermodynamics	1	Demonstrate application of the laws of thermodynamics to wide range of

		systems
	2	Write steady flow energy equation for various flow and non-flow thermodynamic systems
	3	Compute heat and work interactions in thermodynamics systems
	4	Demonstrate the interrelations between thermodynamic functions to solve practical problems.
	5	Use steam table and mollier chart to compute thermodynamics interactions
	6	Compute efficiencies of heat engines, power cycles etc.

MEC302Strength of Materials

Name of the course	**CO**	**Course outcome (CO)**
Strength of Materials	1	Demonstrate fundamental knowledge about various types of loading and stresses induced
	2	Draw the SFD and BMD for different types of loads and support conditions
	3	Analyse the stresses induced in basic mechanical components.
	4	Estimate the strain energy in mechanical elements
	5	Analyse the deflection in beams.
	6	Analyse buckling and bending phenomenon in columns

MEC304Material Technology

Name of the course	**CO**	**Course outcome (CO)**
Material Technology	1	Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms .

	2	Demonstrate understanding of various failure mechanisms of materials.
	3	Interpret Iron-Iron carbide phase diagram, and different phases in microstructures of materials at different conditions.
	4	Select appropriate heat treatment process for specific applications
	5	5. Identify effect of alloying elements on properties of steels
	6	6. Illustrate basics of composite materials, Nano- materials and smart materials.

MEL301Computer Aided Machine Drawing

Name of the course	CO	Course outcome (CO)
Computer Aided Machine Drawing	1	Visualize and prepare detail drawing of a given object.
	2	Read and interpret the drawing
	3	Draw details and assembly of different mechanical systems.
	4	Convert detailed drawing into assembly drawing using modelling software
	5	Convert assembly drawing into detailed drawing using modelling software
	6	Prepare detailed drawing of any given physical object/machine element with actual measurements

MEL305Strength of Materials

Name of the course	CO	Course outcome (CO)
Strength of Materials	1	Analyse the stress - strain behaviour of materials.
	2	Measure ultimate tensile/compression strength of material
	3	Measure torsional strength of material.
	4	Perform impact test using Izod and Charpy method

	5	Measure the hardness of materials
	6	Perform flexural test with central and three point loading conditions

MEL303 Materials Technology

Name of the course	CO	Course outcome (CO)
Materials Technology	1	Demonstrate the understanding of the procedure to prepare samples for studying microstructure using microscope
	2	Interpret different phases present in different plain carbon steels and cast irons. metallographic
	3	Perform different heat treatment processes for a steel and observe microstructures in these conditions.
	4	Identify effects of Annealing, Normalizing and Hardening on microstructure of medium carbon steel
	5	Determine hardenability of steel using Jominy end Quench test
	6	Demonstrate the understanding of the procedure to prepare samples for studying microstructure using microscope

MEL304 Machine Shop Practice-I

Name of the course	CO	Course outcome (CO)
Machine Shop Practice-I	1	Operate various machines like lathe, shaper etc
	2	Perform plain turning, taper turning, and screw cutting etc. on lathe machine.
	3	Perform machining operations on shaper
	4	Demonstrate metal joining process like compressive welding.
	5	Perform forging operations
	6	Perform shaping operations

Second Year (Mechanical Engineering)- Sem IV

MEC401 Applied Mathematics IV

Name of the course	CO	Course outcome (CO)
Applied Mathematics IV	1	Solve the system of linear equations using matrix algebra with rules
	2	Demonstrate basics of vector calculus specific
	3	Apply the concept of probability distribution and sampling theory to engineering problems
	4	Apply principles of vector calculus to the analysis of engineering problems
	5	Identify, formulate and solve engineering problems its
	6	Illustrate basic theory of correlations and regression

MEC402 Fluid Mechanics

Name of the course	CO	Course outcome (CO)
Fluid Mechanics	1	Define properties of fluids and classification of
	2	Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies
	3	Formulate and solve equations of the control volume for fluid flow systems
	4	Apply Bernoulli's equation to various flow measuring devices
	5	Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces fluids
	6	Apply fundamentals of compressible fluid flows to relevant systems.

MEC403 Industrial Electronics

Name of the course	CO	Course outcome (CO)
Industrial Electronics	1	Illustrate construction, working principles and applications of power electronic switches
	2	dentify rectifiers and inverters for dc and ac motor speed control

	3	Develop circuits using OPAMP and timer IC555
	4	Identify digital circuits for industrial applications
	5	Illustrate the knowledge of basic functioning of microcontroller
	6	Analyse speed-torque characteristics of electrical machines for speed control

MEC404 Production Process II

Name of the course	**CO**	**Course outcome (CO)**
Production Process II	1	Demonstrate understanding of metal cutting principles and mechanism
	2	Identify cutting tool geometry of single point and multipoint cutting tool
	3	Demonstrate various concepts of sheet metal forming operations
	4	Demonstrate concepts and use of jigs and fixtures
	5	Illustrate various non-traditional machining techniques
	6	Illustrate concepts and applications of additive manufacturing

MEC405 Kinematics of Machinery

Name of the course	**CO**	**Course outcome (CO)**
Kinematics of Machinery	1	Define various components of
	2	Develop mechanisms to provide specific motion mechanisms

	3	Draw velocity and acceleration diagrams of various mechanisms
	4	Draw Cam profile for the specific follower motion
	5	Analyse forces in various gears
	6	Select appropriate power transmission for specific application.

MEL401 Data Base and Information Retrieval

Name of the course	**CO**	**Course outcome (CO)**
Data Base and Information Retrieval	1	Identify data models and schemes in DBMS
	2	Demonstrate the features of database management systems and Relational database
	3	Use SQL- the standard language of relational databases
	4	Demonstrate understanding of functional dependencies and design of the database
	5	Design graphical user Interface for specific application
	6	Create visual software entities

MEL402 Fluid Mechanics

Name of the course	**CO**	**Course outcome (CO)**
Fluid Mechanics	1	Calibrate different gauges.
	2	Measure hydrostatic forces
	3	Verify the Archimedes Principle
	4	Calibrate Venturimeter, Orificemeter and Pitot tube
	5	Verify the Bernoulli's Principle

	6	Read manometers and maintain them

MEL403 Industrial Electronics

Name of the course	CO	Course outcome (CO)
Industrial Electronics	1	Demonstrate characteristics of various electrical and electronics components
	2	Develop simple applications built around these components
	3	identify use of different basic gates
	4	Identify and use digital circuits for industrial applications
	5	Built and demonstrate basic parameter measurement using microcontroller
	6	Test and Analyse speed-torque characteristics of electrical machines for speed control.

MEL404Kinematics of Machinery

Name of the course	CO	Course outcome (CO)
Kinematics of Machinery	1	Draw velocity diagram by instantaneous center method
	2	Draw velocity and acceleration diagrams for four bar mechanism by relative method.
	3	Draw velocity and acceleration diagrams for Slider crank mechanism by relative method
	4	Draw Cam profile for the specific follower motion
	5	Plot displacement-time, velocity-time, acceleration-time cam profiles
	6	Develop and build mechanisms to provide specific motion

MEL405Machine Shop Practice – II

Name of the course	CO	Course outcome (CO)
Machine Shop Practice – II	1	Operate lathe machine,
	2	Perform shaping operations
	3	Perform finishing operations on grinding machine
	4	Perform milling operations.
	5	Perform precision turning
	6	Perform drilling and threading operations.

Third Year (Mechanical Engineering)- Sem V

MEC 501IC Engines

Name of the course	CO	Course outcome (CO)
IC Engines	1	Differentiate SI and CI engines
	2	Identify and explain working of engines components/systems
	3	Plot and analyze engine performance characteristic
	4	Perform exhaust gas analysis and comment on adverse implications on environment
	5	Illustrate emission norms and emission control
	6	Comprehend the different technological advances in engines and alternate fuels

MEC 502Mechanical Measurement and Control

Name of the course	CO	Course outcome (CO)
Mechanical Measurement and Control	1	Identify and select proper measuring instrument for specific application
	2	Illustrate working principle of measuring instruments
	3	Explain calibration methodology and error analysis related to measuring instruments

	4	Mathematically model and analyze system/process for standard input responses
	5	Analyse error and differentiate various types of control systems and time domain specifications
	6	Analyse the problems associated with stability

MEC 503Production Process – III

Name of the course	**CO**	**Course outcome (CO)**
Production Process – III	1	Demonstrate understanding of sheet metal forming and various stress systems involved in metal forming operations..
	2	Design jigs and fixtures for a given applications
	3	Get knowledge about non-conventional machining operations and its application areas.
	4	Illustrate advanced concepts such as rapid prototyping and Agile manufacturing.
	5	Get knowledge about conventional machining operations and its application areas.
	6	Design and Analysis of jigs and fixtures for a given applications

MEC 504Theory of Machines-II

Name of the course	**CO**	**Course outcome (CO)**
Theory of Machines-II	1	Apply the working principles of clutches and its constructional details.
	2	Analyze working of brakes and dynamometers
	3	Demonstrate working mechanism of different types of governors.
	4	Analyze and select gear trains.

	5	Analyze gyroscopic effect on various applications
	6	Analyze and select Cams trains.

MEC 505Heat transfer

Name of the course	CO	Course outcome (CO)
Heat Transfer	1	Identify & explain the three modes of heat transfer (conduction, convection and radiation).
	2	Develop mathematical model for each mode of heat transfer
	3	Demonstrate and explain mechanism of boiling and condensation
	4	Design and analyze different heat exchangers
	5	Demonstrate and explain mechanism of boiling and condensation
	6	Analyse different heat exchangers and quantify their performance

MEC 506Business Communication & Ethics

Name of the course	CO	Course outcome (CO)
Business Communication & Ethics	1	communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical
	2	Participate and succeed in Campus placements and competitive examinations like GATE, CET. responsibilities
	3	Possess entrepreneurial approach and ability for life-long learning.
	4	Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.
	5	Writing the Project Report.
	6	Presentation Skill.

Third Year (Mechanical Engineering)- Sem VI

MEC601Metrology and Quality Engineering

Name of the course	CO	Course outcome (CO)
Metrology and Quality Engineering	1	Apply inspection gauge and checking systems.
	2	Demonstrate the understanding of purpose of critical dimensions in manufacturing.
	3	Analyse simple parts for dimensional accuracy and functionality
	4	Identify press tool requirements to build concepts pertaining to design of press tools
	5	Illustrate the different sampling techniques in quality control
	6	Illustrate different non destructive techniques used for quality evaluation

MEC 602Machine Design-I

Name of the course	CO	Course outcome (CO)
Machine Design-I	1	Demonstrate understanding of various design considerations
	2	Apply basic principles of machine design
	3	Design machine elements on the basis of strength concept
	4	Use design data books and various standard codes of practices.
	5	Acquire skill in preparing production drawings pertaining to various designs.
	6	Acquire skill in preparing production drawings pertaining to various designs

MEC 603Mechanical Vibration

Name of the course	CO	Course outcome (CO)

Mechanical Vibration	1	Develop mathematical model to represent
	2	Estimate natural frequency of mechanical element/system
	3	Analyze vibratory response of mechanical element/system dynamic
	4	Estimate the parameters of vibration isolation system
	5	Control the vibrations to the acceptable level using basic vibration principles
	6	Handle the vibration measuring instruments

MEC 604Thermal and Fluid Power Engineering

Name of the course	**CO**	**Course outcome (CO)**
Thermal and Fluid Power Engineering	1	Identify utilities of thermal and hydraulic energy
	2	Differentiate impulse and reaction turbines
	3	Analyze performance of turbines
	4	Analyze and calculation of basic principles of fans and blowers
	5	Analyze fan/blower and analyse its performance
	6	Analyze and Identify a compressor and analyse its performance

MEC 605Mechatronics

Name of the course	**CO**	**Course outcome (CO)**
Mechatronics	1	Identify the suitable sensor and actuator for a mechatronics system
	2	Develop the skill required for interfacing the electromechanical system
	3	Indigenously design and develop a mechatronic system
	4	Design hydraulic/pneumatic circuits
	5	Analyse continuous control logics for standard input conditions
	6	Design a mechatronic system

MEC 606Finite Element Analysis

Name of the course	CO	Course outcome (CO)
Finite Element Analysis	1	Solve ordinary and partial differential equations using the Galerkin method.
	2	Develop the finite element equations to model engineering problems governed by 2nd order partial differential equations.
	3	Apply the basic finite element formulation techniques to solve engineering problems.
	4	Use commercial FEA software, to solve problems related to mechanical engineering
	5	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements
	6	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system

Fourth Year (Mechanical Engineering)- Sem VII

MEC 701Machine Design – II

Name of the course	CO	Course outcome (CO)
Machine Design – II	1	Select appropriate gears for power transmission on the basis of given load and speed
	2	Design gears based on the given conditions
	3	Select bearings for a given applications from the manufacturers catalogue
	4	Select and/or design belts and flywheel for given applications.
	5	Design cam and follower mechanisms
	6	Design clutches and brakes

MEC 702CAD/CAM/CAE

Name of the course	CO	Course outcome (CO)
CAD/CAM/CAE	1	Identify proper computer graphics techniques for geometric modelling
	2	Transform, manipulate objects & store and manage data
	3	CAM Tool path Creation and NC
	4	Use rapid prototyping and tooling concepts in any real life applications
	5	Identify the tools for Analysis of a complex engineering component
	6	Identify the tools for Analysis of a complex engineering component.

MEC 703Mechanical Utility System

Name of the course	CO	Course outcome (CO)
Mechanical Utility System	1	Identify proper computer graphics techniques for geometric modelling
	2	Transform, manipulate objects & store and manage data
	3	CAM Tool path Creation and NC
	4	Use rapid prototyping and tooling concepts in any real life applications
	5	Identify the tools for Analysis of a complex engineering component

MEC 704Production Planning and Control

Name of the course	CO	Course outcome (CO)
Production Planning and Control	1	Illustrate production planning functions and manage manufacturing functions in a better way
	2	Develop competency in scheduling and sequencing of manufacturing operations
	3	Forecast the demand of the product and prepare an aggregate plan
	4	Develop the skills of Inventory Management and cost effectiveness
	5	Create a logical approach to Line Balancing in various production systems

	6	Implement techniques of manufacturing planning and control

MEE7019 Operations Research

Name of the course	CO	Course outcome (CO)
Operations Research	1	Understand the theoretical workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness
	2	Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change
	3	Solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems
	4	Understand the applications of integer programming and a queuing model and compute important performance measures
	5	Solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems.
	6	Understand the applications of integer programming and a queuing model and compute important performance measures

MEE 7012Power Plant Engineering

Name of the course	CO	Course outcome (CO)
Power Plant Engineering	1	Comprehend various equipment/systems utilized in power plants
	2	Demonstrate site selection methodology, construction and operation of Hydro Electric Power Plants
	3	Discuss working, site selection, advantages, disadvantages of steam power plants

	4	Discuss operation of Combined Cycle Power Plants
	5	Discuss types of reactors, waste disposal issues in nuclear power plants
	6	Illustrate power plant economics

Fourth Year (Mechanical Engineering)- Sem VIII

MEC801 Design of Mechanical Systems

Name of the course	**CO**	**Course outcome (CO)**
Design of Mechanical Systems	1	Apply the concept of system design
	2	Design material handling systems such as hoisting mechanism of EOT crane
	3	Design belt conveyor systems
	4	Design engine components such as cylinder, piston, connecting rod and crankshaft
	5	Design pumps for the given applications
	6	Prepare layout of machine tool gear box and select number of teeth on each gear

MEC802 Industrial Engineering and Management

Name of the course	**CO**	**Course outcome (CO)**
Industrial Engineering and Management	1	Illustrate the need for optimization of resources and its significance
	2	Develop ability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products
	3	Demonstrate the concept of value analysis and its relevance
	4	Manage and implement different concepts involved in method study and understanding of work content in different situations
	5	Describe different aspects of work system design and facilities design

		pertinent to manufacturing industries
	6	Illustrate concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing

MEC803 RAC (Refrigeration and Air Conditioning)

Name of the course	**CO**	**Course outcome (CO)**
RAC	1	Compute heat interactions in combustion of reactive mixtures
	2	Differentiate boilers, boiler mountings and accessories
	3	Calculate boiler efficiency and assess boiler performance
	4	Demonstrate working cycles of gas turbines
	5	Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency
	6	Demonstrate basic working of pumps

MEE8026 Automobile Engineering

Name of the course	**CO**	**Course outcome (CO)**
Automobile Engineering	1	Compute heat interactions in combustion of reactive mixtures
	2	Differentiate boilers, boiler mountings and accessories
	3	Calculate boiler efficiency and assess boiler performance
	4	Demonstrate working cycles of gas turbines
	5	Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency
	6	Demonstrate basic working of pumps

MEE8022 Renewable Energy Sources

Name of the course	CO	Course outcome (CO)
Automobile Engineering	1	Compute heat interactions in combustion of reactive mixtures
	2	Differentiate boilers, boiler mountings and accessories
	3	Calculate boiler efficiency and assess boiler performance
	4	Demonstrate working cycles of gas turbines
	5	Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency
	6	Demonstrate basic working of pumps

(II) SE Bio-Medical –Semester III

Program Specific Outcomes (PSOs)

PSO1	To impart technical knowledge and competency skills to perform in various areas like sales & marketing, product engineering, research & development, hospital administration, regulatory affairs and also to venture into entrepreneurship..
PSO2	Develop proficiency in various soft skills and bring awareness about social obligations and professional ethics to pursue professional career in a healthcare industry.
PSO3	Motivate to pursue research and specialization in a plethora of domains in the field of Biomedical Engineering covering disciplines such as, Medical Instrumentation, Neuroscience, Computational Engineering, Robotics Engineering, Medical Signal and Image processing, Rehabilitation Engineering, VLSI, Nanotechnology and Biosensors, etc.

(III) DEPARTMENT OF BIOTECHNOLOGY

Departmental PSO's

PSO 1	Understand & design the complex engineering problems and need for sustainable development.
PSO 2	Use of appropriate techniques of modern engineering & it's tools for the public health and safety
PSO 3	Use research-based knowledge and research methods to provide valid conclusions on recent technologies

III\\V) DEPARTMENT OF CHEMICAL ENGINEERING

Program Specific Outcomes (PSOs)

PSO1	The ability to identify, formulate and solve chemical engineering problems
PSO2	The ability to design a process that meets desired specifications with consideration of environmental, safety, economic and ethical criteria.
PSO3	An appreciation of contemporary issues relevant to chemical engineering

(V) Department of Civil Engineering

SE Civil Engineering –Semester III

Program Specific Outcomes (PSOs)

PSO1	The Graduates of this programme with proficiency in mathematics and physical science will excel in the core area of Civil Engineering such as structural, environmental and water resource engineering.
PSO2	The graduate will plan, produce, detailed drawings, write specification, and prepare cost estimates
PSO3	The graduates will interact with stakeholders effectively and execute quality construction work applying necessary tools
PSO4	To understand the impact of civil engineering solution on environment and demonstrate the knowledge of need for sustainable development.

(V) Department of Computer Engineering.

Program Specific Outcomes (PSOs)

PSO1	Acquire skills to design, analyse and develop algorithms and implement them using high-level programming languages
PSO2	Contribute their engineering skills in computing and information engineering domains like network design and administration, database design and knowledge engineering.
PSO3	Develop strong skills in systematic planning, developing, testing implementing and providing IT solutions for different domains which helps in the betterment of life.

(VII) Department of Electrical Engineering

PSO1	Design and analyse the power system that efficiently generate , transmit and distribute electrical power.
PSO2	Design and simulate modern electric control system and its specification.
PSO3	Understand the principle and construction of electrical machine and application .

(VIII) DEPARTMENT OF ELECRONICS AND TELECOMMUNICATIONS

Program Specific Outcomes (PSOs)

PSO1	Analyze specific engineering problems and design analog & digital systems for a given specification and function.
PSO2	Implement functional blocks of hardware-software co-designs for signal processing and communication applications USING applying modern tools FOR Public Domain Applications.
PSO3	Associate the learning from the courses to arrive at solutions to real world problem.

(IX) (Information Technology)

Second Year- Sem –III

PSO 1	Analyze real life problems and design user friendly solutions.
PSO 2	To provide effective solutions for problems in sectors like healthcare, science, commerce, e-governance etc., by employing right set of tools and methodologies.
PSO 3	Design and implement right IT infrastructural setups for any organization.

(X) Second Year (Mechanical Engineering) Sem – III

PSO 1	Identify, formulate and analyze complex mechanical engineering problems and propose substantial conclusion.
PSO 2	Understand the impact of mechanical engineering solution on environment and demonstrate the knowledge of need for sustainable development.
PSO 3	Apply ethical principles and be committed to professional ethics, responsibilities and

	norms of mechanical engineering practices.