Department of Electronica and Communication Engineering

The course outcomes along with POs and PSOs mapping tables are shown below for the R22 regulation

II YEAR : I SEM

Course Name: Numerical Methods and Complex Variables-22MA305BS	**R22**
After completion of course the student will be able to	
C201.1	**Apply** Fourier series and Fourier transforms to **analyze** and solve engineering problems involving periodic and non-periodic signals.
C201.2	**Utilize** numerical methods such as root-finding techniques and interpolation methods to solve polynomial and transcendental equations and perform data fitting.
C201.3	**Implement** numerical integration and differential equation-solving techniques for engineering applications involving continuous functions.
C201.4	**Analyze** complex functions using differentiation techniques, including Cauchy-Riemann equations, Milne-Thomson methods, and conformal mappings.
C201.5	**Evaluate** complex integrals using contour integration techniques, including Cauchy's theorem, Cauchy's integral formula, and the residue theorem for engineering applications.

Course Name: Numerical Methods and Complex Variables-22MA305BS									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C201.1	3	3	3	3	-	-	-	-	-	-	-	-
C201.2	3	3	2	-	-	-	-	-	-	-	-	-
C201.3	3	3	2	-	-	-	-	-	-	-	-	-
C201.4	3	3	3	-	-	-	-	-	-	-	-	-
C201.5	3	3	3	-	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.6**	**3.0**	-	-	-	-	-	-	-	-

Course Name: Numerical Methods and Complex Variables-22MA305BS		
CO	**PSO1**	**PSO2**
C201.1	-	-
C201.2	-	-
C201.3	-	-
C201.4	-	-
C201.5	-	-
Average	-	-

Course Name: Analog Circuits- 22EC304PC		**R22**
After completion of course the student will be able to		
C202.1	**Understand and analyze** various BJT biasing techniques and their impact on amplifier stability and performance.	
C202.2	**Demonstrate** the ability to design and **analyze** FET and MOSFET amplifiers, including frequency response and performance comparison with BJTs.	
C202.3	**Evaluate** the performance of multistage amplifiers, **analyze** frequency response, and **understand** high-frequency transistor models.	
C202.4	**Explain and analyze** different feedback amplifier configurations and their effects on amplifier performance.	
C202.5	**Understand** and design various oscillator circuits, also **analyze** the conditions required for oscillation and stability.	

Course Name: Analog Circuits- 22EC304PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C202.1	3	3	2	2	-	-	-	-	-	-	-	-
C202.2	3	3	3	2	-	-	-	-	-	-	-	-
C202.3	3	3	3	3	-	-	-	-	-	-	-	-
C202.4	3	3	2	2	-	-	-	-	-	-	-	-
C202.5	3	3	3	2	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.6**	**2.2**	-	-	-	-	-	-	-	-

Course Name: Analog Circuits- 22EC304PC		
CO	**PSO1**	**PSO2**
C202.1	3	-
C202.2	-	3
C202.3	-	-
C202.4	-	-
C202.5	-	-
Average	**3.0**	**3.0**

Course Name: Network analysis and Synthesis-22EC306PC	**R22**
After completion of course the student will be able to	
C203.1	**Understand and analyze** network topology, magnetic circuits, impedance transformation, and coupled circuits in electrical networks.
C203.2	**Apply** transient and steady-state analysis techniques to RC, RL, and RLC circuits, and design for given specifications.
C203.3	**Analyze and design** two-port network parameters and their applications in attenuators and impedance matching networks.
C203.4	Classify and **design** various filters and attenuators, **understanding** their frequency response and applications.
C203.5	**Synthesize** electrical networks using different methods, including Hurwitz polynomials and Foster and Cauer synthesis techniques.

Course Name: Network analysis and Synthesis-22EC306PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C203.1	3	3	-	-	-	-	-	-	-	-	-	-
C203.2	3	3	3	2	-	-	-	-	-	-	-	-
C203.3	3	3	2	-	-	-	-	-	-	-	-	-
C203.4	3	3	3	-	-	-	-	-	-	-	-	-
C203.5	3	3	3	3	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.75**	**2.5**	-	-	-	-	-	-	-	-

Course Name: Network analysis and Synthesis-22EC306PC		
CO	**PSO1**	**PSO2**
C203.1	-	-
C203.2	-	-
C203.3	-	-
C203.4	-	-
C203.5	-	-
Average	-	-

Course Name: Digital Logic Design- 22EC307ES	**R22**
After completion of course the student will be able to	
C204.1	**Understand and apply** number systems, Boolean algebra, logic gates, and universal gate realizations in digital circuit design.
C204.2	**Analyze** and optimize Boolean functions using K-map and tabular methods, and comprehend the working of various logic families and IC interfacing.
C204.3	**Design and implement** combinational logic circuits and sequential circuits, including flip-flops and timing considerations.
C204.4	**Analyze and design** shift registers, synchronous and asynchronous counters, and synthesis of finite state machines for various applications.
C204.5	**Analyze** FSM capabilities and limitations, state minimization techniques, and asynchronous design concepts like hazards and burst mode circuits.

Course Name: Digital Logic Design- 22EC307ES									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C204.1	3	3	2	-	-	-	-	-	-	-	-	-
C204.2	3	3	3	-	-	-	-	-	-	-	-	3
C204.3	3	3	3	-	-	-	-	-	-	-	-	-
C204.4	3	3	3	-	-	-	-	-	-	-	-	2
C204.5	3	3	2	-	-	-	-	-	-	-	-	-
Average	**3**	**3**	**2.6**	**-**	-	-	-	-	-	-	-	**2.5**

Course Name: Digital Logic Design- 22EC307ES		
CO	**PSO1**	**PSO2**
C204.1	2	3
C204.2	-	3
C204.3	3	3
C204.4	-	3
C204.5	-	3
Average	**2.5**	**3.0**

Course Name: Signals and Systems- 22EC309PC	**R22**
After completion of course the student will be able to	
C205.1	**Analyze and approximate** signals using orthogonal functions and **understand** fundamental signal classifications and operations.
C205.2	**Apply** Fourier series and Fourier transforms to **analyze** continuous-time signals, including periodic and non-periodic signals.
C205.3	**Design and Evaluate** LTI systems for the given requirements using impulse response and transfer functions.
C205.4	**Utilize** Laplace and Z-transforms to **analyze and design** systems in continuous and discrete domains, focusing on their properties and region of convergence
C205.5	**Apply** sampling theory and correlation analysis to reconstruct signals from samples and **understand** the effects of sampling on signal integrity.

Course Name: Signals and Systems- 22EC309PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C205.1	3	3	2	-	-	-	-	-	-	-	-	-
C205.2	3	3	3	3	-	-	-	-	-	-	-	-
C205.3	3	3	3	3	-	-	-	-	-	-	-	-
C205.4	3	3	3	2	-	-	-	-	-	-	-	-
C205.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.00**	**3.00**	**2.6**	**2.50**	-	-	-	-	-	-	-	-

Course Name: Signals and Systems- 22EC309PC		
CO	**PSO1**	**PSO2**
C205.1	-	-
C205.2	-	-
C205.3	-	-
C205.4	-	-
C205.5	-	-
Average	-	-

Course Name: Analog Circuits Laboratory- 22EC305PC		R22
After completion of course the student will be able to		
C206.1	**Analyze** the biasing techniques of transistors and **evaluate** their impact on circuit stability and performance.	
C206.2	**Demonstrate** the operation and characteristics of different transistor configurations and determine key parameters like h-parameters and transconductance.	
C206.3	**Design, simulate, and implement** amplifiers (CE, CB, CC, CS, CD, cascode, and Darlington pair) and **evaluate** their frequency response and gain characteristics.	
C206.4	**Implement and analyze** feedback amplifier topologies and assess their impact on bandwidth, stability, and distortion.	
C206.5	**Design** and experimentally verify the operation of oscillator circuits, ensuring proper gain conditions for sustained oscillations.	

Course Name: Analog Circuits Laboratory- 22EC305PC									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C206.1	3	3	2	-	3	-	-	-	3	3	-	-
C206.2	3	3	2	-	3	-	-	-	3	3	-	-
C206.3	3	3	3	-	3	-	-	-	3	3	-	-
C206.4	3	3	3	-	3	-	-	-	3	3	-	-
C206.5	3	3	3	-	3	-	-	-	3	3	-	-
Average	**3.0**	**3.0**	**2.6**	**-**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**-**

Course Name: Analog Circuits Laboratory- 22EC305PC		
CO	**PSO1**	**PSO2**
C206.1	2	3
C206.2	2	3
C206.3	3	3
C206.4	-	-
C206.5	-	-
Average	**2.33**	**3.0**

Course Name: Digital logic Design Laboratory- 22EC308ES	**R22**
After completion of course the student will be able to	
C207.1	**Implement and analyze** Boolean functions using logic gates, universal gates, and minimization techniques.
C207.2	**Design and implement** combinational logic circuits such as adders, subtractors, multiplexers, decoders, and comparators.
C207.3	**Implement** and verify the working of sequential circuits including flip-flops, shift registers, and counters.
C207.4	**Design** and implement finite state machines (FSMs) for sequence detection and practical applications.
C207.5	**Demonstrate** the realization of digital logic circuits using different logic families and evaluate their performance.

Course Name: Digital logic Design Laboratory- 22EC308ES									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C207.1	3	3	3	-	3	-	-	-	3	3	-	-
C207.2	3	3	3	-	3	-	-	-	3	3	-	-
C207.3	3	3	3	-	3	-	-	-	3	3	-	3
C207.4	3	3	2	-	3	-	-	-	3	3	-	3
C207.5	3	3	2	-	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.6**	**-**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Digital logic Design Laboratory- 22EC308ES		
CO	**PSO1**	**PSO2**
C207.1	3	3
C207.2	-	3
C207.3	-	3
C207.4	-	3
C207.5	-	3
Average	**3.0**	**3.0**

Course Name: Basic Simulation Laboratory- 22EC310PC	**R22**
After completion of course the student will be able to	
C208.1	**Perform** fundamental matrix operations and generate various signals and sequences using MATLAB.
C208.2	**Analyze** and manipulate signals in terms of basic operations, energy, power, and symmetry using MATLAB.
C208.3	**Apply** system properties such as convolution, correlation, and time-invariance to signal processing problems using MATLAB.
C208.4	**Analyze** signals using Fourier and Laplace transforms, including spectral **analysis** and stability verification using MATLAB.
C208.5	**Simulate and analyze** random processes, noise characteristics, and signal recovery techniques using MATLAB.

Course Name: Basic Simulation Laboratory- 22EC310PC								**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C208.1	3	-	-	-	3	-	-	-	3	3	-	-
C208.2	3	3	3	3	3	-	-	-	3	3	-	3
C208.3	3	3	3	3	3	-	-	-	3	3	-	3
C208.4	3	3	3	3	3	-	-	-	3	3	-	3
C208.5	3	3	3	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.75**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Basic Simulation Laboratory- 22EC310PC		
CO	**PSO1**	**PSO2**
C208.1	-	-
C208.2	-	-
C208.3	-	-
C208.4	-	-
C208.5	-	-
Average	-	-

Course Name: Constitution of India- 22MC303	**R22**
After completion of course the student will be able to	
C209.1	**Understand** the Constitution of India, its history, key characteristics, and its role in shaping India's socio-political and economic values.
C209.2	**Analyze** Fundamental Rights, Duties, and Directive Principles to **evaluate** their role in ensuring constitutional governance and balanced societal development
C209.3	**Explain** the federal structure of the Indian Constitution, distribution of powers between Union and States, and the role of local self-government.
C209.4	**Examine** the parliamentary form of government, constitutional powers of the President, and emergency provisions in India.
C209.5	**Evaluate** constitutional amendments, judicial activism, and Articles 19 and 21 to **understand** their role in driving legal and social reforms.

Course Name: Constitution of India- 22MC303									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C209.1	-	-	-	-	-	3	2	3	-	-	-	3
C209.2	-	-	-	-	-	3	3	3	-	-	-	3
C209.3	-	-	-	-	-	3	3	3	-	-	-	3
C209.4	-	-	-	-	-	3	-	2	-	-	-	3
C209.5	-	-	-	-	-	3	-	3	-	-	-	3
Average	**-**	**-**	**-**	**-**	**-**	**3.0**	**2.66**	**2.8**	**-**	**-**	**-**	**3.00**

Course Name: Constitution of India- 22MC303		
CO	**PSO1**	**PSO2**
C209.1	-	-
C209.2	-	-
C209.3	-	-
C209.4	-	-
C209.5	-	-
Average	-	-

II YEAR : II SEM

Course Name: Probability Theory and Stochastic Processes-22EC415PC	**R22**
After completion of course the student will be able to	
C210.1	**Understand** the fundamental concepts of probability, random variables, distribution, density functions, and their properties, enabling them to **apply** probabilistic techniques in real-world engineering problems.
C210.2	**Analyze** and compute expectations, moment generating functions, transformations of random variables, and statistical independence to model and solve engineering-related stochastic problems.
C210.3	**Gain** insights into different types of random processes, stationarity conditions, ergodicity, autocorrelation, cross-correlation, and their implications in signal processing and communication systems.
C210.4	**Analyze** the spectral properties of random signals using power spectral density and cross-power spectral density, and their relationships with autocorrelation and cross-correlation functions in system analysis.
C210.5	**Understand and analyze** different noise sources, noise figures, and noise bandwidth concepts, along with the principles of information theory such as entropy, mutual information, and channel capacity, essential for communication system design.

Course Name: Probability Theory and Stochastic Processes-22EC415PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C210.1	3	3	-	-	-	-	-	-	-	-	-	-
C210.2	3	3	3	3	-	-	-	-	-	-	-	-
C210.3	3	3	3	3	-	-	-	-	-	-	-	-
C210.4	3	3	3	3	-	-	-	-	-	-	-	-
C210.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.00**	**3.0**	**2.75**	**2.75**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

Course Name: Probability Theory and Stochastic Processes-22EC415PC		
CO	**PSO1**	**PSO2**
C210.1	-	-
C210.2	-	-
C210.3	-	-
C210.4	-	-
C210.5	-	-
Average	-	

Course Name: Electromagnetic Fields and Transmission Lines-22EC416PC	**R22**
After completion of course the student will be able to	
C211.1	**Apply** fundamental electrostatic concepts, including Coulomb's law, Gauss's law, and potential theory, to **analyze** electric fields and capacitance in different configurations.
C211.2	**Analyze** magnetic fields using Biot-Savart's law and Ampere's circuital law, and determine forces and potentials in magnetic systems.
C211.3	Interpret Maxwell's equations in integral and differential forms and **apply** them to boundary conditions in electrostatic and magnetostatic fields.
C211.4	**Examine** electromagnetic wave propagation in different media, including conductors and dielectrics, and **analyze** reflection, refraction, and polarization effects.
C211.5	**Analyze** transmission lines using equivalent circuits, Smith chart, reflection coefficient, and impedance matching techniques to optimize signal transmission.

Course Name: Electromagnetic Fields and Transmission Lines-22EC416PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C211.1	3	3	3	3	-	-	-	-	-	-	-	-
C211.2	3	3	2	2	-	-	-	-	-	-	-	-
C211.3	3	3	2	2	-	-	-	-	-	-	-	-
C211.4	3	3	3	3	-	-	-	-	-	-	-	-
C211.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.6**	**2.6**	-	-	-	-	-	-	-	**3.0**

Course Name: Electromagnetic Fields and Transmission Lines-22EC416PC		
CO	**PSO1**	**PSO2**
C211.1	-	-
C211.2	-	-
C211.3	-	-
C211.4	-	-
C211.5	-	-
Average	-	-

Course Name: Analog and Digital Communications- 22EC417PC	**R22**
After completion of course the student will be able to	
C212.1	**Analyze and implement** AM techniques, including generation, detection, and characteristics of AM, DSBSC, SSB, and VSB signal.
C212.2	**Understand and apply** FM and PM techniques, including spectrum analysis, generation, detection, and comparison with AM
C212.3	**Design and evaluate** AM/FM transmitters and receivers, focusing on their operational characteristics
C212.4	**Analyze and implement** pulse modulation and pulse code modulation techniques for efficient digital communication.
C212.5	**Analyze and implement** digital modulation techniques like ASK, FSK, BPSK, QPSK, and QAM, and evaluate baseband transmission and reception performance.

Course Name: Analog and Digital Communications- 22EC417PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C212.1	3	3	3	2	-	-	-	-	-	-	-	-
C212.2	3	3	2	2	-	-	-	-	-	-	-	-
C212.3	3	3	2	2	-	-	-	-	-	-	-	3
C212.4	3	3	3	2	-	-	-	-	-	-	-	3
C212.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Analog and Digital Communications- 22EC417PC		
CO	**PSO1**	**PSO2**
C212.1	-	-
C212.2	-	-
C212.3	-	-
C212.4	2	-
C212.5	2	-
Average	**2.0**	**-**

Course Name: Linear and Digital IC Applications- 22EC419PC		R22
After completion of course the student will be able to		
C213.1	**Analyze** the characteristics and operational principles of Op-Amps, their configurations, and applications in analog circuits such as comparators, differentiators, and integrators.	
C213.2	**Design and implement** various waveform generators, active filters, and applications of IC 555 and IC 565 in signal processing.	
C213.3	**Analyze** the working principles of various DAC and ADC circuits, their specifications, and design for applications in digital signal processing.	
C213.4	**Utilize** combinational logic ICs such as multiplexers, encoders, and decoders for efficient digital system design.	
C213.5	**Apply** sequential logic ICs, including flip-flops, counters, and shift registers, in memory design and data storage applications.	

Course Name: Linear and Digital IC Applications- 22EC419PC									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C213.1	3	3	2	2	-	-	-	-	-	-	-	3
C213.2	3	3	3	3	-	-	-	-	-	-	-	3
C213.3	3	3	3	3	-	-	-	-	-	-	-	3
C213.4	3	3	3	2	-	-	-	-	-	-	-	3
C213.5	3	3	3	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.8**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Linear and Digital IC Applications- 22EC419PC		
CO	**PSO1**	**PSO2**
C213.1	2	3
C213.2	-	3
C213.3	3	3
C213.4	-	3
C213.5	-	3
Average	**2.5**	**3.0**

Course Name: Electronic Circuit Analysis- 22EC421PC	**R22**
After completion of course the student will be able to	
C214.1	**Analyze** the working principles, efficiency, and configurations of large signal amplifiers including Class A, B, AB, C, and D power amplifiers.
C214.2	**Evaluate** the performance characteristics of single and double-tuned amplifiers, Q-factor, frequency response, and tuning techniques.
C214.3	**Design and analyze** multivibrators, including bistable, monostable, and astable configurations, along with Schmitt trigger circuits using transistors.
C214.4	**Understand** the principles and design of time base generators, including Miller and Bootstrap circuits, and methods for improving linearity.
C214.5	**Design and Examine** synchronization and frequency division techniques in relaxation circuits, sweep circuits, and sinusoidal dividers, along with the principles of sampling gates and pedestal reduction.

Course Name: Electronic Circuit Analysis- 22EC421PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C214.1	3	3	-	2	-	-	-	-	-	-	-	-
C214.2	3	3	-	2	-	-	-	-	-	-	-	-
C214.3	3	3	3	3	-	-	-	-	-	-	-	-
C214.4	3	3	3	2	-	-	-	-	-	-	-	-
C214.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.66**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Course Name: Electronic Circuit Analysis- 22EC421PC		
CO	**PSO1**	**PSO2**
C214.1	-	-
C214.2	-	-
C214.3	2	-
C214.4	-	-
C214.5	-	-
Average	**2.0**	**-**

Course Name: Analog and Digital Communications Laboratory- 22EC418PC	**R22**
After completion of course the student will be able to	
C215.1	**Analyze** different AM and FM Modulation & Demodulation Technique using appropriate hardware experimentation setup and MATLAB
C215.2	**Design** different Multiplexing Techniques using appropriate hardware experimentation setup and MATLAB
C215.3	**Design** different Pulse Modulation Techniques using appropriate hardware experimentation setup and MATLAB
C215.4	**Design and analyze** different Shift Keying Techniques using appropriate hardware experimentation setup and MATLAB
C215.5	**Design and analyze** Different Quadrature Shift Keying Techniques using appropriate hardware experimentation setup and MATLAB

Course Name: Analog and Digital Communications Laboratory- 22EC418PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C215.1	3	3	3	3	3	-	-	-	3	3	-	3
C215.2	3	3	2	2	3	-	-	-	3	3	-	3
C215.3	3	3	2	2	3	-	-	-	3	3	-	3
C215.4	3	3	2	2	3	-	-	-	3	3	-	3
C215.5	3	3	2	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.2**	**2.2**	**3**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Analog and Digital Communications Laboratory- 22EC418PC		
CO	**PSO1**	**PSO2**
C215.1	-	-
C215.2	-	-
C215.3	3	-
C215.4	-	-
C215.5	-	-
Average	**3.0**	-

Course Name: Linear and Digital IC Applications Laboratory- 22EC420PC	**R22**
After completion of course the student will be able to	
C216.1	**Design and analyze** fundamental analog circuits using operational amplifiers (Op-Amps) and IC555 timers.
C216.2	**Implement and evaluate** active filters, waveform generators, and voltage regulators.
C216.3	**Design and test** digital circuits such as DACs, ADCs, and Gray code converters.
C216.4	**Develop and verify** combinational logic circuits, including multiplexers, encoders, and arithmetic circuits using Digital ICs.
C216.5	**Implement and analyze** sequential circuits, including counters, shift registers, and RAM modules using Digital ICs.

Course Name: Linear and Digital IC Applications Laboratory-22EC420PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C216.1	3	3	3	2	3	-	-	-	3	3	-	-
C216.2	3	3	3	3	3	-	-	-	3	3	-	-
C216.3	3	3	3	2	3	-	-	-	3	3	-	3
C216.4	3	3	3	-	3	-	-	-	3	3	-	3
C216.5	3	3	3	-	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.33**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Linear and Digital IC Applications Laboratory-22EC420PC		
CO	**PSO1**	**PSO2**
C216.1	3	3
C216.2	3	-
C216.3	-	3
C216.4	-	3
C216.5	-	3
Average	**3.0**	**3.0**

Course Name: Electronic Circuit Analysis Laboratory- 22EC422PC	**R22**
After completion of course the student will be able to	
C217.1	**Analyze and design** different classes of power amplifiers to **evaluate** efficiency, harmonic distortion, and crossover distortion using hardware and spice software.
C217.2	**Design and test** single-tuned amplifiers, determine the quality factor (Q), and **evaluate** their frequency response using hardware and spice software.
C217.3	**Design and analyze** bistable, astable, and monostable multivibrators, examining waveform characteristics at transistor terminals using hardware and spice software.
C217.4	**Implement and analyze** various sweep circuits and assess their output waveforms using hardware and spice software.
C217.5	**Design and evaluate** Schmitt triggers, sampling gates, and frequency division circuits for signal processing applications using hardware and spice software.

Course Name: Electronic Circuit Analysis Laboratory- 22EC422PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C217.1	3	3	2	2	3	-	-	-	3	3	-	3
C217.2	3	3	3	2	3	-	-	-	3	3	-	3
C217.3	3	3	3	3	3	-	-	-	3	3	-	3
C217.4	3	3	3	3	3	-	-	-	3	3	-	3
C217.5	3	3	3	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.8**	**2.4**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Electronic Circuit Analysis Laboratory- 22EC422PC		
CO	**PSO1**	**PSO2**
C217.1	-	-
C217.2	-	-
C217.3	3	-
C217.4	-	-
C217.5	-	-
Average	**3.0**	**-**

Course Name: Real Time Project/ Field Based Project- 22EC458PR	**R22**
After completion of course the student will be able to	
C218.1	**Identify** real-world engineering problems, define project scope, and **analyze** requirements using systematic problem-solving techniques.
C218.2	**Design** an efficient system architecture using appropriate hardware/software tools, methodologies, and algorithms for real-time applications.
C218.3	**Develop** a working prototype by applying circuit design, embedded systems, communication technologies, and software programming techniques.
C218.4	**Test** the project for functional correctness, reliability, and efficiency, optimize system performance, and ensure robustness under real-world conditions.
C218.5	**Demonstrate** effective communication, teamwork, project management skills, and prepare technical documentation aligned with professional standards.

Course Name: Real Time Project/ Field Based Project- 22EC458PR								**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C218.1	3	3	-	-	-	2	2	2	3	2	3	3
C218.2	3	3	3	3	-	-	-	3	3	2	2	3
C218.3	3	3	3	3	3	-	-	3	3	3	-	3
C218.4	3	3	3	3	3	-	-	-	-	-	-	3
C218.5	-	-	-	-	-	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.0**	**2.0**	**2.66**	**3.0**	**2.5**	**2.5**	**3.0**

Course Name: Real Time Project/ Field Based Project- 22EC458PR		
CO	**PSO1**	**PSO2**
C218.1	3	3
C218.2	3	3
C218.3	3	3
C218.4	3	3
C218.5	3	3
Average	**3.0**	**3.0**

Course Name: Gender Sensitization Lab- 22MC402	R22
After completion of course the student will be able to	
C219.1	**Understand** the fundamental concepts, terminologies, and social constructs of gender, and critically **analyze** the impact of socialization on shaping gender roles in society.
C219.2	**Analyze** the dynamics of gender roles and relations, explore issues like sex selection and the declining sex ratio, and **understand** the broader gender spectrum beyond the binary.
C219.3	Evaluate the division and valuation of labor, including invisible labor, and **assess** gender-related governance, development, and human rights issues.
C219.4	**Examine** the various types and impacts of gender-based violence from a human rights perspective and explore strategies to address and overcome these challenges.
C219.5	**Explore** the portrayal of gender in culture, including film, media, literature, and language, and promote the concept of just relationships and equality.

Course Name: Gender Sensitization Lab- 22MC402									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C219.1	-	-	-	-	-	3	-	3	-	-	-	3
C219.2	-	-	-	-	-	3	2	3	-	-	-	3
C219.3	-	-	-	-	-	3	-	3	-	-	-	3
C219.4	-	-	-	-	-	3	-	3	-	-	-	3
C219.5	-	-	-	-	-	3	3	3	-	-	-	3
Average	-	-	-	-	-	**3.0**	**2.5**	**3.0**	-	-	-	**3.0**

Course Name: Gender Sensitization Lab- 22MC402		
CO	**PSO1**	**PSO2**
C219.1	-	-
C219.2	-	-
C219.3	-	-
C219.4	-	-
C219.5	-	-
Average	-	-

III YEAR : I SEM

Course Name: Microcontrollers -22EC525PC	**R22**
After completion of course the student will be able to	
C301.1	**Understand** the architecture, memory organization, and instruction set of the 8086 microprocessor and applies assembly language programming for basic operations like sorting and string manipulations.
C301.2	**Explain** the architecture, instruction set, and addressing modes of the 8051 microcontroller and analyze its functionalities in embedded applications.
C301.3	**Implement** real-time control operations using 8051 microcontroller by programming timers, hardware interrupts, and serial communication.
C301.4	Interface various I/O devices and memory units with 8051 microcontroller and **explore** different serial communication standards and bus interfaces.
C301.5	**Understand** the ARM processor architecture, instruction set, and its advanced features, including the CORTEX and OMAP processors, for embedded system applications.

Course Name: Microcontrollers -22EC525PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C301.1	3	3	2	3	-	-	-	-	-	-	-	-
C301.2	3	3	2	3	-	-	-	-	-	-	-	-
C301.3	3	3	2	2	-	-	-	-	-	-	-	-
C301.4	3	3	3	2	-	-	-	-	-	-	-	-
C301.5	3	3	3	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.4**	-	-	-	-	-	-	-	**3.0**

Course Name: Microcontrollers -22EC525PC		
CO	**PSO1**	**PSO2**
C301.1	3	-
C301.2	3	-
C301.3	3	-
C301.4	3	-
C301.5	3	-
Average	**3.0**	-

Course Name: IoT Architectures and Protocols- 22EC527PC		R22
After completion of course the student will be able to		
C302.1	**Understand** the fundamentals of IoT, its evolution, characteristics, enabling technologies, and application domains.	
C302.2	**Analyze** the relationship between IoT and M2M, study IoT value chains, industrial structures, and IoT architecture components.	
C302.3	**Design** IoT network protocols at the data link and network layers, including IEEE 802.11, Zigbee, Bluetooth, IPv6, 6LoWPAN, and routing protocols like RPL and CORPL.	
C302.4	**Analyze** the role of transport and session layer protocols such as TCP, UDP, MQTT, and CoAP in IoT communication.	
C302.5	**Evaluate** IoT service layer protocols and security mechanisms, including oneM2M, ETSI M2M, and security protocols like 6LoWPAN and RPL	

Course Name: IoT Architectures and Protocols- 22EC527PC									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C302.1	3	2	2	2	-	-	-	-	-	-	-	3
C302.2	3	3	3	2	-	-	-	-	-	-	-	3
C302.3	3	3	3	3	-	-	-	-	-	-	-	3
C302.4	3	3	2	3	-	-	-	-	-	-	-	3
C302.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.0**	**2.8**	**2.6**	**2.6**	-	-	-	-	-	-	-	**3.0**

Course Name: IoT Architectures and Protocols- 22EC527PC		
CO	**PSO1**	**PSO2**
C302.1	3	-
C302.2	3	-
C302.3	3	-
C302.4	3	-
C302.5	3	-
Average	**3.0**	-

Course Name: Control Systems- 22EC529PC	**R22**
After completion of course the student will be able to	
C303.1	**Analyze** electromechanical systems using mathematical modelling and **calculate** its transfer function
C303.2	**Determine** Transient and Steady State behavior of systems using standard test signals for steady state errors
C303.3	**Conduct** frequency-response analysis using Bode plots, Nyquist stability criterion, and phase-gain margin evaluation for system stability assessment.
C303.4	**Design** a stable control system satisfying requirements of stability and reduced steady state error
C303.5	**Apply** state-space **analysis** to control system modeling, **evaluate** controllability and observability, and perform pole-placement for state feedback control.

Course Name: Control Systems- 22EC529PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C303.1	3	3	3	3	-	-	-	-	-	-	-	-
C303.2	3	3	3	3	-	-	-	-	-	-	-	-
C303.3	3	3	3	3	-	-	-	-	-	-	-	-
C303.4	3	3	3	3	-	-	-	-	-	-	-	-
C303.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.8**	**2.8**	-	-	-	-	-	-	-	-

Course Name: Control Systems- 22EC529PC		
CO	**PSO1**	**PSO2**
C303.1	-	-
C303.2	-	-
C303.3	-	-
C303.4	-	-
C303.5	-	-
Average	-	-

Course Name: Business Economics & Financial Analysis- 22SM501MS	**R22**
After completion of course the student will be able to	
C304.1	**Understand** business structures, economic systems, and key concepts to **analyze** the economic environment's impact on business.
C304.2	**Analyze** demand, supply, elasticity, and forecasting to guide resource allocation and pricing decisions in different economic scenarios.
C304.3	**Evaluate** different production functions, cost structures, and market competition to determine optimal production and pricing strategies.
C303.4	**Apply** the principles of accounting to systematically record, **analyze**, and prepare financial statements, enhancing financial reporting and decision-making skills.
C304.5	Conduct financial ratio analysis to **assess** business performance, liquidity, profitability, and solvency, supporting strategic financial decisions.

Course Name: Business Economics & Financial Analysis- 22SM501MS									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C304.1	-	-	-	-	-	2	-	-	-	-	3	-
C304.2	-	-	-	-	-	3	-	-	-	-	3	-
C304.3	-	-	-	-	-	3	-	-	-	-	3	-
C304.4	-	-	-	-	-	3	-	-	-	-	3	-
C304.5	-	-	-	-	-	2	-	-	-	-	3	-
Average	-	-	-	-	-	**2.6**	-	-	-	-	**3.0**	-

Course Name: Business Economics & Financial Analysis- 22SM501MS		
CO	**PSO1**	**PSO2**
C304.1	-	-
C304.2	-	-
C304.3	-	-
C304.4	-	-
C304.5	-	-
Average	-	-

Course Name: Electronic Measurements And Instrumentation - 22EC542PE	**R22**
After completion of course the student will be able to	
C305.1	**Analyze** the performance characteristics of measuring systems and **evaluate** the accuracy, precision, and types of errors in electrical measurement instruments.
C305.2	Demonstrate the working principles of signal analyzers and generators to **analyze**, generate, and interpret different types of signals.
C305.3	**Apply** knowledge of oscilloscopes and their advanced versions to measure and analyze time, frequency, and other signal parameters.
C305.4	**Examine** the principles and applications of various transducers to measure physical quantities like force, temperature, and pressure.
C305.5	**Utilize** bridge circuits and data acquisition systems to measure electrical and physical parameters with precision and accuracy.

Course Name: Electronic Measurements And Instrumentation - 22EC542PE									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C305.1	3	3	-	2	-	-	-	-	-	-	-	2
C305.2	3	3	-	-	-	-	-	-	-	-	-	2
C305.3	3	3	2	-	-	-	-	-	-	-	-	3
C305.4	3	3	-	3	-	-	-	-	-	-	-	3
C305.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.0**	**2.5**	**2.33**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.4**

Course Name: Electronic Measurements And Instrumentation - 22EC542PE		
CO	**PSO1**	**PSO2**
C305.1	-	-
C305.2	-	-
C305.3	-	-
C305.4	-	-
C305.5	-	-
Average	**-**	**-**

Course Name: Microcontrollers Laboratory- 22EC526PC	**R22**
After completion of course the student will be able to	
C306.1	**Develop** assembly language programs for arithmetic, logical, bitwise, and branching operations using the 8086 microprocessor.
C306.2	**Implement** assembly language programs for arithmetic, logical, time delay generation, serial communication, and interrupt handling using the 8051 microcontroller.
C306.3	**Design and implement** interfacing of peripheral devices such as LED displays, keypads, ADC, and DAC with the 8051 microcontroller.
C306.4	Develop embedded applications using Cortex-M3 development boards and GNU toolchain for LED control and PWM generation.
C306.5	**Analyze and integrate** various microprocessor and microcontroller-based systems for real-time applications.

Course Name: Microcontrollers Laboratory- 22EC526PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C306.1	3	3	3	2	3	-	-	-	3	3	-	-
C306.2	3	3	3	2	3	-	-	-	3	3	-	-
C306.3	3	3	3	3	3	-	-	-	3	3	-	-
C306.4	3	3	3	3	3	-	-	-	3	3	-	3
C306.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.8**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Microcontrollers Laboratory- 22EC526PC		
CO	**PSO1**	**PSO2**
C306.1	3	-
C306.2	3	-
C306.3	3	-
C306.4	3	-
C306.5	3	-
Average	**3.0**	-

Course Name: IoT Architectures and Protocols Laboratory- 22EC528PC	**R22**
After completion of course the student will be able to	
C307.1	**Implement** basic GPIO operations, LED brightness control, and sensor interfacing using Arduino, NodeMCU, and Raspberry Pi.
C307.2	Integrate wireless communication modules to transmit temperature and humidity data to cloud platforms.
C307.3	**Develop** IoT-based home automation applications using voice commands, remote switching, and actuator control.
C307.4	Write and **execute** Arduino programs for interrupts, UART, I2C, SPI communication protocols.
C307.5	**Design** secure and efficient embedded systems for applications like RFID-based attendance and automated devices while ensuring system integration and testing.

Course Name: IoT Architectures and Protocols Laboratory-22EC528PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C307.1	3	3	3	2	3	-	-	-	3	3	-	3
C307.2	3	3	3	2	3	-	-	-	3	3	-	3
C307.3	3	3	3	3	3	-	-	-	3	3	-	3
C307.4	3	3	3	3	3	-	-	-	3	3	-	3
C307.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.6**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: IoT Architectures and Protocols Laboratory-22EC528PC		
CO	**PSO1**	**PSO2**
C307.1	3	-
C307.2	3	-
C307.3	3	-
C307.4	3	-
C307.5	3	-
Average	**3.0**	-

Course Name: Advanced English Communication Skills Laboratory- 22EN503HS	**R22**
After completion of course the student will be able to	
C308.1	**Demonstrate** proficiency in interpersonal communication skills, including body language, vocabulary, and appropriate response techniques.
C308.2	**Improve** reading comprehension by developing skills like scanning, skimming, and critical reading, aiding in understanding context and information.
C308.3	**Develop** structured and coherent writing skills suitable for various formats such as letters, reports, resumes, and emails.
C308.4	**Enhance** oral and written presentation skills through individual and group activities, such as JAM sessions, seminars, and reports.
C308.5	**Demonstrate** effective group discussion and interview skills, including voice modulation, organization of ideas, and pre-interview preparation techniques

Course Name: Advanced English Communication Skills Laboratory- 22EN503HS									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C308.1	-	-	-	-	3	-	-	-	3	3	-	3
C308.2	-	-	-	-	3	-	-	-	3	3	-	2
C308.3	-	3	-	-	3	-	-	-	3	3	-	2
C308.4	-	3	-	-	3	-	-	-	3	3	-	3
C308.5	-	-	-	-	3	-	-	-	3	3	-	2
Average	**-**	**3.0**	**-**	**-**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**2.4**

Course Name: Advanced English Communication Skills Laboratory- 22EN503HS		
CO	**PSO1**	**PSO2**
C308.1	-	-
C308.2	-	-
C308.3	-	-
C308.4	-	-
C308.5	-	-
Average	-	-

Course Name: Intellectual Property Rights- 22MC504	**R22**
After completion of course the student will be able to	
C309.1	**Understand** types of intellectual property, international treaties, and the importance of intellectual property rights (IPR) globally.
C309.2	**Demonstrate** knowledge of trademarks, including their purpose, functions, registration process, and selection of protectable matter.
C309.3	**Explain** the basics of copyright and patent laws, covering ownership, rights, registration, and international considerations.
C309.4	**Recognize and apply** trade secret laws, including misappropriations, trade secret protection, and unfair competition principles such as false advertising.
C309.5	**Analyze** recent developments in intellectual property law, including international trends in trademarks, copyright, patents, and trade secrets.

Course Name: : Intellectual Property Rights- 22MC504									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C309.1	-	-	-	-	-	3	3	-	-	-	-	-
C309.2	-	-	-	-	-	3	3	-	-	-	-	-
C309.3	-	-	-	-	-	3	3	-	-	-	-	-
C30.4	-	-	-	-	-	3	3	-	-	-	-	-
C309.5	-	-	-	-	-	3	3	-	-	-	-	3
Average	-	-	-	-	-	**3.0**	**3.0**	-	-	-	-	**3.0**

Course Name: : Intellectual Property Rights- 22MC504		
CO	**PSO1**	**PSO2**
C309.1	-	-
C309.2	-	-
C309.3	-	-
C309.4	-	-
C309.5	-	-
Average	-	-

Course Name: Cyber Security-22MC507	**R22**
After completion of course the student will be able to	
C310.1	**Understand** the fundamental concepts of cyber security, including the layers of security, threat models, types of attacks, and defence mechanisms, while exploring the implications of cyber threats like cyber warfare and espionage.
C310.2	**Understand** the role of law in cyberspace, national security policies, and the significance of cyber forensics in investigating digital crimes and evidence, including challenges in computer forensics.
C310.3	**Examine** the impact of mobile and wireless technologies on security, including mobile device threats, frauds, and security challenges, and understand organizational measures for addressing mobile security risks.
C310.4	**Assess** the organizational impact of cybercrime, intellectual property rights (IPR), web security, privacy risks, and the challenges posed by social computing and cyber terrorism on organizations.
C310.5	**Analyze** the concepts of data privacy, privacy attacks, and the challenges of maintaining privacy across different domains and explore privacy policies and techniques to ensure data protection**.**

Course Name: Cyber Security-22MC507									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C310.1	3	3	-		3	2	3	-	-	-	-	3
C310.2	3	3	2	3	3	-	-	-	-	-	-	3
C310.3	3	3	-	2	3	3	-	-	-	-	-	-
C310.4	3	3	3	-	2	-	3	-	-	-	-	-
C310.5	3	3	-	-	2	-	-	-	-	-	-	2
Average	**3.0**	**3.0**	**2.5**	**2.5**	**2.6**	**2.5**	**3**	**-**	**-**	**-**	**-**	**2.66**

Course Name: Cyber Security-22MC507		
CO	**PSO1**	**PSO2**
C310.1	-	-
C310.2	-	-
C310.3	-	-
C310.4	-	-
C310.5	-	-
Average	**-**	**-**

III YEAR : II SEM

Course Name: Antennas and Wave Propagation- 22EC632PC	**R22**
After completion of course the student will be able to	
C311.1	**Understand** the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations.
C311.2	**Apply** the concept of radiation Mechanism to Antenna arrays and arrange a setup to carry out the antenna far Field pattern and gain measurements
C311.3	**Design** the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF and UHF antennas
C311.4	**Design** the antennas based on frequency, configure the geometry and establish the radiation patterns of Microwave antennas
C311.5	**Analyze** the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.

Course Name: Antennas and Wave Propagation- 22EC632PC								**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C311.1	3	3	3	3	-	-	-	-	-	-	-	-
C311.2	3	3	3	2	-	-	-	-	-	-	-	3
C311.3	3	2	2	2	-	-	-	-	-	-	-	3
C311.4	3	2	2	2	-	-	-	-	-	-	-	3
C311.5	3	3	-	3	-	-	-	-	-	-	-	-
Average	**3.0**	**2.6**	**2.5**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Antennas and Wave Propagation- 22EC632PC		
CO	**PSO1**	**PSO2**
C311.1	-	-
C311.2	-	-
C311.3	-	-
C311.4	-	-
C311.5	-	-
Average	**-**	**-**

Course Name: Digital Signal Processing- 22EC633PC	**R22**
After completion of course the student will be able to	
C312.1	**Understand** the fundamentals of DSP, including discrete-time signals, systems, stability, causality, and multirate signal processing concepts such as down-sampling, up-sampling, and sampling rate conversion.
C312.2	**Analyze** and compute the Discrete Fourier Series and Discrete Fourier Transform, and implement FFT algorithms such as radix-2 DIT and DIF.
C312.3	**Design and analyze** IIR digital filters using Butterworth and Chebyshev approximations, impulse invariance, bilinear transformation, and spectral transformations.
C312.4	**Design and analyze** FIR digital filters using the Fourier series method, window techniques, and frequency sampling, while comparing IIR and FIR filter characteristics.
C312.5	**Implement and realize** digital filters in different forms and assess finite word-length effects, including round-off noise, overflow oscillations, and coefficient quantization effects.

Course Name: Digital Signal Processing- 22EC633PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C312.1	3	3	2	3	-	-	-	-	-	-	-	3
C312.2	3	3	3	3	-	-	-	-	-	-	-	-
C312.3	3	3	3	2	-	-	-	-	-	-	-	3
C312.4	3	3	3	2	-	-	-	-	-	-	-	3
C312.5	3	3	3	2	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.8**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Antennas and Wave Propagation- 22EC632PC		
CO	**PSO1**	**PSO2**
C312.1	-	-
C312.2	-	2
C312.3	-	3
C312.4	-	3
C312.5	-	-
Average	**-**	**2.66**

Course Name: CMOS VLSI Design- 22EC635PC	R22
After completion of course the student will be able to	
C313.1	**Understand** IC technology basics (MOS, CMOS, BiCMOS) and **analyze** key electrical properties like threshold voltage, transconductance, and inverter designs.
C313.2	**Demonstrate** the VLSI design flow, apply design rules for stick diagrams and layouts, and **analyze** the impact of scaling on MOS circuits.
C313.3	**Design** and **analyze** gate-level circuits, logic gates, and understand the effects of capacitance, fan-in, and fan-out on performance.
C313.4	**Design** and implement data path and array subsystems, including adders, ALUs, multipliers, memory arrays, and counters.
C313.5	**Explore** programmable logic devices (PLDs) like PLA, PAL, FPGAs, and CPLDs, and develop strategies for CMOS testing and chip-level verification.

Course Name :CMOS VLSI Design- 22EC635PC									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C313.1	3	3	2	2	-	-	-	-	-	-	-	3
C313.2	3	3	3	3	-	-	-	-	-	-	-	-
C313.3	3	3	3	3	-	-	-	-	-	-	-	3
C313.4	3	3	3	2	-	-	-	-	-	-	-	3
C313.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.00**	**2.8**	**2.4**	-	-	-	-	-	-	-	**2.75**

Course Name :CMOS VLSI Design- 22EC635PC		
CO	**PSO1**	**PSO2**
C313.1	-	3
C313.2	-	3
C313.3	-	3
C313.4	-	3
C313.5	-	3
Average	-	**3.00**

Course Name: Digital Image Processing - 22EC643PE	**R22**
After completion of course the student will be able to	
C314.1	**Understand** the fundamentals of digital image processing, including sampling, quantization, pixel relationships, and various image transforms for feature extraction and analysis.
C314.2	**Apply** spatial and frequency domain techniques to enhance image quality through filtering, transformation, and histogram manipulation.
C314.3	**Develop** techniques for restoring degraded images using mathematical models, inverse filtering, and least squares restoration methods.
C314.4	**Analyze and implement** image segmentation methods and morphological operations for feature detection, edge linking, and region-oriented segmentation.
C314.5	**Understand** image compression techniques and standards, including error-free and lossy compression, to optimize image storage and transmission.

Course Name: Professional Elective - II									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C314.1	3	3	2	-	-	-	-	-	-	-	-	-
C314.2	3	3	2	-	-	-	-	-	-	-	-	3
C314.3	3	3	3	2	-	-	-	-	-	-	-	3
C314.4	3	3	3	2	-	-	-	-	-	-	-	3
C314.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.6**	**2.33**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Professional Elective - II		
CO	**PSO1**	**PSO2**
C314.1	-	-
C314.2	-	-
C314.3	-	-
C314.4	-	-
C314.5	-	-
Average	-	-

Course Name: Fundamentals of Management for Engineers - 22SM605OE	**R22**
After completion of course the student will be able to	
C315.1	**Understand** the evolution, functions, and challenges of management and apply managerial skills in decision-making process.
C315.2	**Analyze** various organizational structures, HR planning, and strategies for recruitment, training, and performance appraisal to enhance organizational effectiveness.
C315.3	**Apply** operational management principles, quality control methods, and inventory management techniques to optimize production and service efficiency.
C315.4	**Evaluate** marketing strategies, digital marketing trends, and supply chain management techniques to improve business competitiveness.
C315.5	**Utilize** project management methodologies, network analysis techniques (PERT & CPM), and cost optimization strategies for effective project execution.

Course Name: Fundamentals of Management for Engineers - 22SM605OE									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C315.1	-	-	-	-	-	-	-	-	3	3	2	2
C315.2	-	-	-	-	-	-	-	-	3	2	2	2
C315.3	-	-	-	-	-	2	-	3	3	2	3	3
C315.4	-	-	-	-	-	3	-	2	3	3	3	3
C315.5	-	-	-	-	-	-	-	3	3	3	3	3
Average	**-**	**-**	**-**	**-**	**-**	**2.5**	**-**	**2.66**	**3.0**	**2.4**	**2.6**	**2.6**

Course Name: Fundamentals of Management for Engineers - 22SM605OE		
CO	**PSO1**	**PSO2**
C315.1	-	-
C315.2	-	-
C315.3	-	-
C315.4	-	-
C315.5	-	-
Average	**-**	**-**

Course Name: Digital Signal Processing Laboratory- 22EC634PC	**R22**
After completion of course the student will be able to	
C316.1	**Analyze** and synthesize various discrete-time signals using recursive difference equations, Fourier transforms, and frequency-domain methods.
C316.2	**Design** and evaluate digital systems' frequency responses and **understand** the power spectrum of signals using mathematical and computational tools.
C316.3	**Implement and analyze** FIR and IIR digital filters, and study their applications in signal processing.
C316.4	**Apply** digital signal processing techniques for generation, transformation, and manipulation of signals such as DTMF signals, decimation, and interpolation.
C316.5	**Investigate** system responses for first- and second-order systems to **understand** their impulse response and dynamic behavior.

Course Name: Digital Signal Processing Laboratory- 22EC634PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C316.1	3	3	-	3	3	-	-	-	3	3	-	3
C316.2	3	3	3	2	3	-	-	-	3	3	-	3
C316.3	3	3	3	3	3	-	-	-	3	3	-	3
C316.4	3	2	3	2	3	-	-	-	3	3	-	3
C316.5	3	3	-	3	3	-	-	-	3	3	-	3
Average	**3.0**	**2.8**	**3.0**	**2.6**	**3.0**	-	-	-	**3.0**	**3.0**	-	**3.0**

Course Name: Digital Signal Processing Laboratory- 22EC634PC		
CO	**PSO1**	**PSO2**
C316.1	-	-
C316.2	-	-
C316.3	-	-
C316.4	-	-
C316.5	-	-
Average	-	-

Course Name: CMOS VLSI Design Laboratory- 22EC636PC	**R22**
After completion of course the student will be able to	
C317.1	**Develop and simulate** basic digital logic circuits and combinational components using HDL, demonstrating proficiency in hardware modeling.
C317.2	**Design and implement** sequential circuits such as counters, flip-flops, and finite state machines using HDL, showcasing systematic design approaches.
C317.3	**Analyze and create** CMOS-based schematics for basic and advanced combinational circuits, understanding physical design principles.
C317.4	**Perform** physical verification, placement, routing, and timing analysis for CMOS circuits to ensure design integrity and performance.
C317.5	**Evaluate** power integrity issues such as IR drop and crosstalk in CMOS layouts and propose optimization techniques for reliable circuit performance.

Course Name: CMOS VLSI Design Laboratory- 22EC636PC									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C317.1	3	3	3	2	3	-	-	-	3	3	-	3
C317.2	3	3	3	3	3	-	-	-	3	3	-	3
C317.3	3	3	3	3	3	-	-	-	3	3	-	3
C317.4	3	3	-	2	3	-	-	-	3	3	-	3
C317.5	3	3	-	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.4**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: CMOS VLSI Design Laboratory- 22EC636PC		
CO	**PSO1**	**PSO2**
C317.1	-	3
C317.2	-	3
C317.3	-	3
C317.4	-	3
C317.5	-	3
Average	**-**	**3.0**

Course Name: Advanced Communication Laboratory- 22EC639PC		R22
After completion of course the student will be able to		
C318.1	**Analyze** and interpret the features of spectrum analyzers and their applications in signal analysis.	
C318.2	**Simulate** and evaluate the radiation patterns and resistance of different antenna types using MATLAB.	
C318.3	**Implement and analyze** various signal processing techniques, including eye diagram and constellation diagram plotting using MATLAB.	
C318.4	**Design and evaluate** wireless communication techniques, including OFDM generation, fading model analysis, and modulation techniques using MATLAB.	
C318.5	**Investigate** advanced wireless communication performance metrics, including PAPR calculations, MRC performance, and Alamouti encoding schemes using MATLAB.	

Course Name: Advanced Communication Laboratory- 22EC639PC									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C318.1	3	3	-	-	3	-	-	-	3	3	-	-
C318.2	3	3	2	-	3	-	-	-	3	3	-	3
C318.3	3	3	3	2	3	-	-	-	3	3	-	3
C318.4	3	3	3	3	3	-	-	-	3	3	-	3
C318.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.75**	**2.66**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Advanced Communication Laboratory- 22EC639PC		
CO	**PSO1**	**PSO2**
C318.1	-	-
C318.2	-	-
C318.3	-	-
C318.4	-	-
C318.5	-	-
Average	-	-

Course Name: Industry Oriented Mini Project/ Internship- 22EC659PR	**R22**
After completion of course the student will be able to	
C3019.1	**Identify and analyze** real-world engineering problems related to electronics and communication systems using theoretical knowledge.
C3019.2	**Design and develop** innovative solutions or prototypes for industrial problems by applying engineering principles and modern tools.
C3019.3	**Work** collaboratively in a multidisciplinary team and demonstrate effective project management, planning, and execution
C3019.4	**Apply** project management and time management skills to deliver solutions within stipulated timelines.
C3019.5	Document the project outcomes effectively and reflect on the learning process to foster lifelong learning and adaptability in a professional environment.

Course Name: Industry Oriented Mini Project/ Internship- 22EC659PR									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C3019.1	3	3	3	3	3	3	2	2	3	-	3	3
C3019.2	3	3	3	3	3	3	3	3	3	-	3	3
C3019.3	-	-	-	-	-	-	-	-	3	3	2	3
C3019.4	-	-	-	-	-	-	-	-	3	3	3	3
C3019.5	-	-	-	-	3	-	-	-	2	3	3	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.5**	**2.8**	**3.0**	**2.80**	**3.0**

Industry Oriented Mini Project/ Internship- 22EC659PR		
CO	**PSO1**	**PSO2**
C319.1	-	-
C309.2	-	-
C319.3	-	-
C319.4	-	-
C319.5	-	-
Average	-	-

Course Name: Environmental Science-22MC606	R22
After completion of course the student will be able to	
C3020.1	**Understand** ecosystems' structure, function, and processes like food chains and energy flow, **applying** them to field observations.
C3020.2	**Analyze** the use and conservation of natural resources, **assessing** their environmental impact and sustainability.
C3020.3	**Evaluate** biodiversity at all levels and **understand** conservation methods, threats, and global frameworks.
C3020.4	**Examine** pollution types, sources, impacts, and **evaluate** control technologies and global issues like climate change and ozone depletion.
C3020.5	**Apply** environmental laws, policies, and EIA methods to propose sustainable solutions, focusing on green technologies and ethics.

Course Name : Environmental Science-22MC606									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C3020.1	3	3	-	-	-	3	2	-	-	3	-	3
C3020.2	3	3	-	-	-	3	3	-	-	3	-	3
C3020.3	3	3	-	-	-	3	3	-	-	3	-	3
C3020.4	3	3	-	-	-	3	3	-	-	3	-	3
C3020.5	3	3	-	-	-	3	3	-	-	3	-	3
Average	**3.0**	**3.0**	**-**	**-**	**-**	**3.0**	**2.8**	**-**	**-**	**3.0**	**-**	**3.0**

Course Name : Environmental Science-22MC606		
CO	**PSO1**	**PSO2**
C320.1	-	-
C300.2	-	-
C302.3	-	-
C3204	-	-
C320.5	-	-
Average	-	-

Course Name: Fundamentals of AI- 22MC605	R22
After completion of course the student will be able to	
C321.1	**Understand** the fundamentals of AI problems, agents, and environments, and **apply** various search strategies, including uninformed and heuristic search algorithms, to solve computational problems.
C321.2	**Implement** advanced search techniques, such as A*, Minimax search with Alpha-Beta pruning, and apply basic knowledge representation methods like propositional logic and first-order logic for reasoning tasks.
C321.3	**Analyze and apply** advanced knowledge representation techniques and reasoning under uncertainty, including Bayesian networks, nonmonotonic reasoning, and probabilistic reasoning methods.
C321.4	**Understand** the concepts of machine learning, including rote learning, learning by taking advice, and learning from examples, and implement decision tree algorithms for classification tasks.
C321.5	**Design and develop** expert systems using domain knowledge, knowledge acquisition, and explanation methods, including building shells for specific problem domains.

Course Name : Fundamentals of AI- 22MC605									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C321.1	3	3	-	2	-	-	-	-	-	-	-	-
C321.2	3	3	3	3	-	-	-	-	-	-	-	2
C321.3	3	3	2	3	-	-	-	-	-	-	-	3
C321.4	3	3	-	2	-	-	-	-	-	-	-	3
C321.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.0**	**2.66**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.5**

Course Name : Fundamentals of AI- 22MC605		
CO	**PSO1**	**PSO2**
C321.1	-	-
C321.2	-	-
C321.3	-	-
C321.4	-	-
C321.5	-	-
Average	-	-

IV YEAR : I SEM

Course Name: Microwave and Optical Communications-22EC737PC	**R22**
After completion of course the student will be able to	
C401.1	Understand the limitations of conventional tubes at microwave frequencies and **analyze** the working principles of O-type and M-type microwave tubes, traveling wave tubes, magnetrons, and microwave solid-state devices.
C401.2	**Learn** about different waveguide components, their coupling mechanisms, waveguide discontinuities, attenuators, phase shifters, multiport junctions, and ferrite devices, enabling them to analyze and design microwave circuits.
C401.3	**Gain** knowledge about scattering matrix properties and directional couplers and be able to perform microwave measurements such as attenuation, frequency, SWR, and impedance by designing set up.
C401.4	**Understand** the fundamental concepts of optical fiber communication, including fiber modes, ray optics, optical sources, and photodetectors, essential for optical communication system design.
C401.5	**Analyze** optical fiber transmission types, losses, WDM concepts, link budget, and optical amplifiers such as Erbium-Doped Fiber Amplifiers and Raman amplifiers.

Course Name: Microwave and Optical Communications-22EC737PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C401.1	3	3	-	3	-	-	-	-	-	-	-	-
C401.2	3	3	2	2	-	-	-	-	-	-	-	-
C401.3	3	3	3	2	-	-	-	-	-	-	-	-
C401.4	3	3	2	2	-	-	-	-	-	-	-	-
C401.5	3	3	-	-	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.33**	**2.25**	-	-	-	-	-	-	-	-

Course Name: Microwave and Optical Communications-22EC737PC		
CO	**PSO1**	**PSO2**
C401.1	-	-
C401.2	-	-
C401.3	-	-
C401.4	-	-
C401.5	-	-
Average	-	-

Course Name: Radar Systems - 22EC746PE	**R22**
After completion of course the student will be able to	
C402.1	**Analyze** the basic principles of radar systems, including range performance, radar equations, and system losses, for designing efficient radar solutions.
C402.2	**Apply** principles of continuous-wave and frequency-modulated radar systems for Doppler measurement and altitude estimation in practical applications.
C402.3	**Evaluate** the working of Moving Target Indicator and Pulse Doppler radar systems, including their parameters, performance, and limitations in detecting moving targets.
C402.4	**Design and analyze** radar tracking systems using techniques like sequential lobing, conical scan, and monopulse tracking for accurate target tracking.
C402.5	**Investigate** radar signal detection in noisy environments, **analyze** radar receivers and displays, and explore phased array antennas for advanced radar applications.

Course Name: Radar Systems - 22EC746PE									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C402.1	3	3	2	2	-	-	-	-	-	-	-	-
C402.2	3	3	2	2	-	-	-	-	-	-	-	3
C402.3	3	3	3	2	-	-	-	-	-	-	-	3
C402.4	3	3	3	2	-	-	-	-	-	-	-	3
C402.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.2**	-	-	-	-	-	-	-	**3.0**

Course Name: Radar Systems - 22EC746PE		
CO	**PSO1**	**PSO2**
C402.1	-	-
C402.2	-	-
C402.3	-	-
C402.4	-	-
C402.5	-	-
Average	-	-

Course Name: Satellite Communications-22EC750PE	R22
After completion of course the student will be able to	
C403.1	**Demonstrate** an understanding of satellite communication systems, including their origin, orbital mechanics, and launch vehicle technologies.
C403.2	Analyze the functioning of various satellite subsystems such as attitude and orbit control, telemetry, and communication systems to assess their roles in satellite operations.
C403.3	**Design** satellite links by **applying** transmission theory, and evaluate the performance of multiple access techniques like FDMA, TDMA, and CDMA in satellite communication.
C403.4	**Examine** the components and technologies used in earth station systems, including transmitters, receivers, antennas, and tracking systems for effective satellite communication.
C403.5	**Understand** the characteristics of LEO and GEO satellite systems and apply GPS principles for accurate positioning and navigation.

Course Name: Satellite Communications-22EC750PE									R22		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C403.1	3	3	-	-	-	-	-	-	-	-	-	3
C403.2	3	3	-	3	-	-	-	-	-	-	-	3
C403.3	3	3	3	3	-	-	-	-	-	-	-	3
C403.4	3	2	2	2	-	-	-	-	-	-	-	3
C403.5	3	3	-	-	-	-	-	-	-	-	-	3
Average	**3.0**	**2.8**	**2.5**	**2.66**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Satellite Communications-22EC750PE		
CO	**PSO1**	**PSO2**
C403.1	-	-
C403.2	-	-
C403.3	-	-
C403.4	-	-
C403.5	-	-
Average	**-**	**-**

Course Name: IoT Automation - 22CS7145OE		R22
After completion of course the student will be able to		
C40.1	**Understand** the fundamental concepts of IIoT, its architecture, and the challenges in its implementation, including the basics of control systems and feedback mechanisms.	
C404.2	**Analyze** different types of sensors and switches used in IIoT applications and comprehend their working principles for industrial automation.	
C404.3	**Explore** various communication protocols and industry standards used in IIoT, including wired and wireless network communication technologies.	
C404.4	**Implement** cloud computing, edge computing, and data visualization techniques in IIoT applications, including integration of Arduino/Raspberry Pi with IoT.	
C404.5	**Apply** data extraction techniques, machine-to-machine communication, and industrial automation concepts using PLC, SCADA, and HMI.	

Course Name: IoT Automation - 22CS7145OE									R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C404.1	3	3	2	2	-	-	-	-	-	-	-	-
C404.2	3	3	3	2	-	-	-	-	-	-	-	-
C404.3	3	3	3	3	-	-	-	-	-	-	-	-
C404.4	3	3	3	3	-	-	-	-	-	-	-	-
C404.5	3	3	3	3	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.8**	**2.6**	-	-	-	-	-	-	-	-

Course Name: IoT Automation - 22CS7145OE		
CO	**PSO1**	**PSO2**
C404.1	3	-
C404.2	3	-
C404.3	3	-
C404.4	3	-
C404.5	3	-
Average	**3.0**	-

Course Name: Professional Practice, Law & Ethics- 22SM703MS	**R22**
After completion of course the student will be able to	
C405.1	**Develop** a comprehensive understanding of professional ethics, ethical responsibilities, and mechanisms like whistle-blowing to address ethical dilemmas in engineering practices.
C405.2	**Apply** the fundamental principles of contract law, including essential elements, performance, discharge, and remedies, to engineering and business practices.
C405.3	**Analyze** various dispute resolution methods like arbitration, conciliation, and mediation to resolve engineering and construction-related conflicts effectively.
C405.4	**Understand and apply** labour engagement practices, industrial dispute laws, and construction-related regulations, including RERA and NBC.
C405.5	**Acquire** knowledge of intellectual property laws related to copyrights, patents, and trademarks, ensuring compliance and protection of innovative engineering solutions.

Course Name: Professional Practice, Law & Ethics- 22SM703MS									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C405.1	-	-	-	-	-	3	-	3	-	-	-	3
C405.2	-	-	-	-	-	2	-	3	-	-	-	3
C405.3	-	-	-	-	-	3	-	3	-	-	-	2
C405.4	-	-	-	-	-	3	-	3	-	-	-	3
C405.5	-	-	-	-	-	2	-	3	-	-	-	3
Average	-	-	-	-	-	**2.6**	-	**3.0**	-	-	-	**2.8**

Course Name: Professional Practice, Law & Ethics- 22SM703MS		
CO	**PSO1**	**PSO2**
C405.1	-	-
C405.2	-	-
C405.3	-	-
C405.4	-	-
C405.5	-	-
Average	-	-

Course Name: Microwave and Optical Communications Laboratory- 22EC738PC		**R22**
After completion of course the student will be able to		
C406.1	**Analyze** the characteristics of microwave components such as Reflex Klystron, Gunn Diode, and directional couplers to understand their operational principles.	
C406.2	**Perform** attenuation, frequency, and impedance measurements using microwave test benches and **analyze** waveguide component scattering parameters.	
C406.3	Measure Voltage Standing Wave Ratio (VSWR) and impedance matching techniques to optimize microwave transmission.	
C406.4	**Characterize** LED and Laser Diode, and study intensity modulation techniques for optical fiber communication.	
C406.5	**Evaluate** optical fiber communication parameters such as data rate, numerical aperture, and link losses to enhance system efficiency.	

Course Name: Microwave and Optical Communications Laboratory- 22EC738PC									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C406.1	3	3	2	2	3	-	-	-	3	3	-	-
C406.2	3	3	2	3	3	-	-	-	3	3	-	-
C406.3	3	3	3	3	3	-	-	-	3	3	-	-
C406.4	3	3	3	3	3	-	-	-	3	3	-	-
C406.5	3	3	3	3	3	-	-	-	3	3	-	-
Average	**3.0**	**3.0**	**2.6**	**2.8**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**-**

Course Name: Microwave and Optical Communications Laboratory- 22EC738PC		
CO	**PSO1**	**PSO2**
C406.1	-	-
C406.2	-	-
C406.3	-	-
C406.4	-	-
C406.5	-	-
Average	-	-

Course Name: Project Stage – I- 22EC760PR		**R22**
After completion of course the student will be able to		
C407.1	**Identify and define** an engineering problem or research question in electronics and communication by conducting a thorough literature survey.	
C407.2	Conduct an in-depth review of existing solutions, methodologies, and technologies to **understand** the current state-of-the-art.	
C407.3	Formulate clear and measurable project objectives and constraints based on the insights gained from the literature review.	
C407.4	**Develop** a preliminary **design** and select appropriate methodologies or models to address the identified problem.	
C407.5	Prepare and present a detailed report covering the literature survey, problem definition, and preliminary design.	

Course Name Project Stage – I- 22EC760PR									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C407.1	3	3	-	-	-	2	2	-	2	-	2	3
C407.2	3	3	-	3	-	3	3	-	3	2	3	3
C407.3	3	3	3	3	-	-	-	-	3	3	3	3
C407.4	3	3	3	3	3	-	3	3	3	3	3	3
C407.5	-	-	-	-	-	-	-	-	3	3	2	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.66**	**3.0**	**2.8**	**2.75**	**2.6**	**3.0**

Course Name: Project Stage – I- 22EC760PR		
CO	**PSO1**	**PSO2**
C407.1	3	3
C407.2	3	3
C407.3	3	3
C407.4	3	3
C407.5	3	3
Average	**3.0**	**3.0**

IV year II Sem

Course Name: 5G and Beyond Communications - 22EC853PE	**R22**
After completion of course the student will be able to	
C408.1	**Analyze and design** the principles of MIMO communications, including spatial multiplexing, spatial diversity, beamforming, and their role in 5G communication technologies.
C408.2	**Analyze** the evolution of mobile communication from 5G to advanced wireless paradigms like WISDOM, GIMVC, and D2D communication, and evaluate their implementation challenges.
C408.3	**Examine** large-scale and small-scale mmWave propagation effects, spatial characterization, and outdoor/indoor channel modeling for 5G and beyond.
C408.4	**Investigate** networking challenges, beam adaptation, relaying techniques, and performance of cellular networks for mmWave communication and emerging wireless standards.
C408.5	**Explore** emerging mobile technologies, cybersecurity challenges, spectrum issues, and futuristic concepts like High-Altitude Platform Stations (HAPS) and CONASENSE for communication beyond 2020.

Course Name: 5G and Beyond Communications - 22EC853PE									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C408.1	3	3	2	3	-	-	-	-	-	-	-	3
C408.2	3	3	2	3	-	-	-	-	-	-	-	3
C408.3	3	3	3	3	-	-	-	-	-	-	-	3
C408.4	3	3	3	3	-	-	-	-	-	-	-	3
C408.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.6**	**3.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: 5G and Beyond Communications - 22EC853PE		
CO	**PSO1**	**PSO2**
C408.1	-	-
C408.2	-	-
C408.3	-	-
C408.4	-	-
C408.5	-	-
Average	-	-

Course Name: System On Chip Architecture 22EC856PE	R22
After completion of course the student will be able to	
C409.1	**Understand** the system architecture, hardware/software components, processor architectures, memory addressing, and SOC design methodologies to analyze system complexity.
C409.2	**Analyze** different processor architectures, microarchitecture concepts, pipeline processing, branch prediction, VLIW, superscalar, and vector processing techniques for efficient computation in SOCs.
C409.3	**Design** and evaluate SOC memory hierarchy, including cache organization, write policies, virtual-to-real memory translation, and interaction between processor and memory subsystems.
C409.4	**Examine** SOC interconnect architectures, bus models, contention handling, and performance optimizations for efficient data transfer within an SOC.
C409.5	**Investigate** reconfigurable architectures, instruction processor customization, soft processors, and trade-offs in reconfigurable parallelism for application-specific SOC implementations.

Course Name: System On Chip Architecture 22EC856PE								R22			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C409.1	3	3	2	3	-	-	-	-	-	-	-	3
C409.2	3	3	3	3	-	-	-	-	-	-	-	3
C409.3	3	3	3	3	-	-	-	-	-	-	-	3
C409.4	3	3	3	3	-	-	-	-	-	-	-	3
C409.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.8**	**3.0**	-	-	-	-	-	-	-	**3.0**

Course Name: System On Chip Architecture 22EC856PE		
CO	**PSO1**	**PSO2**
C409.1	-	3
C409.2	-	3
C409.3	-	3
C409.4	-	3
C409.5	-	3
Average	-	**3.0**

Course Name: Entrepreneurship - 22SM807OE	**R22**
After completion of course the student will be able to	
C410.1	**Understand** the foundational concepts of entrepreneurship, including its evolution, types, competencies, motivations, and training methods, to build entrepreneurial capacity.
C410.1	**Analyze** models for opportunity evaluation and business planning, and comprehend the procedures and institutional support available for setting up new ventures at the central and state levels.
C410.3	**Identify and address** challenges faced by MSMEs, understand the causes and symptoms of industrial sickness, and devise strategies for the rehabilitation of sick enterprises.
C410.4	**Apply** marketing principles, cost and pricing strategies, branding techniques, and explore global trade opportunities to ensure the sustainable growth of enterprises.
C410.5	**Develop** strategic perspectives for entrepreneurial growth, address valuation challenges, and understand the role of technology, business incubation, and the development of women entrepreneurs in India

Course Name: Entrepreneurship - 22SM807OE									**R22**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C410.1	-	-	-	-	-	2	2	-	-	-	-	3
C410.2	-	-	-	-	-	2	2	-	-	-	-	3
C410.3	-	-	-	-	-	3	3	-	-	-	-	3
C410.4	-	-	-	-	-	2	2	-	-	-	-	3
C410.5	-	-	-	-	-	3	3	-	-	-	-	3
Average	-	-	-	-	-	**2.4**	**2.4**	-	-	-	-	**3.0**

Course Name: Entrepreneurship - 22SM807OE		
CO	**PSO1**	**PSO2**
C410.1	-	-
C410.2	-	-
C410.3	-	-
C410.4	-	-
C410.5	-	-
Average	-	-

Course Name: Project Stage – II including Seminar- 22EC861PR		**R22**
After completion of course the student will be able to		
C411.1	**Apply** engineering principles and advanced tools to refine the conceptual design and create a detailed system model for implementation.	
C411.1	**Implement** the designed solution using appropriate hardware/software tools and methodologies.	
C411.3	**Evaluate** the performance of the implemented solution through rigorous testing and validate it against defined objectives.	
C411.4	**Analyze** and address the societal, environmental, and ethical impacts of the implemented solution.	
C411.5	Document the complete project and present it effectively, demonstrating technical proficiency and communication skills.	

Course Name : Project Stage – II including Seminar- 22EC861PR									**R22**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C411.1	3	3	3	3	3	-	-	-	3	3	3	3
C411.1	3	3	3	3	3	-	-	-	3	3	3	3
C411.3	3	3	3	3	3	-	-	-	3	3	3	3
C411.4	-	-	-	-	-	3	3	3	3	3	-	3
C411.5	-	-	-	-	-	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

Course Name: : Project Stage – II including Seminar- 22EC861PR		
CO	**PSO1**	**PSO2**
C411.1	3	3
C411.1	3	3
C411.3	3	3
C411.4	3	3
C411.5	3	3
Average	**3.0**	**3.0**

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The course outcomes along with POs and PSOs mapping tables are shown below for the R21 regulation

II YEAR : I SEM

Course Name: Digital System Design-21EC301PC		**R21**
After completion of course the student will be able to		
C201.1	**Understand and apply** number systems, conversions, complements, and Boolean algebra to **analyze** and simplify digital logic circuits.	
C201.2	**Design** and minimize Boolean functions using K-map and tabular methods; **analyze and implement** combinational logic circuits for real-world applications.	
C201.3	**Analyze and design** sequential circuits using latches, flip-flops, registers, and counters for data storage and processing.	
C201.4	**Design** synchronous sequential machines like sequence detectors and parity-bit generators using Mealy and Moore models.	
C201.5	**Understand and implement** basic logic gates using diodes and transistors; **evaluate** the performance of different logic families and integrated circuits.	

Course Name: Digital System Design-21EC301PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C201.1	3	3	2	-	-	-	-	-	-	-	-	-
C201.2	3	3	3	-	-	-	-	-	-	-	-	-
C201.3	3	3	3	-	-	-	-	-	-	-	-	-
C201.4	3	3	3	-	-	-	-	-	-	-	-	2
C201.5	3	3	2	-	-	-	-	-	-	-	-	3
Average	**3.00**	**3.00**	**2.60**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.5**

Course Name: Digital System Design-21EC301PC		
CO	**PSO1**	**PSO2**
C201.1	2	3
C201.2	-	3
C201.3	3	3
C201.4	-	3
C201.5	-	3
Average	**2.50**	**3.00**

Course Name: Network Analysis & Synthesis- 21EC306PC		**R21**
After completion of course the student will be able to		
C202.1	**Apply** network topology principles, including graph theory and magnetic circuits, to **analyze** electrical networks and coupled circuits.	
C202.2	**Perform** transient and steady-state analysis of RC, RL, and RLC circuits, including resonance and response analysis.	
C202.3	**Evaluate** two-port network parameters, network functions, and **design** impedance matching networks.	
C202.4	**Design and analyze** filters and attenuators to meet specific frequency response and signal attenuation requirements.	
C202.5	**Synthesize and analyze** LC, RC, and RL networks using properties of positive real functions and various synthesis methods.	

Course Name: Network Analysis & Synthesis- 21EC306PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C202.1	3	3	-	-	-	-	-	-	-	-	-	-
C202.2	3	3	3	2	-	-	-	-	-	-	-	-
C202.3	3	3	2	-	-	-	-	-	-	-	-	-
C202.4	3	3	3	-	-	-	-	-	-	-	-	-
C202.5	3	3	3	3	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.75**	**2.5**	-	-	-	-	-	-	-	-

Course Name: Network Analysis & Synthesis- 21EC306PC		
CO	**PSO1**	**PSO2**
C202.1	-	-
C202.2	-	-
C202.3	-	-
C202.4	-	-
C202.5	-	-
Average	-	-

Course Name: Probability Theory & Stochastic Processes-21EC307PC		**R21**
After completion of course the student will be able to		
C203.1	**Understand and apply** probability theory, random variables, and their distributions to solve problems involving discrete and continuous sample spaces.	
C203.2	**Analyze and compute** the expected values, moments, and transformations of single and multiple random variables to **evaluate** probabilistic models.	
C203.3	**Evaluate** the statistical properties of multiple random variables, including joint and marginal distributions, and **apply** the Central Limit Theorem in data analysis.	
C203.4	**Analyze** random processes, their temporal characteristics, and responses of linear systems to random signals using correlation functions and system response methods.	
C203.5	**Analyze** the spectral characteristics of random processes and systems responses; **apply** principles of information theory for efficient communication system design.	

Course Name: Probability Theory & Stochastic Processes-21EC307PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C203.1	3	2	2	-	-	-	-	-	-	-	-	-
C203.2	3	3	3	3	-	-	-	-	-	-	-	-
C203.3	3	3	3	3	-	-	-	-	-	-	-	-
C203.4	3	3	3	3	-	-	-	-	-	-	-	-
C203.5	3	3	3	2	-	-	-	-	-	-	-	-
Average	**3.00**	**2.80**	**2.8**	**2.75**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

Course Name: Probability Theory & Stochastic Processes-21EC307PC		
CO	**PSO1**	**PSO2**
C203.1	-	-
C203.2	-	-
C203.3	-	-
C203.4	-	-
C203.5	-	-
Average	-	-

Course Name: Electronic Devices and Circuits-21EC308PC	**R21**
After completion of course the student will be able to	
C204.1	**Analyze and design** rectifiers and diode-based circuits to **understand** their behavior in electronic systems.
C204.2	**Apply** BJT principles to design and **analyze** amplifier circuits, focusing on their switching behavior and biasing characteristics
C204.3	**Evaluate and compare** the performance of Junction Field Effect Transistors (FETs) and Special Purpose Diodes in electronic circuits.
C204.4	**Design and analyze** small signal low frequency BJT amplifiers using hybrid models and h-parameters to optimize amplifier performance.
C204.5	**Implement and assess** small signal FET amplifiers and MOSFET-based circuits for practical applications in electronic systems.

Course Name: Electronic Devices and Circuits-21EC308PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C204.1	3	3	3	-	-	-	-	-	-	-	-	-
C204.2	3	3	2	2	-	-	-	-	-	-	-	-
C204.3	3	3	3	2	-	-	-	-	-	-	-	3
C204.4	3	3	3	3	-	-	-	-	-	-	-	2
C204.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.00**	**3.0**	**2.60**	**2.5**	-	-	-	-	-	-	-	2.66

Course Name: Electronic Devices and Circuits-21EC308PC		
CO	**PSO1**	**PSO2**
C204.1	3	-
C204.2	-	-
C204.3	2	3
C204.4	3	-
C204.5	3	3
Average	**2.75**	**3.00**

Course Name: Signals and Systems-21EC312PC	**R21**
After completion of course the student will be able to	
C205.1	**Analyze and approximate** signals using orthogonal functions and **understand** fundamental signal classifications and operations.
C205.2	**Apply** Fourier series and Fourier transforms to **analyze** continuous-time signals, including periodic and non-periodic signals.
C205.3	**Design and Evaluate** LTI systems for the given requirements using impulse response and transfer functions.
C205.4	**Utilize** Laplace and Z-transforms to **analyze** and design systems in continuous and discrete domains, focusing on their properties and region of convergence
C205.5	**Apply** sampling theory and correlation analysis to reconstruct signals from samples and **understand** the effects of sampling on signal integrity.

Course Name: Signals and Systems-21EC312PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C205.1	3	3	2	-	-	-	-	-	-	-	-	-
C205.2	3	3	2	3	-	-	-	-	-	-	-	-
C205.3	3	3	3	3	-	-	-	-	-	-	-	-
C205.4	3	3	3	2	-	-	-	-	-	-	-	-
C205.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.00**	**3.00**	**2.6**	**2.50**	-	-	-	-	-	-	-	-

Course Name: Signals and Systems-21EC312PC		
CO	**PSO1**	**PSO2**
C205.1	-	-
C205.2	-	-
C205.3	-	-
C205.4	-	-
C205.5	-	-
Average	-	-

Course Name: Electronic Devices and Circuits Lab-21EC309PC		**R21**
After completion of course the student will be able to		
C206.1	**Analyze and characterize** the behavior of semiconductor devices such as diodes and transistors.	
C206.2	**Design and evaluate** rectifier circuits and filtering techniques.	
C206.3	**Measure and analyze** the performance of transistor amplifiers in various configurations.	
C206.4	**Understand and analyze** the characteristics of special semiconductor devices such as SCRs.	
C206.5	**Implement and analyze** clipping and clamping circuits in various applications.	

Course Name: Electronic Devices and Circuits Lab-21EC309PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C206.1	3	3	2	-	3	-	-	-	3	3	-	-
C206.2	3	3	3	-	3	-	-	-	3	3	-	3
C206.3	3	3	2	-	3	-	-	-	3	3	-	-
C206.4	3	3	2	-	3	-	-	-	3	3	-	3
C206.5	3	3	3	-	3	-	-	-	3	3	-	-
Average	**3.00**	**3.00**	**2.4**	-	3.0	**-**	**-**	**-**	**3.00**	**3.00**	**-**	**3.0**

Course Name: Electronic Devices and Circuits Lab-21EC309PC		
CO	**PSO1**	**PSO2**
C206.1	-	-
C206.2	3	-
C206.3	3	-
C206.4	-	-
C206.5	-	-
Average	**3.00**	**-**

Course Name: Digital System Design Lab-21EC302PC	**R21**
After completion of course the student will be able to	
C207.1	**Design and realize** Boolean expressions and logic gates using basic and universal gates.
C207.2	**Design and implement** digital circuits involving arithmetic operations and conversion between different number systems.
C207.3	**Design and implement** multiplexers, comparators, and other combinational circuits.
C207.4	**Design and implement** various types of registers, counters, and shift registers using flip-flops.
C207.5	**Design and realize** finite state machines for sequence detection and other sequential logic applications.

Course Name: Digital System Design Lab-21EC302PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C207.1	3	3	3	-	3	-	-	-	3	3	-	-
C207.2	3	3	3	-	3	-	-	-	3	3	-	-
C207.3	3	3	3	-	3	-	-	-	3	3	-	3
C207.4	3	3	2	-	3	-	-	-	3	3	-	3
C207.5	3	3	2	-	3	-	-	-	3	3	-	3
Average	**3.00**	**3.00**	**2.6**	**-**	3	-	-	-	**3.00**	**3.00**	-	3.0

Course Name: Digital System Design Lab-21EC302PC		
CO	**PSO1**	**PSO2**
C207.1	3	3
C207.2	-	3
C207.3	-	3
C207.4	-	3
C207.5	-	3
Average	3.0	3.0

Course Name: Basic Simulation Lab- 21EC334PC		**R21**
After completion of course the student will be able to		
C208.1	**Perform** fundamental matrix operations and generate various signals (periodic and aperiodic) using MATLAB	
C208.2	**Perform** operations on signals and compute the energy and average power of signals using MATLAB.	
C208.3	**Understand** and **apply** convolution, autocorrelation, cross-correlation, Fourier transform, and Laplace transform for signal analysis using MATLAB.	
C208.4	**Verify** the properties of linearity, time-invariance, physical realizability, and stability of continuous and discrete systems using MATLAB.	
C208.5	Simulate Gaussian noise, compute statistical parameters, **verify** sampling theorem, and **analyze** random processes for stationarity using MATLAB.	

Course Name: Basic Simulation Lab- 21EC334PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C208.1	3	-	-	-	3	-	-	-	3	3	-	-
C208.2	3	3	3	3	3	-	-	-	3	3	-	3
C208.3	3	3	3	3	3	-	-	-	3	3	-	3
C208.4	3	3	3	3	3	-	-	-	3	3	-	3
C208.5	3	3	3	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.75**	**3.0**	-	-	-	**3.0**	**3.0**	-	**3.0**

Course Name: Basic Simulation Lab- 21EC334PC		
CO	**PSO1**	**PSO2**
C208.1	-	-
C208.2	-	-
C208.3	-	-
C208.4	-	-
C208.5	-	-
Average	-	-

Course Name: Social Innovation in Practice-21HS301	**R21**
After completion of course the student will be able to	
C209.1	**Understand** the core definitions, history, and elements of social innovation, and **analyze** their role in societal and economic change.
C209.2	**Engage** with communities to identify and **understand** social and economic challenges, fostering empathy and responsibility.
C209.3	**Analyze** societal needs, define problems, and identify constraints to propose affordable and appropriate technological solutions.
C209.4	**Evaluate** social innovation practices across various sectors and their global impact, identifying cross-sectoral links for collaborative innovation.
C209.5	**Develop and implement** social innovation projects, documenting and presenting their societal impact and vision.

Course Name: Social Innovation in Practice-21HS301									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C209.1	-	-	-	-	-	3	3	2	-	-	-	2
C209.2	-	-	-	-	-	3	3	3	-	-	-	-
C209.3	-	-	-	-	-	3	3	-	-	-	-	-
C209.4	-	-	-	-	-	3	3	3	-	-	-	-
C209.5	-	-	-	-	-	3	-	3	-	-	-	3
Average	-	-	-	-	-	**3**	**3**	**2.5**	-	-	-	**2.5**

Course Name: Social Innovation in Practice-21HS301		
CO	**PSO1**	**PSO2**
C209.1	-	-
C209.2	-	-
C209.3	-	-
C209.4	-	-
C209.5	-	-
Average	-	-

Course Name: Gender Sensitization Lab - 21MC302	**R21**
After completion of course the student will be able to	
C210.1	**Understand** the fundamental concepts, terminologies, and social constructs of gender, and critically **analyze** the impact of socialization on shaping gender roles in society.
C210.2	**Analyze** the dynamics of gender roles and relations, **explore** issues like sex selection and the declining sex ratio, and **understand** the broader gender spectrum beyond the binary.
C210.3	**Evaluate** the division and valuation of labor, including invisible labor, and **assess** gender-related governance, development, and human rights issues.
C210.4	**Examine** the various types and impacts of gender-based violence from a human rights perspective and **explore** strategies to address and overcome these challenges.
C210.5	**Explore** the portrayal of gender in culture, including film, media, literature, and language, and promote the concept of just relationships and equality.

Course Name: Gender Sensitization Lab - 21MC302									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C210.1	-	-	-	-	-	3	-	3	-	-	-	3
C210.2	-	-	-	-	-	3	2	3	-	-	-	3
C210.3	-	-	-	-	-	3	-	3	-	-	-	3
C210.4	-	-	-	-	-	3	-	3	-	-	-	3
C210.5	-	-	-	-	-	3	3	3	-	-	-	3
Average	-	-	-	-	-	**3.0**	**2.5**	**3.0**	-	-	-	**3.0**

Course Name: Gender Sensitization Lab - 21MC302		
CO	**PSO1**	**PSO2**
C210.1	-	-
C210.2	-	-
C210.3	-	-
C210.4	-	-
C210.5	-	-
Average	-	-

II YEAR : II SEM

Course Name: Numerical Methods and Complex Variables-21MA404BS		**R21**
After completion of course the student will be able to		
C211.1	**Solve** polynomial and transcendental equations and perform interpolation using numerical methods for engineering problems.	
C211.2	**Apply** numerical integration and solve ordinary differential equations using various numerical techniques for engineering analysis.	
C211.3	**Analyze** and differentiate complex functions using Cauchy-Riemann equations and harmonic conjugates for engineering applications.	
C211.4	**Evaluate** line integrals and **analyze** complex functions using series expansions and residue theory for advanced problem-solving.	
C211.5	**Solve** real integrals using residue theory and perform conformal mapping to transform complex functions for practical applications.	

Course Name: Numerical Methods and Complex Variables-21MA404BS									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C211.1	3	3	2	-	-	-	-	-	-	-	-	-
C211.2	3	3	2	-	-	-	-	-	-	-	-	-
C211.3	3	3	3	-	-	-	-	-	-	-	-	-
C211.4	3	3	3	-	-	-	-	-	-	-	-	-
C211.5	3	3	3	-	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Course Name: Numerical Methods and Complex Variables-21MA404BS		
CO	**PSO1**	**PSO2**
C211.1	-	-
C211.2	-	-
C211.3	-	-
C211.4	-	-
C211.5	-	-
Average	-	-

Course Name: Electronic Circuit Analysis- 21EC413PC		**R21**
After completion of course the student will be able to		
C212.1	**Design** of multistage amplifiers and **understand** the concepts of High Frequency Analysis of Transistors.	
C212.2	**Design and Analyze** negative feedback circuits for improving stability	
C212.3	**Design and analyze** positive feedback circuits for generating sustained oscillations	
C212.4	**Design** and **Realize** different classes of power amplifiers & tuned amplifiers useable for audio and Radio applications	
C212.5	**Design** of Multivibrators and sweep circuits for various applications.	

Course Name: Electronic Circuit Analysis- 21EC413PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C212.1	3	3	2	2	-	-	-	-	-	-	-	-
C212.2	3	3	2	2	-	-	-	-	-	-	-	-
C212.3	3	3	3	2	-	-	-	-	-	-	-	-
C212.4	3	3	3	2	-	-	-	-	-	-	-	3
C212.5	3	3	3	3	-	-	-	-	-	-	-	-
Average	3.0	3.0	2.6	2.2	-	-	-	-	-	-	-	3.0

Course Name: Electronic Circuit Analysis- 21EC413PC		
CO	**PSO1**	**PSO2**
C212.1	3	-
C212.2	-	-
C212.3	-	-
C212.4	-	-
C212.5	2	-
Average	2.5	-

Course Name: Analog and Digital Communications-21EC415PC	**R21**
After completion of course the student will be able to	
C213.1	**Analyze and implement** AM techniques, including generation, detection, and characteristics of AM, DSBSC, SSB, and VSB signal.
C213.2	**Understand and apply** FM and PM techniques, including spectrum analysis, generation, detection, and comparison with AM
C213.3	**Design and evaluate** AM/FM transmitters and receivers, focusing on their operational characteristics
C213.4	**Analyze and implement** pulse modulation and pulse code modulation techniques for efficient digital communication.
C213.5	**Analyze and implement** digital modulation techniques like ASK, FSK, BPSK, QPSK, and QAM, and evaluate baseband transmission and reception performance.

Course Name: Analog and Digital Communications -21EC415PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C213.1	3	3	3	2	-	-	-	-	-	-	-	-
C213.2	3	3	2	2	-	-	-	-	-	-	-	-
C213.3	3	3	2	2	-	-	-	-	-	-	-	3
C213.4	3	3	3	2	-	-	-	-	-	-	-	3
C213.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Analog and Digital Communications -21EC415PC		
CO	**PSO1**	**PSO2**
C213.1	-	-
C213.2	-	-
C213.3	-	-
C213.4	2	-
C213.5	2	-
Average	**2**	**-**

Course Name: Electromagnetic Waves & Transmission Lines-21EC417PC	**R21**
After completion of course the student will be able to	
C214.1	**Analyze and solve** problems related to electrostatics, including charge distributions, electric field intensity, potential, and capacitance for various configurations.
C214.2	**Apply** the principles of magnetostatics, Faraday's law, and Maxwell's equations to **analyze** static and time-varying electromagnetic fields.
C214.3	**Understand and Analyze** electromagnetic wave propagation in various media, including reflection, refraction, and energy transfer using Poynting theorem.
C214.4	**Analyze** transmission line parameters, equations, and performance for distortionless and low-loss signal transmission.
C214.5	**Evaluate** transmission line impedance, reflection coefficient, and VSWR; **apply** the Smith chart for impedance matching and design of transmission line circuits.

Course Name: Electromagnetic Waves & Transmission Lines-21EC417PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C214.1	3	3	3	3	-	-	-	-	-	-	-	-
C214.2	3	3	2	2	-	-	-	-	-	-	-	-
C214.3	3	3	3	3	-	-	-	-	-	-	-	-
C214.4	3	3	3	2	-	-	-	-	-	-	-	-
C214.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.8**	**2.6**	-	-	-	-	-	-	-	**3.0**

Course Name: Electromagnetic Waves & Transmission Lines-21EC417PC		
CO	**PSO1**	**PSO2**
C214.1	-	-
C214.2	-	-
C214.3	-	-
C214.4	-	-
C214.5	-	-
Average	-	-

Course Name: Linear IC Applications-21EC419PC	**R21**
After completion of course the student will be able to	
C215.1	**Understand** the characteristics, features, and modes of operation of operational amplifiers and **analyze** their behavior in various configurations.
C215.2	**Apply** operational amplifiers in **designing** analog circuits for arithmetic operations, signal conditioning, and voltage regulation.
C215.3	**Analyze and design** filters and waveform generators for signal processing applications.
C215.4	**Understand** the functionality of timers and phase-locked loops and their applications in signal generation and synchronization.
C215.5	**Design and analyze** digital-to-analog and analog-to-digital converters, compare IC logic families, and develop interfacing solutions for TTL and CMOS circuits.

Course Name: Linear IC Applications-21EC419PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C215.1	3	3	2	2	-	-	-	-	-	-	-	3
C215.2	3	3	2	2	-	-	-	-	-	-	-	3
C215.3	3	3	3	3	-	-	-	-	-	-	-	3
C215.4	3	3	3	3	-	-	-	-	-	-	-	3
C215.5	3	3	2	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Linear IC Applications-21EC419PC		
CO	**PSO1**	**PSO2**
C215.1	-	3
C215.2	2	3
C215.3	-	3
C215.4	3	3
C215.5	3	3
Average	**2.66**	**3.0**

Course Name : Electronic Circuit Analysis Lab-21EC414PC	**R21**
After completion of course the student will be able to	
C216.1	**Design and analyze** various single and multi-stage amplifiers using hardware and SPICE/Multisim
C216.2	**Design and analyze** the various oscillator circuits using hardware and SPICE/Multisim
C216.3	**Design and Analyze** multivibrators using hardware and SPICE/Multisim
C216.4	**Design and analyze** feedback amplifiers using hardware and SPICE/Multisim
C216.5	**Design and analyze** sweep circuits using hardware and SPICE/Multisim

Course Name: Electronic Circuit Analysis Lab -21EC414PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C216.1	3	3	2	2	3	-	-	-	3	3	-	3
C216.2	3	3	3	3	3	-	-	-	3	3	-	3
C216.3	3	3	3	3	3	-	-	-	3	3	-	3
C216.4	3	3	3	2	3	-	-	-	3	3	-	3
C216.5	2	2	2	2	3	-	-	-	3	3	-	3
Average	**2.8**	**2.8**	**2.6**	**2.4**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Electronic Circuit Analysis Lab -21EC414PC		
CO	**PSO1**	**PSO2**
C216.1	3	3
C216.2	3	-
C216.3	3	-
C216.4	-	3
C216.5	-	-
Average	3.0	3.0

Course Name: Analog and Digital Communication Lab-21EC416PC	**R21**
After completion of course the student will be able to	
C217.1	**Design and Analyze** different AM and FM Modulation & Demodulation Technique using appropriate hardware experimentation setup and MATLAB
C217.2	**Design** different Multiplexing Techniques using appropriate hardware experimentation setup and MATLAB
C217.3	**Design** different Pulse Modulation Techniques using appropriate hardware experimentation setup and MATLAB
C217.4	**Design and analyze** different Shift Keying Techniques using appropriate hardware experimentation setup and MATLAB
C217.5	**Design and analyze** Different Quadrature Shift Keying Techniques using appropriate hardware experimentation setup and MATLAB

Course Name: Analog and Digital Communications Lab - 21EC416PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C217.1	3	3	3	3	3	-	-	-	3	3	-	3
C217.2	3	3	2	2	3	-	-	-	3	3	-	3
C217.3	3	3	2	2	3	-	-	-	3	3	-	3
C217.4	3	3	2	2	3	-	-	-	3	3	-	3
C217.5	3	3	2	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.2**	**2.2**	**3**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Analog and Digital Communications Lab -21EC416PC		
CO	**PSO1**	**PSO2**
C217.1	-	-
C217.2	-	-
C217.3	3	-
C217.4	-	-
C217.5	-	-
Average	**3.0**	**-**

.**Course Name:** IC Applications Lab- 21EC420PC	**R21**
After completion of course the student will be able to	
C218.1	**Analyze** different Modes of Operation of Op Amp using appropriate experimentation setup
C218.2	**Design and Analyze** different Applications of Op Amp Circuits using appropriate experimentation setup.
C218.3	**Design and Analyze** different Active filter Applications of Op Amp Circuits using appropriate experimentation setup.
C218.4	**Design and analyze** different multi vibrator of Op Amp Circuits using appropriate experimentation setup.
C218.5	**Design and analyze** Voltage Regulator of Op Amp Circuits using appropriate experimentation setup.

Course Name: IC Applications Lab - 21EC420PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C218.1	3	3	-	2	3	-	-	-	3	3	-	-
C218.2	3	3	3	2	3	-	-	-	3	3	-	3
C218.3	3	3	3	3	3	-	-	-	3	3	-	3
C218.4	3	3	3	3	3	-	-	-	3	3	-	-
C218.5	3	3	2	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.75**	**2.4**	**3.0**	-	-	-	**3.0**	**3.0**	-	**3.0**

Course Name: IC Applications Lab - 21EC420PC		
CO	**PSO1**	**PSO2**
C218.1	-	3
C218.2	-	-
C218.3	2	2
C218.4	2	-
C218.5	2	2
Average	**2.0**	**2.33**

Course Name: Aptitude and critical thinking skills Lab-**:** 21MA408BS		**R21**
After completion of course the student will be able to		
C219.1	**Apply** fundamental numerical techniques such as simplification, BODMAS, LCM, and HCF to solve mathematical problems effectively.	
C219.2	**Solve** real-world problems using ratio, proportion, number series, and reasoning techniques like analogy and classification.	
C219.3	**Estimate** solutions for problems related to time, distance, work, and financial calculations while applying combinatorics and probability concepts.	
C219.4	**Analyze** and interpret data using averages, mixtures, allegations, and graphical methods like bar charts, pie charts, and Venn diagrams, applying it to industrial scenarios.	
C219.5	**Apply** logical reasoning and critical thinking to solve problems involving coding-decoding, statement analysis, and calendar-based challenges.	

Course Name: Aptitude and critical thinking skills Lab-**:** 21MA408BS									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C219.1	3	2	-	-	-	-	-	-	-	-	-	2
C219.2	3	3	-	2	-	-	-	-	-	-	-	2
C219.3	3	3	2	-	-	-	-	-	-	-	-	2
C219.4	-	3	-	2	-	-	-	-	-	-	-	3
C219.5	-	3	2	2	-	-	-	-	-	-	-	3
Average	**3.0**	**2.8**	**2.0**	**2.0**	-	-	-	-	-	-	-	**2.4**

Course Name: Aptitude and critical thinking skills Lab-**:** 21MA408BS		
CO	**PSO1**	**PSO2**
C219.1	-	-
C219.2	-	-
C219.3	-	-
C219.4	-	-
C219.5	-	-
Average	-	-

Course Name: Constitution of India- 21MC403	**R21**
After completion of course the student will be able to	
C220.1	**Understand** the Constitution of India, its history, key characteristics, and its role in shaping India's socio-political and economic values.
C220.2	**Analyze** Fundamental Rights, Duties, and Directive Principles to **evaluate** their role in ensuring constitutional governance and balanced societal development
C220.3	**Explain** the federal structure of the Indian Constitution, distribution of powers between Union and States, and the role of local self-government.
C220.4	**Examine** the parliamentary form of government, constitutional powers of the President, and emergency provisions in India.
C220.5	**Evaluate** constitutional amendments, judicial activism, and Articles 19 and 21 to **understand** their role in driving legal and social reforms.

Course Name: Constitution of India - MC309									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C220.1	-	-	-	-	-	3	2	3	-	-	-	3
C220.2	-	-	-	-	-	3	3	3	-	-	-	3
C220.3	-	-	-	-	-	3	3	3	-	-	-	3
C220.4	-	-	-	-	-	3	-	2	-	-	-	3
C220.5	-	-	-	-	-	3	-	3	-	-	-	3
Average	-	-	-	-	-	3.0	2.66	2.8	-	-	-	3.00

Course Name: Constitution of India - MC309		
CO	**PSO1**	**PSO2**
C220.1	-	-
C220.2	-	-
C220.3	-	-
C220.4	-	-
C220.5	-	-
Average	-	-

III YEAR : I SEM

Course Name: Control Systems-21EC518PC		**R21**
After completion of course the student will be able to		
C301.1	**Analyze** electromechanical systems using mathematical modelling and **calculate** its transfer function.	
C301.2	**Determine** Transient and Steady State behavior of systems using standard test signals for steady state errors.	
C301.3	**Conduct** frequency-response analysis using Bode plots, Nyquist stability criterion, and phase-gain margin evaluation for system stability assessment.	
C301.4	**Design** a stable control system satisfying requirements of stability and reduced steady state error	
C301.5	**Apply** state-space analysis to control system modeling, **evaluate** controllability and observability, and perform pole-placement for state feedback control.	

Course Name: Control Systems - 21EC518PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C301.1	3	3	3	3	-	-	-	-	-	-	-	-
C301.2	3	3	3	3	-	-	-	-	-	-	-	-
C301.3	3	3	3	3	-	-	-	-	-	-	-	-
C301.4	3	3	3	3	-	-	-	-	-	-	-	-
C301.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.8**	**2.8**	-	-	-	-	-	-	-	-

Course Name: Control Systems - 21EC518PC		
CO	**PSO1**	**PSO2**
C301.1	-	-
C301.2	-	-
C301.3	-	-
C301.4	-	-
C301.5	-	-
Average	-	-

Course Name: Business Economics &Financial Analysis-21SM501MS		**R21**
After completion of course the student will be able to		
C302.1	**Understand** business structures, economic systems, and key concepts to **analyze** the economic environment's impact on business.	
C302.2	**Analyze** demand, supply, elasticity, and forecasting to guide resource allocation and pricing decisions in different economic scenarios.	
C302.3	**Evaluate** different production functions, cost structures, and market competition to determine optimal production and pricing strategies.	
C302.4	**Apply** the principles of accounting to systematically record, **analyze**, and prepare financial statements, enhancing financial reporting and decision-making skills.	
C302.5	**Conduct** financial ratio analysis to **assess** business performance, liquidity, profitability, and solvency, supporting strategic financial decisions.	

Course Name: Business Economics & Financial Analysis - 21SM501MS									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C302.1	-	-	-	-	-	2	-	-	-	-	3	-
C302.2	-	-	-	-	-	3	-	-	-	-	3	-
C302.3	-	-	-	-	-	3	-	-	-	-	3	-
C302.4	-	-	-	-	-	3	-	-	-	-	3	-
C302.5	-	-	-	-	-	2	-	-	-	-	3	-
Average	-	-	-	-	-	**2.6**	-	-	-	-	**3.0**	-

Course Name: Business Economics & Financial Analysis - 21SM501MS		
CO	**PSO1**	**PSO2**
C302.1	-	-
C302.2	-	-
C302.3	-	-
C302.4	-	-
C302.5	-	-
Average	-	-

Course Name: Data Communication & Networks- 21EC528PC		**R21**
After completion of course the student will be able to		
C303.1	**Understan**d the fundamental concepts of data communication and networking models by **analyzing** network components, standards, and architectures.	
C303.2	**Apply** data link layer techniques to enhance network communication reliability, including error detection and correction mechanisms	
C303.3	**Analyze and implement** network layer functionalities, including IP addressing, packet forwarding, and routing mechanisms.	
C303.4	**Evaluate** the transport layer protocols and their role in ensuring end-to-end communication reliability	
C303.5	**Demonstrate** the principles of application-layer protocols and security mechanisms such as FTP, SMTP, DNS, and IP Security.	

Course Name: Data Communications and Networks - EC502PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C303.1	3	3	-	-	-	-	-	-	-	-	-	-
C303.2	3	3	3	2	-	-	-	-	-	-	-	3
C303.3	3	3	2	2	-	-	-	-	-	-	-	3
C303.4	3	3	3	3	-	-	-	-	-	-	-	3
C303.5	3	3	2	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.5**	**2.25**	-	-	-	-	-	-	-	3.0

Course Name: Data Communications and Networks - EC502PC		
CO	**PSO1**	**PSO2**
C303.1	-	-
C303.2	-	-
C303.3	-	-
C303.4	-	-
C303.5	-	-
Average	-	-

Course Name: Micro Processors & Micro Controllers-21EC524PC		**R21**
After completion of course the student will be able to		
C304.1	**Explain** the architecture, functional diagram, register organization, memory segmentation, signal descriptions, and instruction set of the 8086 microprocessor and **write** assembly language programs.	
C304.2	**Analyze** the architecture and instruction set of the 8051 microcontroller and **develop** real-time control programs using interrupts, timers, and serial communication.	
C304.3	**Interface** I/O devices and external memory with 8051 microcontroller and **analyze** communication interfaces such as I2C, SPI, and UART for data transfer.	
C304.4	**Explain** the ARM architecture, register organization, pipeline structure, instruction set, and exception handling mechanisms.	
C304.5	**Analyze** the architecture of PIC microcontrollers, Raspberry Pi, and advanced ARM processors like Cortex and OMAP, and interface Raspberry Pi with peripherals.	

Course Name Microprocessors & Microcontrollers - 21EC524PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C304.1	3	3	2	3	-	-	-	-	-	-	-	-
C304.2	3	3	2	3	-	-	-	-	-	-	-	-
C304.3	3	3	3	2	-	-	-	-	-	-	-	-
C304.4	3	3	-	-	-	-	-	-	-	-	-	3
C304.5	3	3	3	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.5**	**2.5**	-	-	-	-	-	-	-	**3.0**

Course Name: Microprocessors & Microcontrollers - 21EC524PC		
CO	**PSO1**	**PSO2**
C304.1	3	-
C304.2	3	-
C304.3	3	-
C304.4	3	-
C304.5	3	-
Average	**3.0**	-

Course Name: Electronic Measurements and Instrumentation- 21EC535PE		**R21**
After completion of course the student will be able to		
C305.1	**Analyze** the performance characteristics of measuring systems and **evaluate** the accuracy, precision, and types of errors in electrical measurement instruments.	
C305.2	**Demonstrate** the working principles of signal analyzers and generators to analyze, generate, and interpret different types of signals.	
C305.3	**Apply** knowledge of oscilloscopes and their advanced versions to measure and **analyze** time, frequency, and other signal parameters.	
C305.4	**Examine** the principles and applications of various transducers to measure physical quantities like force, temperature, and pressure.	
C305.5	**Utilize** bridge circuits and data acquisition systems to measure electrical and physical parameters with precision and accuracy.	

Course Name: Electronic Measurements and Instrumentation- 21EC535PE									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C305.1	3	3	-	2	-	-	-	-	-	-	-	2
C305.2	3	3	-	-	-	-	-	-	-	-	-	2
C305.3	3	3	2	-	-	-	-	-	-	-	-	3
C305.4	3	3	-	3	-	-	-	-	-	-	-	3
C305.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.0**	**2.5**	**2.33**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.4**

Course Name: Electronic Measurements and Instrumentation- 21EC535PE		
CO	**PSO1**	**PSO2**
C305.1	-	-
C305.2	-	-
C305.3	-	-
C305.4	-	-
C305.5	-	-
Average	-	-

Course Name: Data Communication & Networks Lab-21EC529PC	**R21**
After completion of course the student will be able to	
C306.1	**Develop** TCL scripts to create nodes, establish links, and transmit data, enabling fundamental network simulations.
C306.2	**Evaluate** the performance of various network topologies and queue management schemes, enhancing understanding of network efficiency.
C306.3	**Analyze** the impact of scheduling mechanisms and transport protocols on network performance, optimizing communication reliability.
C306.4	**Compare** the performance of different routing protocols, improving decision-making in dynamic network environments.
C306.5	**Investigate** the behavior of wireless network protocols and analyze protocol interactions in real-time scenarios.

Course Name: Data Communications and Networks Lab - 21EC529PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C306.1	3	3	3	2	3	-	-	-	3	3	-	3
C306.2	3	3	3	3	3	-	-	-	3	3	-	3
C306.3	3	3	3	3	3	-	-	-	3	3	-	3
C306.4	3	3	3	3	3	-	-	-	3	3	-	3
C306.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.8**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Data Communications and Networks Lab - 21EC529PC		
CO	**PSO1**	**PSO2**
C306.1	3	-
C306.2	3	-
C306.3	3	-
C306.4	3	-
C306.5	3	-
Average	**3.0**	**-**

Course Name: Micro Processors & Micro Controllers Lab-21EC525PC		**R21**
After completion of course the student will be able to		
C307.1	**Develop and execute** assembly language programs on 8086 microprocessor for performing arithmetic, logical, string operations, and bit-level manipulations.	
C307.2	**Design and implement** assembly language programs on 8051 microcontroller for arithmetic operations, logical manipulations, timer-based delays, serial communication, and interrupt-based waveform generation.	
C307.3	**Interface** 8051 microcontroller with external I/O devices such as 7-segment displays, matrix keypads, and DACs for generating specific signals.	
C307.4	**Utilize** Raspberry Pi for interfacing sensors and controlling basic hardware components for embedded system applications.	
C307.5	**Analyze** and integrate microprocessor, microcontroller, and embedded system concepts for practical problem-solving in interfacing, communication, and control applications.	

Course Name: Micro Processors & Micro Controllers Lab-21EC525PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C307.1	3	3	3	2	3	-	-	-	3	3	-	3
C307.2	3	3	3	2	3	-	-	-	3	3	-	3
C307.3	3	3	3	3	3	-	-	-	3	3	-	3
C307.4	3	3	3	3	3	-	-	-	3	3	-	3
C307.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.8**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Micro Processors & Micro Controllers Lab-21EC525PC		
CO	**PSO1**	**PSO2**
C307.1	3	-
C307.2	3	-
C307.3	3	-
C307.4	3	-
C307.5	3	-
Average	**3.0**	**-**

Course Name: Advanced English Communication Skills Lab-21EN503HS		**R21**
After completion of course the student will be able to		
C308.1	**Demonstrate** proficiency in interpersonal communication skills, including body language, vocabulary, and appropriate response techniques.	
C308.2	**Improve** reading comprehension by developing skills like scanning, skimming, and critical reading, aiding in understanding context and information.	
C308.3	**Develop** structured and coherent writing skills suitable for various formats such as letters, reports, resumes, and emails.	
C308.4	**Enhance** oral and written presentation skills through individual and group activities, such as JAM sessions, seminars, and reports.	
C308.5	**Demonstrate** effective group discussion and interview skills, including voice modulation, organization of ideas, and pre-interview preparation techniques	

Course Name: Advanced Communication Skills Lab - 21EN503HS									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C308.1	-	-	-	-	3	-	-	-	3	3	-	3
C308.2	-	-	-	-	3	-	-	-	3	3	-	2
C308.3	-	3	-	-	3	-	-	-	3	3	-	2
C308.4	-	3	-	-	3	-	-	-	3	3	-	3
C308.5	-	-	-	-	3	-	-	-	3	3	-	2
Average	**-**	**3.0**	**-**	**-**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**2.4**

Course Name: Advanced Communication Skills Lab - 21EN503HS		
CO	**PSO1**	**PSO2**
C308.1	-	-
C308.2	-	-
C308.3	-	-
C308.4	-	-
C308.5	-	-
Average	-	-

Course Name: Summer Internship – I-21EC556PR		**R21**
After completion of course the student will be able to		
C309.1	**Identify and analyze** real-world engineering problems related to electronics and communication systems using theoretical knowledge.	
C309.2	**Design and develop** innovative solutions or prototypes for industrial problems by applying engineering principles and modern tools.	
C309.3	**Work** collaboratively in a multidisciplinary team and **demonstrate** effective project management, planning, and execution	
C309.4	**Apply** project management and time management skills to deliver solutions within stipulated timelines.	
C309.5	Document the project outcomes effectively and reflect on the learning process to foster lifelong learning and adaptability in a professional environment.	

Course Name: Summer Internship – I-21EC556PR								**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C309.1	3	3	3	3	3	3	2	2	3	-	3	3
C309.2	3	3	3	3	3	3	3	3	3	-	3	3
C309.3	-	-	-	-	-	-	-	-	3	3	2	3
C309.4	-	-	-	-	-	-	-	-	3	3	3	3
C309.5	-	-	-	-	3	-	-	-	2	3	3	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.5**	**2.8**	**3.0**	**2.80**	**3.0**

Course Name: Summer Internship – I-21EC556PR		
CO	**PSO1**	**PSO2**
C309.1	3	3
C309.2	3	3
C309.3	3	3
C309.4	3	3
C309.5	3	3
Average	**3.0**	**3.0**

Course Name: Intellectual Property Rights- 21MC504		**R21**
After completion of course the student will be able to		
C310.1	**Understand** types of intellectual property, international treaties, and the importance of intellectual property rights (IPR) globally.	
C310.2	**Demonstrate** knowledge of trademarks, including their purpose, functions, registration process, and selection of protectable matter.	
C310.3	**Explain** the basics of copyright and patent laws, covering ownership, rights, registration, and international considerations.	
C310.4	**Recognize** and apply trade secret laws, including misappropriations, trade secret protection, and unfair competition principles such as false advertising.	
C310.5	**Analyze** recent developments in intellectual property law, including international trends in trademarks, copyright, patents, and trade secrets.	

Course Name: Intellectual Property Rights - 21MC504									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C310.1	-	-	-	-	-	3	3	-	-	-	-	-
C310.2	-	-	-	-	-	3	3	-	-	-	-	-
C310.3	-	-	-	-	-	3	3	-	-	-	-	-
C310.4	-	-	-	-	-	3	3	-	-	-	-	-
C310.5	-	-	-	-	-	3	3	-	-	-	-	3
Average	-	-	-	-	-	**3.0**	**3.0**	-	-	-	-	**3.0**

Course Name: Intellectual Property Rights - 21MC504		
CO	**PSO1**	**PSO2**
C310.1	-	-
C310.2	-	-
C310.3	-	-
C310.4	-	-
C310.5	-	-
Average	-	-

Course Name: Cyber Security-21MC506	**R21**
After completion of course the student will be able to	
C311.1	**Understand** the fundamental concepts of cyber security, including the layers of security, threat models, types of attacks, and defence mechanisms, while exploring the implications of cyber threats like cyber warfare and espionage.
C311.2	**Understand** the role of law in cyberspace, national security policies, and the significance of cyber forensics in investigating digital crimes and evidence, including challenges in computer forensics.
C311.3	**Examine** the impact of mobile and wireless technologies on security, including mobile device threats, frauds, and security challenges, and **understand** organizational measures for addressing mobile security risks.
C311.4	**Assess** the organizational impact of cybercrime, intellectual property rights (IPR), web security, privacy risks, and the challenges posed by social computing and cyber terrorism on organizations.
C311.5	**Analyze** the concepts of data privacy, privacy attacks, and the challenges of maintaining privacy across different domains and explore privacy policies and techniques to ensure data protection.

Course Name: Cyber Security-21MC506									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C311.1	3	3	-		3	2	3	-	-	-	-	3
C311.2	3	3	2	3	3	-	-	-	-	-	-	3
C311.3	3	3	-	2	3	3	-	-	-	-	-	-
C311.4	3	3	3	-	2	-	3	-	-	-	-	-
C311.5	3	3	-	-	2	-	-	-	-	-	-	2
Average	**3.0**	**3.0**	2.5	2.5	2.6	2.5	3	-	-	-	-	2.66

Course Name: Cyber Security-21MC506		
CO	**PSO1**	**PSO2**
C311.1	-	-
C311.2	-	-
C311.3	-	-
C311.4	-	-
C311.5	-	-
Average	-	-

III YEAR : II SEM

Course Name: Antenna & Wave Propagation-21EC621PC		**R21**
After completion of course the student will be able to		
C312.1	**Understand** the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations.	
C312.2	**Apply** the concept of radiation Mechanism to Antenna arrays and arrange a setup to carry out the antenna far Field pattern and gain measurements	
C312.3	**Design** the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF and UHF antennas	
C312.4	**Design** the antennas based on frequency, configure the geometry and establish the radiation patterns of Microwave antennas	
C312.5	**Analyze** the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.	

Course Name: Antennas and Propagation - 21EC621PC								**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C312.1	3	3	3	3	-	-	-	-	-	-	-	-
C312.2	3	3	3	2	-	-	-	-	-	-	-	3
C312.3	3	2	2	2	-	-	-	-	-	-	-	3
C312.4	3	2	2	2	-	-	-	-	-	-	-	3
C312.5	3	3	-	3	-	-	-	-	-	-	-	-
Average	**3.0**	**2.6**	**2.5**	**2.4**	-	-	-	-	-	-	-	3.0

Course Name: Antennas and Propagation - 21EC621PC		
CO	**PSO1**	**PSO2**
C312.1	-	-
C312.2	-	-
C312.3	-	-
C312.4	-	-
C312.5	-	-
Average	-	-

Course Name: VLSI Design-21EC626PC		**R21**
After completion of course the student will be able to		
C313.1	**Understand** IC technology basics (MOS, CMOS, BiCMOS) and **analyze** key electrical properties like threshold voltage, transconductance, and inverter designs.	
C313.2	**Demonstrate** the VLSI design flow, **apply** design rules for stick diagrams and layouts, and **analyze** the impact of scaling on MOS circuits.	
C313.3	**Design** and **analyze** gate-level circuits, logic gates, and **understand** the effects of capacitance, fan-in, and fan-out on performance.	
C313.4	**Design** and implement data path and array subsystems, including adders, ALUs, multipliers, memory arrays, and counters.	
C313.5	**Explore** programmable logic devices (PLDs) like PLA, PAL, FPGAs, and CPLDs, and **develop** strategies for CMOS testing and chip-level verification.	

Course Name: VLSI Design-21EC626PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C313.1	3	3	2	3	-	-	-	-	-	-	-	3
C313.2	3	3	3	3	-	-	-	-	-	-	-	-
C313.3	3	3	3	2	-	-	-	-	-	-	-	3
C313.4	3	3	3	2	-	-	-	-	-	-	-	3
C313.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.00**	**2.8**	**2.4**	-	-	-	-	-	-	-	**2.75**

Course Name: VLSI Design-21EC626PC		
CO	**PSO1**	**PSO2**
C313.1	-	-
C313.2	-	2
C313.3	-	3
C313.4	-	3
C313.5	-	-
Average	-	2.66

Course Name: Digital Signal Processing-21EC622PC		**R21**
After completion of course the student will be able to		
C314.1	**Understand** the fundamentals of digital signal processing, including discrete-time signals, systems, and their stability, causality, and frequency domain representation.	
C314.2	**Analyze** and compute Discrete Fourier Transform and Fast Fourier Transform using various algorithms and **apply** them to practical problems.	
C314.3	**Design** Infinite Impulse Response (IIR) digital filters using analog filter approximations and transformation techniques for practical applications.	
C314.4	**Design** Finite Impulse Response (FIR) digital filters using Fourier and window techniques, and compare FIR and IIR filters for specific applications.	
C314.5	**Realize** digital filters in various forms, **analyze** their frequency response, and implement multi-rate digital signal processing techniques.	

Course Name: Digital Signal Processing-21EC622PC								**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C314.1	3	3	2	3	-	-	-	-	-	-	-	3
C314.2	3	3	3	3	-	-	-	-	-	-	-	-
C314.3	3	3	3	2	-	-	-	-	-	-	-	3
C314.4	3	3	3	2	-	-	-	-	-	-	-	3
C314.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.00**	**2.8**	**2.4**	-	-	-	-	-	-	-	**2.75**

Course Name: Digital Signal Processing-21EC622PC		
CO	**PSO1**	**PSO2**
C314.1	-	-
C314.2	-	2
C314.3	-	3
C314.4	-	3
C314.5	-	-
Average	-	2.66

Course Name: Information Theory & Coding-21EC638PE		**R21**
After completion of course the student will be able to		
C315.1	**Apply** the fundamental concepts of information theory and error control strategies, and design efficient source coding schemes for reliable digital communication.	
C315.2	**Analyze** linear block codes for error detection and correction and their applications in data storage systems.	
C315.3	**Design and evaluate** cyclic codes with an emphasis on their encoding and decoding processes for error control in communication systems.	
C315.4	**Develop** convolutional codes, utilize decoding algorithms like Viterbi and sequential decoding, and **assess** their applications in ARQ systems.	
C315.5	**Analyze** BCH codes, their minimum distance bounds, and error correction capabilities to ensure robust digital communication.	

Course Name: Information Theory & Coding-21EC638PE									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C315.1	3	3	3	2	-	-	-	-	-	-	-	-
C315.2	3	3	2	2	-	-	-	-	-	-	-	-
C315.3	3	3	3	2	-	-	-	-	-	-	-	-
C315.4	3	3	3	3	-	-	-	-	-	-	-	3
C315.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.6**	**2.4**	-	-	-	-	-	-	-	**3.0**

Course Name: Information Theory & Coding-21EC638PE		
CO	**PSO1**	**PSO2**
C315.1	-	3
C315.2	-	3
C315.3	-	3
C315.4	-	3
C315.5	-	3
Average	-	**3.0**

Course Name: Disaster Management -21CE656OE	**R21**
After completion of course the student will be able to	
C316.1	**Analyze** different types of disasters, their risk levels, and the associated vulnerabilities to **assess** disaster impact and preparedness.
C316.2	**Understand** disaster management cycles, risk management principles, and mitigation strategies for effective disaster response and recovery.
C316.3	**Evaluate** structural and non-structural measures, capacity-building strategies, and legislative frameworks to enhance disaster resilience.
C316.4	**Develop** coping mechanisms, industrial safety plans, and media strategies to minimize disaster impact and improve public awareness.
C316.5	Formulate disaster risk reduction plans and **understand** India's disaster management policies, laws, and organizational structures.

Course Name: Disaster Management -21CE656OE									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C316.1	-	-	-	-	-	3	3	2	-	-	-	2
C316.2	-	-	-	-	-	3	2	2	3	3	-	3
C316.3	-	-	-	-	-	3	3	2	-	-	-	3
C316.4	-	-	-	-	-	3	2	3	3	3	-	3
C316.5	-	-	-	-	-	3	3	3	-	-	-	3
Average	-	-	-	-	-	**3.0**	**2.6**	**2.4**	**3.0**	**3.0**	-	**2.8**

Course Name: Disaster Management -21CE656OE		
CO	**PSO1**	**PSO2**
C316.1	-	-
C316.2	-	-
C316.3	-	-
C316.4	-	-
C316.5	-	-
Average	-	-

Course Name: Digital Signal ProcessingLab-21EC623PC		**R21**
After completion of course the student will be able to		
C317.1	**Analyze** and synthesize various discrete-time signals using recursive difference equations, Fourier transforms, and frequency-domain methods.	
C317.2	**Design** and evaluate digital systems' frequency responses and **understand** the power spectrum of signals using mathematical and computational tools.	
C317.3	**Implement and analyze** FIR and IIR digital filters, and study their applications in signal processing.	
C317.4	**Apply** digital signal processing techniques for generation, transformation, and manipulation of signals such as DTMF signals, decimation, and interpolation.	
C317.5	**Investigate** system responses for first- and second-order systems to **understand** their impulse response and dynamic behavior.	

Course Name: Digital Signal Processing Lab - 21EC623PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C317.1	3	3	-	3	3	-	-	-	3	3	-	3
C317.2	3	3	3	2	3	-	-	-	3	3	-	3
C317.3	3	3	3	3	3	-	-	-	3	3	-	3
C317.4	3	2	3	2	3	-	-	-	3	3	-	3
C317.5	3	3	-	3	3	-	-	-	3	3	-	3
Average	**3.0**	**2.8**	**3.0**	**2.6**	**3.0**	-	-	-	**3.0**	**3.0**	-	**3.0**

Course Name: Digital Signal Processing Lab - 21EC623PC		
CO	**PSO1**	**PSO2**
C317.1	-	-
C317.2	-	-
C317.3	-	-
C317.4	-	-
C317.5	-	-
Average	-	-

Course Name: E-CAD Lab-21EC627PC		**R21**
After completion of course the student will be able to		
C318.1	**Develop and simulate** basic digital logic circuits and combinational components using HDL, demonstrating proficiency in hardware modeling.	
C318.2	**Design and implement** sequential circuits such as counters, flip-flops, and finite state machines using HDL, showcasing systematic design approaches.	
C318.3	**Analyze and create** CMOS-based schematics for basic and advanced combinational circuits, understanding physical design principles.	
C318.4	**Perform** physical verification, placement, routing, and timing analysis for CMOS circuits to ensure design integrity and performance.	
C318.5	**Evaluate** power integrity issues such as IR drop and crosstalk in CMOS layouts and propose optimization techniques for reliable circuit performance.	

Course Name: e – CAD Lab - 21EC627PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C318.1	3	3	3	2	3	-	-	-	3	3	-	3
C318.2	3	3	3	3	3	-	-	-	3	3	-	3
C318.3	3	3	3	3	3	-	-	-	3	3	-	3
C318.4	3	3	-	2	3	-	-	-	3	3	-	3
C318.5	3	3	-	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.4**	**3.0**	-	-	-	3.0	**3.0**	-	**3.0**

Course Name: e – CAD Lab - 21EC627PC		
CO	**PSO1**	**PSO2**
C318.1	-	3
C318.2	-	3
C318.3	-	3
C318.4	-	3
C318.5	-	3
Average	-	**3.0**

Course Name: Scripting Languages Lab-21CS641PC		**R21**
After completion of course the student will be able to		
C319.1	**Develop** basic Ruby scripts to perform string manipulations, mathematical computations, and conditional logic for simple problem-solving.	
C319.2	**Implement** Ruby scripts to perform array manipulations, control structures, and solve problems using hashes for data representation.	
C319.3	**Design** TCL scripts for computations, sorting, list manipulation, and file operations, showcasing TCL syntax and programming skills.	
C319.4	**Use** Perl scripts with subroutines and string/list operations to solve complex problems, demonstrating modularity.	
C319.5	**Develop** Perl scripts for file handling, command-line argument processing, and reverse-order data output to address practical computational challenges.	

Course Name: Scripting Languages Lab-21CS641PC								**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C319.1	3	3	2	2	3	-	-	-	3	3	-	3
C319.2	3	3	3	2	3	-	-	-	3	3	-	3
C319.3	3	3	3	3	3	-	-	-	3	3	-	3
C319.4	3	3	3	3	3	-	-	-	3	3	-	3
C319.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.8**	**2.6**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Scripting Languages Lab-21CS641PC		
CO	**PSO1**	**PSO2**
C319.1	-	-
C319.2	-	-
C319.3	-	-
C319.4	-	-
C319.5	-	-
Average	-	-

Course Name: Environmental Science-*21MC605	**R21**
After completion of course the student will be able to	
C320.1	**Understand** ecosystems' structure, function, and processes like food chains and energy flow, applying them to field observations.
C320.2	**Analyze** the use and conservation of natural resources, **assessing** their environmental impact and sustainability.
C320.3	**Evaluate** biodiversity at all levels and understand conservation methods, threats, and global frameworks.
C320.4	**Examine** pollution types, sources, impacts, and **evaluate** control technologies and global issues like climate change and ozone depletion.
C320.5	**Apply** environmental laws, policies, and EIA methods to propose sustainable solutions, focusing on green technologies and ethics.

Course Name: Environmental Science-*21MC605									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C320.1	3	3	-	-	-	3	2	-	-	3	-	3
C320.2	3	3	-	-	-	3	3	-	-	3	-	3
C320.3	3	3	-	-	-	3	3	-	-	3	-	3
C320.4	3	3	-	-	-	3	3	-	-	3	-	3
C320.5	3	3	-	-	-	3	3	-	-	3	-	3
Average	**3.0**	**3.0**	**-**	**-**	**-**	**3.0**	**2.8**	**-**	**-**	**3.0**	**-**	**3.0**

Course Name: Environmental Science-*21MC605		
CO	**PSO1**	**PSO2**
C320.1	-	-
C320.2	-	-
C320.3	-	-
C320.4	-	-
C320.5	-	-
Average	-	-

Course Name: Artificial Intelligence-21MC607	**R21**
After completion of course the student will be able to	
C321.1	**Understand** the fundamentals of AI problems, agents, and environments, and **apply** various search strategies, including uninformed and heuristic search algorithms, to solve computational problems.
C321.2	**Implement** advanced search techniques, such as A*, Minimax search with Alpha-Beta pruning, and **apply** basic knowledge representation methods like propositional logic and first-order logic for reasoning tasks.
C321.3	**Analyze and apply** advanced knowledge representation techniques and reasoning under uncertainty, including Bayesian networks, nonmonotonic reasoning, and probabilistic reasoning methods.
C321.4	**Understand** the concepts of machine learning, including rote learning, learning by taking advice, and learning from examples, and implement decision tree algorithms for classification tasks.
C321.5	**Design and develop** expert systems using domain knowledge, knowledge acquisition, and explanation methods, including building shells for specific problem domains.

Course Name: : Artificial Intelligence-21MC607								**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C321.1	3	3	-	2	-	-	-	-	-	-	-	-
C321.2	3	3	3	3	-	-	-	-	-	-	-	2
C321.3	3	3	2	3	-	-	-	-	-	-	-	3
C321.4	3	3	-	2	-	-	-	-	-	-	-	3
C321.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	3.0	3.0	2.66	2.4	-	-	-	-	-	-	-	2.5

Course Name: : Artificial Intelligence-21MC607		
CO	**PSO1**	**PSO2**
C321.1	-	-
C321.2	-	-
C321.3	-	-
C321.4	-	-
C321.5	-	-
Average	-	-

IV YEAR : I SEM

Course Name: Microwave &Optical Communications-21EC730PC		**R21**
After completion of course the student will be able to		
C401.1	**Analyze** O-type and M-type microwave tubes, such as klystrons and TWTs, for performance and limitations at microwave frequencies.	
C401.2	**Examine** the principles, characteristics, and applications of Gunn, IMPATT, and TRAPATT diodes for microwave frequency generation.	
C401.3	**Design and analyze** waveguide components for efficient microwave signal transmission.	
C401.4	**Use** microwave measurement techniques to **evaluate** system performance.	
C401.5	**Understand** optical fiber transmission, types, losses, and components to **evaluate** optical link budgets and system performance.	

Course Name: Microwave and Optical Communications - 21EC730PC									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C401.1	3	3	-	3	-	-	-	-	-	-	-	-
C401.2	3	2	-	3	-	-	-	-	-	-	-	-
C401.3	3	3	2	2	-	-	-	-	-	-	-	-
C401.4	3	3	3	2	-	-	-	-	-	-	-	-
C401.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.0**	**2.8**	**2.33**	**2.4**	-	-	-	-	-	-	-	-

Course Name: Microwave and Optical Communications - EC701PC		
CO	**PSO1**	**PSO2**
C401.1	-	-
C401.2	-	-
C401.3	-	-
C401.4	-	-
C401.5	-	-
Average	-	-

Course Name: Professional Practice, Law and Ethics-21SM709MS	**R21**
After completion of course the student will be able to	
C402.1	**Develop** a comprehensive understanding of professional ethics, ethical responsibilities, and mechanisms like whistle-blowing to address ethical dilemmas in engineering practices.
C402.2	**Apply** the fundamental principles of contract law, including essential elements, performance, discharge, and remedies, to engineering and business practices.
C402.3	**Analyze** various dispute resolution methods like arbitration, conciliation, and mediation to resolve engineering and construction-related conflicts effectively.
C402.4	**Understand and apply** labour engagement practices, industrial dispute laws, and construction-related regulations, including RERA and NBC.
C402.5	**Acquire** knowledge of intellectual property laws related to copyrights, patents, and trademarks, ensuring compliance and protection of innovative engineering solutions.

Course Name: Professional Practice, Law and Ethics-21SM709MS									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C402.1	-	-	-	-	-	3	-	3	-	-	-	3
C402.2	-	-	-	-	-	2	-	3	-	-	-	3
C402.3	-	-	-	-	-	3	-	3	-	-	-	2
C402.4	-	-	-	-	-	3	-	3	-	-	-	3
C402.5	-	-	-	-	-	2	-	3	-	-	-	3
Average	-	-	-	-	-	**2.6**	-	**3.0**	**-**	**-**	**-**	**2.8**

Course Name: Professional Practice, Law and Ethics-21SM709MS		
CO	**PSO1**	**PSO2**
C402.1	-	-
C402.2	-	-
C402.3	-	-
C402.4	-	-
C402.5	-	-
Average	-	-

Course Name: Radar Systems - 21EC742PE	**R21**
After completion of course the student will be able to	
C403.1	**Analyze** the basic principles of radar systems, including range performance, radar equations, and system losses, for designing efficient radar solutions.
C403.2	**Apply** principles of continuous-wave and frequency-modulated radar systems for Doppler measurement and altitude estimation in practical applications.
C403.3	**Evaluate** the working of Moving Target Indicator and Pulse Doppler radar systems, including their parameters, performance, and limitations in detecting moving targets.
C403.4	**Design and analyze** radar tracking systems using techniques like sequential lobing, conical scan, and monopulse tracking for accurate target tracking.
C403.5	**Investigate** radar signal detection in noisy environments, **analyze** radar receivers and displays, and **explore** phased array antennas for advanced radar applications.

Course Name: Radar Systems - 21EC742PE									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C403.1	3	3	2	2	-	-	-	-	-	-	-	-
C403.2	3	3	2	2	-	-	-	-	-	-	-	3
C403.3	3	3	3	2	-	-	-	-	-	-	-	3
C403.4	3	3	3	2	-	-	-	-	-	-	-	3
C403.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.2**	-	-	-	-	-	-	-	**3.0**

Course Name: Radar Systems - 21EC742PE		
CO	**PSO1**	**PSO2**
C403.1	-	-
C403.2	-	-
C403.3	-	-
C403.4	-	-
C403.5	-	-
Average	-	-

Course Name: Satellite Communications - 21EC745PE		**R21**
After completion of course the student will be able to		
C404.1	**Demonstrate an understanding** of satellite communication systems, including their origin, orbital mechanics, and launch vehicle technologies.	
C404.2	**Analyze** the functioning of various satellite subsystems such as attitude and orbit control, telemetry, and communication systems to **assess** their roles in satellite operations.	
C404.3	**Design** satellite links by applying transmission theory, and **evaluate** the performance of multiple access techniques like FDMA, TDMA, and CDMA in satellite communication.	
C404.4	**Examine** the components and technologies used in earth station systems, including transmitters, receivers, antennas, and tracking systems for effective satellite communication.	
C404.5	**Understand** the characteristics of LEO and GEO satellite systems and **apply** GPS principles for accurate positioning and navigation.	

Course Name: Satellite Communications - 21EC745PE									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C404.1	3	3	-	-	-	-	-	-	-	-	-	3
C404.2	3	3	-	3	-	-	-	-	-	-	-	3
C404.3	3	3	3	3	-	-	-	-	-	-	-	3
C404.4	3	2	2	2	-	-	-	-	-	-	-	3
C404.5	3	3	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.8	2.5	2.66	-	-	-	-	-	-	-	3.0

Course Name: Satellite Communications - 21EC745PE		
CO	**PSO1**	**PSO2**
C404.1	-	-
C404.2	-	-
C404.3	-	-
C404.4	-	-
C404.5	-	-
Average	-	-

Course Name: Python Programming- 21CS7182OE		**R21**
After completion of course the student will be able to		
C405.1	**Understand** Python basics, objects, and various data types like numbers, strings, lists, and tuples, enabling effective problem-solving using Python.	
C405.2	**Gain** knowledge of file operations, exception handling, and modular programming for building robust applications.	
C405.3	**Develop** proficiency in using regular expressions and multithreaded programming to manage concurrency and process complex patterns in data.	
C405.4	**Design** and implement GUI-based and web-based applications using Python libraries and frameworks.	
C405.5	**Apply** database programming techniques and ORM concepts to manage data-driven applications.	

Course Name: Python Programming- 21CS7182OE									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C405.1	3	3	2	2	-	-	-	-	-	-	-	2
C405.2	3	3	2	2	-	-	-	-	-	-	-	2
C405.3	3	3	3	2	-	-	-	-	-	-	-	2
C405.4	3	3	3	3	-	-	-	-	-	-	-	3
C405.5	3	3	3	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.6**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.6**

Course Name: Python Programming- 21CS7182OE		
CO	**PSO1**	**PSO2**
C405.1	-	-
C405.2	-	-
C405.3	-	-
C405.4	-	-
C405.5	-	-
Average	-	-

Course Name: Microwave &Optical Communications Lab-21EC731PC	**R21**
After completion of course the student will be able to	
C406.1	**Analyze** the characteristics of microwave components such as Reflex Klystron, Gunn Diode, and directional couplers to **understand** their operational principles.
C406.2	**Perform** attenuation, frequency, and impedance measurements using microwave test benches and **analyze** waveguide component scattering parameters.
C406.3	**Measure** Voltage Standing Wave Ratio (VSWR) and impedance matching techniques to optimize microwave transmission.
C406.4	Characterize LED and Laser Diode, and **study** intensity modulation techniques for optical fiber communication.
C406.5	**Evaluate** optical fiber communication parameters such as data rate, numerical aperture, and link losses to enhance system efficiency.

Course Name: Microwave and Optical Communications Lab – 21EC731PC									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C406.1	3	3	2	2	3	-	-	-	3	3	-	-
C406.2	3	3	2	3	3	-	-	-	3	3	-	-
C406.3	3	3	3	3	3	-	-	-	3	3	-	-
C406.4	3	3	3	3	3	-	-	-	3	3	-	-
C406.5	3	3	3	3	3	-	-	-	3	3	-	-
Average	**3.0**	**3.0**	**2.6**	**2.8**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**-**

Course Name: Microwave and Optical Communications Lab – 21EC731PC		
CO	**PSO1**	**PSO2**
C406.1	-	-
C406.2	-	-
C406.3	-	-
C406.4	-	-
C406.5	-	-
Average	-	-

Course Name: Summer Internship – II-21EC757PR		**R21**
After completion of course the student will be able to		
C407.1	**Identify and analyze** real-world engineering problems related to electronics and communication systems using theoretical knowledge.	
C407.2	**Design and develop** innovative solutions or prototypes for industrial problems by applying engineering principles and modern tools.	
C407.3	**Work** collaboratively in a multidisciplinary team and **demonstrate** effective project management, planning, and execution	
C407.4	**Apply** project management and time management skills to deliver solutions within stipulated timelines.	
C407.5	Document the project outcomes effectively and reflect on the learning process to foster lifelong learning and adaptability in a professional environment.	

Course Name: Summer Internship – II-21EC757PR								**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C407.1	3	3	3	3	3	3	2	2	3	-	3	3
C407.2	3	3	3	3	3	3	3	3	3	-	3	3
C407.3	-	-	-	-	-	-	-	-	3	3	2	3
C407.4	-	-	-	-	-	-	-	-	3	3	3	3
C407.5	-	-	-	-	3	-	-	-	2	3	3	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.5**	**2.8**	**3.0**	**2.80**	**3.0**

Course Name: Summer Internship – II-21EC757PR		
CO	**PSO1**	**PSO2**
C407.1	3	3
C407.2	3	3
C407.3	3	3
C407.4	3	3
C407.5	3	3
Average	**3.0**	**3.0**

Course Name: Project Stage– I-21EC758PR		**R21**
After completion of course the student will be able to		
C408.1	**Identify and define** an engineering problem or research question in electronics and communication by conducting a thorough literature survey.	
C408.2	**Conduct** an in-depth review of existing solutions, methodologies, and technologies to understand the current state-of-the-art.	
C408.3	**Formulate** clear and measurable project objectives and constraints based on the insights gained from the literature review.	
C408.4	**Develop** a preliminary design and select appropriate methodologies or models to address the identified problem.	
C408.5	**Prepare** and present a detailed report covering the literature survey, problem definition, and preliminary design.	

Course Name: Project Stage-I - 21EC758PR									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C408.1	3	3	-	-	-	2	2	-	2	-	2	3
C408.2	3	3	-	3	-	3	3	-	3	2	3	3
C408.3	3	3	3	3	-	-	-	-	3	3	3	3
C408.4	3	3	3	3	3	-	3	3	3	3	3	3
C408.5	-	-	-	-	-	-	-	-	3	3	2	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.66**	**3.0**	**2.8**	**2.75**	**2.6**	**3.0**

Course Name Project Stage-I - 21EC758PR		
CO	**PSO1**	**PSO2**
C408.1	3	3
C408.2	3	3
C408.3	3	3
C408.4	3	3
C408.5	3	3
Average	**3.0**	**3.0**

IV YEAR : II SEM

Course Name: Optical Communications - 21EC851PE		**R21**
After completion of course the student will be able to		
C409.1	**Explain** the principles of optical fiber communication, waveguiding mechanisms, fiber types, and material properties.	
C409.2	**Analyze** signal distortion mechanisms in optical fibers and **evaluate** loss mechanisms and dispersion types.	
C409.3	**Demonstrate** knowledge of fiber splicing techniques, optical sources, and source-to-fiber power coupling.	
C409.4	**Describe** the working principles of optical detectors, receiver operations, and their performance parameters in optical communication systems.	
C409.5	**Design** optical communication systems by performing link power budgets and rise-time calculations considering system constraints.	

Course Name: Optical Communications - 21EC851PE									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C409.1	3	2	-	-	-	-	-	-	-	-	-	-
C409.2	3	3	-	2	-	-	-	-	-	-	-	2
C409.3	3	3	2	-	-	-	-	-	-	-	-	3
C409.4	3	3	-	2	-	-	-	-	-	-	-	-
C409.5	3	3	**3**	-	-	-	-	-	-	-	-	**3**
Average	3.0	2.8	**2.5**	**2.0**	-	-	-	-	-	-	-	**2.66**

Course Name: Optical Communications - 21EC851PE		
CO	**PSO1**	**PSO2**
C409.1	-	-
C409.2	-	-
C409.3	-	-
C409.4	-	-
C409.5	-	-
Average	-	-

Course Name: Wireless Communications - 21EC852PE	**R21**
After completion of course the student will be able to	
C410.1	**Explain** the fundamentals of cellular systems, including frequency reuse, interference management, handoff strategies, and techniques to improve coverage and capacity.
C410.2	**Analyze** large-scale path loss mechanisms and propagation models for outdoor and indoor wireless communication environments.
C410.3	**Evaluate** small-scale fading and multipath propagation effects, including their statistical models, Doppler spread, and time dispersion parameters.
C410.4	**Demonstrate** knowledge of equalization and diversity techniques to mitigate fading effects and enhance wireless communication reliability.
C410.5	**Compare** and contrast various wireless networks, their standards, protocols, and applications, with a focus on WLAN and PAN technologies.

Course Name: Wireless Communications - 21EC852PE									**R21**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C410.1	3	3	3	-	-	-	-	-	-	-	-	3
C410.2	3	3	-	3	-	-	-	-	-	-	-	-
C410.3	3	3	-	3	-	-	-	-	-	-	-	2
C410.4	3	3	2	-	-	-	-	-	-	-	-	3
C410.5	3	3	-	-	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	2.5	3.0	-	-	-	-	-	-	-	**2.66**

Course Name: Wireless Communications - 21EC852PE		
CO	**PSO1**	**PSO2**
C410.1	-	-
C410.2	-	-
C410.3	-	-
C410.4	-	-
C410.5	-	-
Average	-	-

Course Name: Database Management Systems- 21CS8185OE		**R21**
After completion of course the student will be able to		
C411.1	**Understand** the foundational concepts of database systems, including the data model, data independence, and the ER model for database design.	
C411.2	**Apply** the relational model concepts, integrity constraints, relational algebra, and relational calculus to design and manipulate relational databases.	
C411.3	**Develop** SQL queries with constraints, triggers, and schema refinement, including normalization techniques for optimizing database design.	
C411.4	**Analyze** transaction management concepts such as concurrency control, atomicity, durability, and recovery techniques to ensure database reliability.	
C411.5	**Examine** file organization and indexing methods, including tree-based and hash-based indexing, to optimize database performance and query execution.	

Course Name: Database Management Systems- 21CS8185OE									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C411.1	3	3	2	-	-	-	-	-	-	-	-	2
C411.2	3	3	2	-	-	-	-	-	-	-	-	-
C411.3	3	3	3	-	-	-	-	-	-	-	-	-
C411.4	3	3	3	2	-	-	-	-	-	-	-	-
C411.5	3	3	-	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.5**	**2.5**	-	-	-	-	-	-	-	**2.5**

Course Name: Database Management Systems- 21CS8185OE		
CO	**PSO1**	**PSO2**
C411.1	-	-
C411.2	-	-
C411.3	-	-
C411.4	-	-
C411.5	-	-
Average	-	-

Course Name: Project Stage– II**-:** 21EC859PR		**R21**
After completion of course the student will be able to		
C412.1	**Apply** engineering principles and advanced tools to refine the conceptual design and create a detailed system model for implementation.	
C412.2	**Implement** the designed solution using appropriate hardware/software tools and methodologies.	
C412.3	**Evaluate** the performance of the implemented solution through rigorous testing and validate it against defined objectives.	
C412.4	**Analyze** and address the societal, environmental, and ethical impacts of the implemented solution.	
C412.5	Document the complete project and present it effectively, demonstrating technical proficiency and communication skills.	

Course Name: Project Stage-II **-:** 21EC859PR									**R21**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C412.1	3	3	3	3	3	-	-	-	3	3	3	3
C412.2	3	3	3	3	3	-	-	-	3	3	3	3
C412.3	3	3	3	3	3	-	-	-	3	3	3	3
C412.4	-	-	-	-	-	3	3	3	3	3	-	3
C412.5	-	-	-	-	-	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

Course Name: Project Stage-II **-:** 21EC859PR		
CO	**PSO1**	**PSO2**
C413.1	3	3
C413.2	3	3
C413.3	3	3
C413.4	3	3
C413.5	3	3
Average	**3.0**	**3.0**

Department of Electronica and Communication Engineering

The course outcomes along with POs and PSOs mapping tables are shown below for the R18 regulation.

II YEAR :

Course Name: Electronic Devices and Circuits - EC301PC		**R18**
After completion of course the student will be able to		
C201.1	**Analyze and design** rectifiers and diode-based circuits to understand their behavior in electronic systems.	
C201.2	**Apply** principles of Bipolar Junction Transistors (BJTs) to **design and analyze** amplifier circuits by understanding their switching and biasing characteristics.	
C201.3	**Evaluate and compare** the performance of Junction Field Effect Transistors (FETs) and Special Purpose Diodes in electronic circuits.	
C201.4	**Design and analyze** small signal low frequency BJT amplifiers using hybrid models and h-parameters to optimize amplifier performance.	
C201.5	**Implement and assess** small signal FET amplifiers and MOSFET-based circuits for practical applications in electronic systems.	

Course Name: Electronic Devices and Circuits - EC301PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C201.1	3	3	3	-	-	-	-	-	-	-	-	-
C201.2	3	3	2	2	-	-	-	-	-	-	-	-
C201.3	3	3	3	2	-	-	-	-	-	-	-	3
C201.4	3	3	3	3	-	-	-	-	-	-	-	2
C201.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.00**	**3.0**	**2.60**	**2.5**	-	-	-	-	-	-	-	2.66

Course Name: Electronic Devices and Circuits - EC301PC		
CO	**PSO1**	**PSO2**
C201.1	3	-
C201.2	-	-
C201.3	2	3
C201.4	3	-
C201.5	3	3
Average	**2.75**	**3.00**

Course Name: Network Analysis and Transmission Lines - EC302PC	**R18**
After completion of course the student will be able to	
C202.1	**Analyze and apply** network topology, impedance transformation, and magnetic circuits to solve electrical network problems.
C202.2	**Perform** transient and steady-state analysis of RC, RL, and RLC circuits, including resonance and response analysis.
C202.3	**Evaluate** two-port network parameters, network functions, and **design** impedance matching networks.
C202.4	**Understand and analyze** transmission line parameters, impedance, and distortion to **evaluate** performance of transmission lines.
C202.5	**Perform** transmission line impedance matching with and without Smith charts, and analyze reflections and Standing waves.

Course Name: Network Analysis and Transmission Lines - EC302PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C202.1	3	3	2	-	-	-	-	-	-	-	-	-
C202.2	3	3	3	2	-	-	-	-	-	-	-	-
C202.3	3	3	2	-	-	-	-	-	-	-	-	-
C202.4	3	3	3	2	-	-	-	-	-	-	-	-
C202.5	3	3	3	3	-	-	-	-	-	-	-	3
Average	**3**	**3**	**2.6**	**2.33**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Network Analysis and Transmission Lines - EC302PC		
CO	**PSO1**	**PSO2**
C202.1	-	-
C202.2	-	-
C202.3	-	-
C202.4	-	-
C202.5	-	-
Average	-	-

Course Name: Digital System Design - EC303PC		**R18**
After completion of course the student will be able to		
C203.1	**Understand and apply** number systems, Boolean algebra, and digital logic gates to design and analyze digital circuits.	
C203.2	**Design** combinational logic circuits using various methods and components by minimizing Boolean functions.	
C203.3	**Design and analyze** sequential circuits, including various types of flip-flops, shift registers, and counters.	
C203.4	**Develop and synthesize** sequential machines, including finite state machines, and implement synchronous sequential circuits for specific applications.	
C203.5	**Realize and compare** logic gates using different logic families for practical digital system design and interfacing.	

Course Name: Digital System Design - EC303PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C203.1	3	3	2	-	-	-	-	-	-	-	-	-
C203.2	3	3	3	-	-	-	-	-	-	-	-	-
C203.3	3	3	3	-	-	-	-	-	-	-	-	-
C203.4	3	3	3	-	-	-	-	-	-	-	-	2
C203.5	3	3	2	-	-	-	-	-	-	-	-	3
Average	**3.00**	**3.00**	**2.60**	**-**	-	-	-	-	-	-	-	**2.5**

Course Name: Digital System Design - EC303PC		
CO	**PSO1**	**PSO2**
C203.1	2	3
C203.2	-	3
C203.3	3	3
C203.4	-	3
C203.5	-	3
Average	**2.50**	**3.00**

Course Name: Signals and Systems - EC304PC		**R18**
After completion of course the student will be able to		
C204.1	**Analyze and approximate** signals using orthogonal functions and **understand** fundamental signal classifications and operations.	
C204.2	**Apply** Fourier series and Fourier transforms to **analyze** continuous-time signals, including periodic and non-periodic signals.	
C204.3	**Design and Evaluate** LTI systems for the given requirements using impulse response and transfer functions.	
C204.4	Utilize Laplace and Z-transforms to **analyze and design** systems in both continuous and discrete domains, including their properties and region of convergence.	
C204.5	**Apply** sampling theory and correlation analysis to reconstruct signals from samples and understand the effects of sampling on signal integrity.	

Course Name: Signals and Systems - EC304PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C204.1	3	3	2	-	-	-	-	-	-	-	-	-
C204.2	3	3	3	3	-	-	-	-	-	-	-	-
C204.3	3	3	3	3	-	-	-	-	-	-	-	-
C204.4	3	3	3	2	-	-	-	-	-	-	-	-
C204.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.00**	**3.00**	**2.6**	**2.50**	-	-	-	-	-	-	-	-

Course Name: Signals and Systems - EC304PC		
CO	**PSO1**	**PSO2**
C204.1	-	-
C204.2	-	-
C204.3	-	-
C204.4	-	-
C204.5	-	-
Average	-	-

Course Name: Probability Theory and Stochastic Processes - EC305ES	**R18**
After completion of course the student will be able to	
C205.1	**Understand and apply** probability theory, random variables, and their distributions to solve problems involving discrete and continuous sample spaces.
C205.2	**Analyze** operations on random variables and **apply** these concepts to vector random variables and the central limit theorem.
C205.3	**Understand and analyze** random processes, including their temporal characteristics, stationarity, and response to linear systems.
C205.4	**Analyze** the spectral characteristics of random processes, including power spectra and cross-power density spectra, and their relationship to system responses.
C205.5	**Apply** concepts of noise sources and information theory to analyze and design systems with considerations of noise, entropy, and channel capacity

Course Name: Probability Theory and Stochastic Processes - EC305ES									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C205.1	3	2	2	-	-	-	-	-	-	-	-	-
C205.2	3	3	3	3	-	-	-	-	-	-	-	-
C205.3	3	3	3	3	-	-	-	-	-	-	-	-
C205.4	3	3	3	3	-	-	-	-	-	-	-	-
C205.5	3	3	-	2	-	-	-	-	-	-	-	-
Average	**3.00**	**2.80**	**2.75**	**2.75**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

Course Name: Probability Theory and Stochastic Processes - EC305ES		
CO	**PSO1**	**PSO2**
C205.1	-	-
C205.2	-	-
C205.3	-	-
C205.4	-	-
C205.5	-	-
Average	-	-

Course Name: Electronic Devices and Circuits Lab - EC306PC	**R18**
After completion of course the student will be able to	
C206.1	**Analyze and characterize** the behavior of semiconductor devices such as diodes and transistors.
C206.2	**Design and evaluate** rectifier circuits and filtering techniques.
C206.3	**Measure and analyze** the performance of transistor amplifiers in various configurations.
C206.4	**Understand and analyze** the characteristics of special semiconductor devices such as SCRs.
C206.5	**Implement and analyze** clipping and clamping circuits in various applications.

Course Name: Electronic Devices and Circuits Lab - EC306PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C206.1	3	3	2	-	3	-	-	-	3	3	-	-
C206.2	3	3	3	-	3	-	-	-	3	3	-	3
C206.3	3	3	2	-	3	-	-	-	3	3	-	-
C206.4	3	3	2	-	3	-	-	-	3	3	-	3
C206.5	3	3	3	-	3	-	-	-	3	3	-	-
Average	**3.00**	**3.00**	**2.4**	**-**	**3.0**	**-**	**-**	**-**	**3.00**	**3.00**	**-**	**3.0**

Course Name: Electronic Devices and Circuits Lab - EC306PC		
CO	**PSO1**	**PSO2**
C206.1	-	-
C206.2	3	-
C206.3	3	-
C206.4	-	-
C206.5	-	-
Average	**3.00**	**-**

Course Name: Digital System Design Lab - EC307PC		**R18**
After completion of course the student will be able to		
C207.1	**Design and realize** Boolean expressions and logic gates using basic and universal gates.	
C207.2	**Design and implement** digital circuits involving arithmetic operations and conversion between different number systems.	
C207.3	**Design and implement** multiplexers, comparators, and other combinational circuits.	
C207.4	**Design and implement** various types of registers, counters, and shift registers using flip-flops.	
C207.5	**Design and realize** finite state machines for sequence detection and other sequential logic applications.	

Course Name: Digital System Design Lab - EC307PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C207.1	3	3	3	-	3	-	-	-	3	3	-	-
C207.2	3	3	3	-	3	-	-	-	3	3	-	-
C207.3	3	3	3	3	3	-	-	-	3	3	-	3
C207.4	3	3	2	3	3	-	-	-	3	3	-	3
C207.5	3	3	2	2	3	-	-	-	3	3	-	3
Average	**3.00**	**3.00**	**2.60**	**2.66**	3	-	-	-	**3.00**	**3.00**	-	**3.0**

Course Name: Digital System Design Lab - EC307PC		
CO	**PSO1**	**PSO2**
C207.1	3	3
C207.2	-	3
C207.3	-	3
C207.4	-	3
C207.5	-	3
Average	**3.0**	**3.0**

Course Name: Basic Simulation Lab - EC308ES		**R18**
After completion of course the student will be able to		
C208.1	**Perform** fundamental matrix operations and generate various signals (periodic and aperiodic) using MATLAB	
C208.2	**Perform** operations on signals and compute the energy and average power of signals using MATLAB.	
C208.3	**Understand** the concepts of convolution, autocorrelation, cross-correlation, Fourier transform, and Laplace transform and **apply** these techniques to signals analysis using MATLAB.	
C208.4	**Verify** the properties of linearity, time-invariance, physical realizability, and stability of continuous and discrete systems using MATLAB.	
C208.5	**Simulate** Gaussian noise, compute statistical parameters, verify sampling theorem, and analyze random processes for stationarity using MATLAB.	

Course Name: Basic Simulation Lab - EC308ES									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C208.1	3	-	-	-	3	-	-	-	3	3	-	-
C208.2	3	3	3	3	3	-	-	-	3	3	-	3
C208.3	3	3	3	3	3	-	-	-	3	3	-	3
C208.4	3	3	3	3	3	-	-	-	3	3	-	3
C208.5	3	3	3	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.75**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Basic Simulation Lab - EC308ES		
CO	**PSO1**	**PSO2**
C208.1	-	-
C208.2	-	-
C208.3	-	-
C208.4	-	-
C208.5	-	-
Average	-	-

Course Name: Constitution of India - MC309	**R18**
After completion of course the student will be able to	
C209.1	**Understand** the concept of constitutional law and constitutionalism, the historical evolution of the Indian Constitution, and its fundamental principles.
C209.2	**Analyze** the scheme of fundamental rights, duties, and directive principles of state policy, emphasizing their role in achieving justice and equality in society.
C209.3	**Explain** the federal structure of the Indian Constitution, distribution of powers between Union and States, and the role of local self-government.
C209.4	**Examine** the parliamentary form of government, constitutional powers of the President, and emergency provisions in India.
C209.5	**Evaluate** constitutional amendments, judicial activism, and the scope of rights under Articles 19 and 21 to understand their impact on legal and social reforms.

Course Name: Constitution of India - MC309									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C209.1	-	-	-	-	-	3	2	3	-	-	-	3
C209.2	-	-	-	-	-	3	3	3	-	-	-	3
C209.3	-	-	-	-	-	3	3	3	-	-	-	3
C209.4	-	-	-	-	-	3	-	2	-	-	-	3
C209.5	-	-	-	-	-	3	-	3	-	-	-	3
Average	-	-	-	-	-	3.0	2.66	2.8	-	-	-	3.00

Course Name: Constitution of India - MC309		
CO	**PSO1**	**PSO2**
C209.1	-	-
C209.2	-	-
C209.3	-	-
C209.4	-	-
C209.5	-	-
Average	-	-

Course Name: Laplace Transforms, Numerical Methods & Complex Variables - MA401BS		**R18**
After completion of course the student will be able to		
C210.1	**Understand and apply** Laplace Transforms to solve differential equations, evaluate integrals, and transform periodic and special functions.	
C210.2	**Apply** numerical methods and interpolation techniques to solve polynomial, transcendental equations, and interpolation problems.	
C210.3	**Solve** numerical integration problems and ordinary differential equations using methods like Trapezoidal, Simpson's rules, Taylor's series, Runge-Kutta, and Euler methods.	
C210.4	**Understand and apply** the concepts of differentiation in complex variables, including Cauchy-Riemann equations, analytic functions, and harmonic functions.	
C210.5	**Apply** integration techniques in complex analysis, such as line integrals, Cauchy's theorem, Cauchy's integral formula, and use residue calculus for evaluating integrals.	

Course Name: Laplace Transforms, Numerical Methods & Complex Variables - MA401BS									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C210.1	3	3	3	-	-	-	-	-	-	-	-	-
C210.2	3	3	2	-	-	-	-	-	-	-	-	-
C210.3	3	3	2	-	-	-	-	-	-	-	-	-
C210.4	3	3	3	-	-	-	-	-	-	-	-	-
C210.5	3	3	3	-	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Course Name: Laplace Transforms, Numerical Methods & Complex Variables - MA401BS		
CO	**PSO1**	**PSO2**
C210.1	-	-
C210.2	-	-
C210.3	-	-
C210.4	-	-
C210.5	-	-
Average	-	-

Course Name: Electromagnetic Fields and Waves - EC402PC	**R18**
After completion of course the student will be able to	
C211.1	**Analyze** electrostatic fields, charge distributions, and electric potential using Coulomb's Law, Gauss's Law, and Poisson's equation.
C211.2	**Apply** magnetostatic principles to determine magnetic fields, flux densities, and magnetic forces using Biot-Savart's Law and Ampere's Circuital Law.
C211.3	**Understand and apply** Maxwell's equations for time-varying fields to various electromagnetic phenomena.
C211.4	**Analyze** electromagnetic wave propagation in conducting and dielectric media.
C211.5	**Design and analyze** waveguides, includes understanding wave modes, phase and group velocities, and power transmission through these structures.

Course Name: Electromagnetic Fields and Waves - EC402PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C211.1	3	3	3	3	-	-	-	-	-	-	-	-
C211.2	3	3	2	2	-	-	-	-	-	-	-	-
C211.3	3	3	2	2	-	-	-	-	-	-	-	-
C211.4	3	3	3	3	-	-	-	-	-	-	-	-
C211.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.00**	**3.00**	**2.4**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Course Name: Electromagnetic Fields and Waves - EC402PC		
CO	**PSO1**	**PSO2**
C211.1	-	-
C211.2	-	-
C211.3	-	-
C211.4	-	-
C211.5	-	-
Average	-	-

Course Name: Analog and Digital Communications - EC403PC		**R18**
After completion of course the student will be able to		
C212.1	**Analyze and implement** amplitude modulation (AM) and demodulation techniques, including generation, detection, and characteristics of AM, DSBSC, SSB, and VSB signals.	
C212.2	**Understand and apply** frequency modulation (FM) and phase modulation (PM) techniques, including their spectrum analysis, generation, detection, and comparison with AM.	
C212.3	**Design and evaluate** different types of transmitters and receivers, including AM and FM transmitters and receivers, and **understand** their operational characteristics.	
C212.4	**Analyze and implement** pulse modulation and pulse code modulation techniques for efficient digital communication.	
C212.5	**Analyze and implement** digital modulation techniques, including ASK, FSK, BPSK, QPSK, and QAM, and **evaluate** baseband transmission and reception performance.	

Course Name: Analog and Digital Communications - EC403PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C212.1	3	3	3	2	-	-	-	-	-	-	-	-
C212.2	3	3	2	2	-	-	-	-	-	-	-	-
C212.3	3	3	2	2	-	-	-	-	-	-	-	3
C212.4	3	3	3	2	-	-	-	-	-	-	-	3
C212.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Analog and Digital Communications - EC403PC		
CO	**PSO1**	**PSO2**
C212.1	-	-
C212.2	-	-
C212.3	-	-
C212.4	2	-
C212.5	2	-
Average	**2**	**-**

Course Name: Linear IC Applications - EC404PC		**R18**
After completion of course the student will be able to		
C213.1	**Understand** the principles, characteristics, and applications of operational amplifiers (Op-Amps), including ideal and practical aspects, internal circuits, and modes of operation.	
C213.2	**Design and implement** various typical applications of operational amplifiers in linear and non-linear modes of operation.	
C213.3	**Design and analyze** various active filter circuits and oscillators using operational amplifier.	
C213.4	**Understand** the functional diagrams and applications of IC 555 and IC 565 and **Apply** them for **design** different application	
C213.5	**Classify** and **analyze** the operation of various types of analog to digital and digital to analog converters & Design them.	

Course Name: Linear IC Applications - EC404PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C213.1	3	2	-	2	-	-	-	-	-	-	-	3
C213.2	3	3	2	2	-	-	-	-	-	-	-	3
C213.3	3	3	3	3	-	-	-	-	-	-	-	3
C213.4	3	3	3	3	-	-	-	-	-	-	-	3
C213.5	3	3	2	2	-	-	-	-	-	-	-	3
Average	**3.0**	**2.8**	**2.5**	2.4	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Linear IC Applications - EC404PC		
CO	**PSO1**	**PSO2**
C213.1	-	3
C213.2	2	3
C213.3	-	3
C213.4	3	3
C213.5	3	3
Average	**2.66**	**3.0**

Course Name: Electronic Circuit Analysis - EC405PC		**R18**
After completion of course the student will be able to		
C214.1	**Design** of multistage amplifiers and **understand** the concepts of High Frequency Analysis of Transistors.	
C214.2	**Design and Analyze** negative feedback circuits for improving stability	
C214.3	**Design and analyze** positive feedback circuits for generating sustained oscillations	
C214.4	**Design** and **Realize** different classes of power amplifiers & tuned amplifiers useable for audio and Radio applications	
C214.5	**Design** of Multivibrators and sweep circuits for various applications.	

Course Name: Electronic Circuit Analysis - EC405PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C214.1	3	3	2	2	-	-	-	-	-	-	-	-
C214.2	3	3	2	2	-	-	-	-	-	-	-	-
C214.3	3	3	3	2	-	-	-	-	-	-	-	-
C214.4	3	3	3	2	-	-	-	-	-	-	-	3
C214.5	3	3	3	3	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.6**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**

Course Name: Electronic Circuit Analysis - EC405PC		
CO	**PSO1**	**PSO2**
C214.1	3	-
C214.2	-	-
C214.3	-	-
C214.4	-	-
C214.5	2	
Average	2.5	-

Course Name: Analog and Digital Communications Lab - EC406PC		**R18**
After completion of course the student will be able to		
C215.1	**Analyze** different AM and FM Modulation & Demodulation Technique using appropriate hardware experimentation setup and MATLAB	
C215.2	**Design** different Multiplexing Techniques using appropriate hardware experimentation setup and MATLAB	
C215.3	**Design** different Pulse Modulation Techniques using appropriate hardware experimentation setup and MATLAB	
C215.4	**Design and analyze** different Shift Keying Techniques using appropriate hardware experimentation setup and MATLAB	
C215.5	**Design and analyze** Different Quadrature Shift Keying Techniques using appropriate hardware experimentation setup and MATLAB	

Course Name: Analog and Digital Communications Lab - EC406PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C215.1	3	3	3	3	3	-	-	-	3	3	-	3
C215.2	3	3	2	2	3	-	-	-	3	3	-	3
C215.3	3	3	2	2	3	-	-	-	3	3	-	3
C215.4	3	3	2	2	3	-	-	-	3	3	-	3
C215.5	3	3	2	2	3	-	-	-	3	3	-	3
Average	3.0	3.0	2.2	2.2	3	-	-	-	3.0	3.0	-	3.0

Course Name: Analog and Digital Communications Lab - EC406PC		
CO	**PSO1**	**PSO2**
C215.1	-	-
C215.2	-	-
C215.3	3	-
C215.4	-	-
C215.5	-	-
Average	3	-

Course Name: IC Applications Lab - EC407PC		**R18**
After completion of course the student will be able to		
C216.1	**Analyze** different Modes of Operation of Op Amp using appropriate experimentation setup	
C216.2	**Design and Analyze** different Applications of Op Amp Circuits using appropriate experimentation setup.	
C216.3	**Design and Analyze** different Active filter Applications of Op Amp Circuits using appropriate experimentation setup.	
C216.4	**Design and analyze** different multi vibrator of Op Amp Circuits using appropriate experimentation setup.	
C216.5	**Design and analyze** Voltage Regulator of Op Amp Circuits using appropriate experimentation setup.	

Course Name: IC Applications Lab - EC407PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C216.1	3	3	-	2	3	-	-	-	3	3	-	-
C216.2	3	3	3	2	3	-	-	-	3	3	-	3
C216.3	3	3	3	3	3	-	-	-	3	3	-	3
C216.4	3	3	3	3	3	-	-	-	3	3	-	-
C216.5	3	3	2	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.75**	**2.4**	**3.0**	-	-	-	**3.0**	**3.0**	-	**3.0**

Course Name: IC Applications Lab - EC407PC		
CO	**PSO1**	**PSO2**
C216.1	-	3
C216.2	-	-
C216.3	2	2
C216.4	2	-
C216.5	2	2
Average	2.0	2.33

Course Name: Electronic Circuit Analysis Lab - EC408PC		**R18**
After completion of course the student will be able to		
C217.1	**Design and analyze** various single and multi-stage amplifiers using hardware and SPICE/Multisim	
C217.2	**Design and analyze** the various oscillator circuits using hardware and SPICE/Multisim	
C217.3	**Design and Analyze** multivibrators using hardware and SPICE/Multisim	
C217.4	**Design and analyze** feedback amplifiers using hardware and SPICE/Multisim	
C217.5	**Design and analyze** sweep circuits using hardware and SPICE/Multisim	

Course Name: Electronic Circuit Analysis Lab - EC408PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C217.1	3	3	2	2	3	-	-	-	3	3	-	-
C217.2	3	3	3	3	3	-	-	-	3	3	-	-
C217.3	3	3	3	3	3	-	-	-	3	3	-	-
C217.4	3	3	3	2	3	-	-	-	3	3	-	-
C217.5	2	2	2	2	3	-	-	-	3	3	-	-
Average	2.8	2.8	2.6	2.4	3.0	-	-	-	3.0	3.0	-	-

Course Name: Electronic Circuit Analysis Lab - EC408PC		
CO	**PSO1**	**PSO2**
C217.1	3	3
C217.2	3	-
C217.3	3	-
C217.4	-	3
C217.5	-	-
Average	3.0	3.0

Course Name: Gender Sensitization Lab - MC409	**R18**
After completion of course the student will be able to	
C218.1	**Understand** the fundamental concepts, terminologies, and social constructs of gender, and critically **analyze** the impact of socialization on shaping gender roles in society.
C218.2	**Analyze** the dynamics of gender roles and relations, **explore** issues like sex selection and the declining sex ratio, and understand the broader gender spectrum beyond the binary.
C218.3	**Evaluate** the division and valuation of labor, including invisible labor, and **assess** gender-related governance, development, and human rights issues.
C218.4	**Examine** the various types and impacts of gender-based violence from a human rights perspective and **explore** strategies to address and overcome these challenges.
C218.5	**Explore** the portrayal of gender in culture, including film, media, literature, and language, and promote the concept of just relationships and equality.

Course Name: Gender Sensitization Lab - MC409									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C218.1	-	-	-	-	-	3	-	3	-	-	-	3
C218.2	-	-	-	-	-	3	2	3	-	-	-	3
C218.3	-	-	-	-	-	3	-	3	-	-	-	3
C218.4	-	-	-	-	-	3	-	3	-	-	-	3
C218.5	-	-	-	-	-	3	3	3	-	-	-	3
Average	-	-	-	-	-	**3.0**	**2.5**	**3.0**	-	-	-	**3.0**

Course Name: Gender Sensitization Lab - MC409		
CO	**PSO1**	**PSO2**
C218.1	-	-
C218.2	-	-
C218.3	-	-
C218.4	-	-
C218.5	-	-
Average	-	-

III YEAR :

Course Name: Microprocessors & Microcontrollers - EC501PC	**R18**
After completion of course the student will be able to	
C301.1	**Understand** the architecture, instruction set, addressing modes, and assembly language programming of the 8086 microprocessor for logical operations, string manipulations, and branching.
C301.2	**Demonstrate** the ability to program and utilize the 8051 microcontroller for real-time control applications, including timer, interrupt, and serial communication programming.
C301.3	**Interface** peripheral devices like LCDs, keyboards, ADCs, and DACs with microcontrollers, and utilize serial communication protocols such as I2C, SPI, and UART for data transfer.
C301.4	**Understand** the ARM processor architecture, instruction set, and programming fundamentals for tasks involving data processing, branching, and exception handling.
C301.5	**Analyze** the architecture and features of advanced ARM processors like Cortex and OMAP, and **understand** their relevance in modern embedded systems.

Course Name Microprocessors & Microcontrollers - EC501PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C301.1	3	3	3	3	-	-	-	-	-	-	-	-
C301.2	3	3	3	3	-	-	-	-	-	-	-	-
C301.3	3	3	2	2	-	-	-	-	-	-	-	-
C301.4	3	3	2	2	-	-	-	-	-	-	-	3
C301.5	3	3	-	-	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.5**	**2.5**	-	-	-	-	-	-	-	**3.0**

Course Name: Microprocessors & Microcontrollers - EC501PC		
CO	**PSO1**	**PSO2**
C301.1	3	-
C301.2	3	-
C301.3	3	-
C301.4	3	-
C301.5	3	-
Average	**3.0**	-

Course Name: Data Communications and Networks - EC502PC		**R18**
After completion of course the student will be able to		
C302.1	**Understand** the fundamental concepts of data communication, network components, models, and standards, with a focus on layered architectures like OSI and TCP/IP.	
C302.2	**Analyze** error detection and correction techniques, flow control, and multiple access protocols, with applications to modern LANs and WiFi networks.	
C302.3	**Understand** network layer concepts including routing, addressing, and protocols, with a focus on their applications in virtual circuits and datagram networks.	
C302.4	**Evaluate** transport layer protocols (UDP, TCP) for multiplexing, reliable data transfer, flow control, and congestion control in modern networks.	
C302.5	**Explore** application layer services and protocols like FTP, HTTP, SMTP, and DNS, focusing on their design principles and real-world applications.	

Course Name: Data Communications and Networks - EC502PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C302.1	3	3	-	-	-	-	-	-	-	-	-	-
C302.2	3	3	3	2	-	-	-	-	-	-	-	3
C302.3	3	3	2	2	-	-	-	-	-	-	-	3
C302.4	3	3	3	3	-	-	-	-	-	-	-	3
C302.5	3	3	2	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.5**	**2.25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3.0

Course Name: Data Communications and Networks - EC502PC		
CO	**PSO1**	**PSO2**
C302.1	-	-
C302.2	-	-
C302.3	-	-
C302.4	-	-
C302.5	-	-
Average	-	-

Course Name: Control Systems - EC503PC		**R18**
After completion of course the student will be able to		
C303.1	**Analyze** electromechanical systems using mathematical modelling and **calculate** its transfer function	
C303.2	**Determine** Transient and Steady State behavior of systems using standard test signals for steady state errors	
C303.3	**Analyze** linear and non-linear systems for absolute stability and relative stability	
C303.4	**Design** a stable control system satisfying requirements of stability and reduced steady state error	
C303.5	**Construct** the state-space model to test the performance of LTI systems	

Course Name: Control Systems - EC503PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C303.1	3	3	3	3	-	-	-	-	-	-	-	-
C303.2	3	3	3	3	-	-	-	-	-	-	-	-
C303.3	3	3	3	3	-	-	-	-	-	-	-	-
C303.4	3	3	3	3	-	-	-	-	-	-	-	-
C303.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.0**	**3.0**	**2.8**	**2.8**	-	-	-	-	-	-	-	-

Course Name: Control Systems - EC503PC		
CO	**PSO1**	**PSO2**
C303.1	-	-
C303.2	-	-
C303.3	-	-
C303.4	-	-
C303.5	-	-
Average	-	-

Course Name: Business Economics & Financial Analysis - SM504MS		**R18**
After completion of course the student will be able to		
C304.1	**Understand** the structure of business firms, economic systems, and foundational economic concepts, enabling **analysis** of the economic environment's impact on business.	
C304.2	**Analyze** demand and supply dynamics, including elasticity and forecasting, to make informed decisions on resource allocation and pricing in various economic scenarios.	
C304.3	**Evaluate** different production functions, cost structures, and market competition to determine optimal production and pricing strategies.	
C304.4	**Apply** the principles of accounting to systematically record**, analyze**, and prepare financial statements, enhancing financial reporting and decision-making skills.	
C304.5	Conduct financial ratio analysis to **assess** business performance, liquidity, profitability, and solvency, supporting strategic financial decisions.	

Course Name: Business Economics & Financial Analysis - SM504MS									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C304.1	-	-	-	-	-	2	-	-	-	-	3	-
C304.2	-	-	-	-	-	3	-	-	-	-	3	-
C304.3	-	-	-	-	-	3	-	-	-	-	3	-
C304.4	-	-	-	-	-	3	-	-	-	-	3	-
C304.5	-	-	-	-	-	2	-	-	-	-	3	-
Average	-	-	-	-	-	**2.6**	-	**-**	**-**	-	**3.0**	-

Course Name: Business Economics & Financial Analysis - SM504MS		
CO	**PSO1**	**PSO2**
C304.1	-	-
C304.2	-	-
C304.3	-	-
C304.4	-	-
C304.5	-	-
Average	-	-

Course Name: Error Correcting Codes-EC512PE		**R18**
After completion of course the student will be able to		
C305.1	**Apply** coding techniques for reliable digital transmission and error control, understanding error control strategies and applications in data storage	
C305.2	**Analyze** and **implement** cyclic codes to detect and correct errors in digital systems, ensuring data integrity	
C305.3	**Utilize** convolutional codes for error detection and correction in digital communication systems, applying sequential and majority logic decoding	
C305.4	**Implement** advanced error correction techniques using Turbo and LDPC codes to enhance system performance in communication systems	
C305.5	**Develop** and **apply** space-time coding schemes to improve data rates and reliability in wireless communication systems with multiple antennas	

Course Name: Error Correcting Codes-EC512PE									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C305.1	3	2	-	2	-	-	-	-	-	-	-	-
C305.2	3	3	2	2	-	-	-	-	-	-	-	-
C305.3	3	3	3	2	-	-	-	-	-	-	-	-
C305.4	3	3	3	3	-	-	-	-	-	-	-	3
C305.5	3	3	2	3	-	-	-	-	-	-	-	3
Average	**3.0**	**2.8**	**2.5**	**2.4**	-	-	-	-	-	-	-	**3.0**

Course Name: Error Correcting Codes-EC512PE		
CO	**PSO1**	**PSO2**
C305.1	-	3
C305.2	-	3
C305.3	-	3
C305.4	-	3
C305.5	-	3
Average	-	3.0

Course Name: Microprocessors & Microcontrollers Lab - EC505PC		**R18**
After completion of course the student will be able to		
C306.1	**Have** programming skills for microprocessors and microcontrollers using assembly language and high-level languages like C.	
C306.2	**Interface** microprocessors/microcontrollers with various peripherals such as sensors, actuators, displays, and communication modules.	
C306.3	**Design and implement** embedded systems using microcontrollers for specific applications.	
C306.4	**Understand and perform** digital and analog input and output operations using microcontrollers.	
C306.5	**Understand** serial communication protocols, timers, counters and interrupt handling mechanisms in microcontrollers and **implementing** specific applications.	

Course Name: Microprocessors & Microcontrollers Lab - EC505PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C306.1	3	3	3	3	3	-	-	-	3	3	-	3
C306.2	3	3	3	3	3	-	-	-	3	3	-	3
C306.3	3	3	3	3	3	-	-	-	3	3	-	3
C306.4	3	3	3	3	3	-	-	-	3	3	-	3
C306.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Microprocessors & Microcontrollers Lab - EC505PC		
CO	**PSO1**	**PSO2**
C306.1	3	-
C306.2	3	-
C306.3	3	-
C306.4	3	-
C306.5	3	-
Average	**3.0**	-

Course Name: Data Communications and Networks Lab - EC506PC		**R18**
After completion of course the student will be able to		
C307.1	**Develop** TCL scripts to create nodes, establish links, and **simulate** data transmission between nodes in a network environment.	
C307.2	**Evaluate** the performance of different LAN topologies using network simulation tools, **analyzing** factors such as throughput, delay, and packet loss.	
C307.3	**Analyze** the performance of Drop Tail and RED queue management schemes, and **evaluate** the efficiency of CBQ and FQ scheduling mechanisms in traffic management.	
C307.4	**Evaluate** and compare the performance of various transport layer protocols (TCP, UDP) and advanced versions (TCP New Reno, Vegas), **focusing** on throughput, latency, and error handling.	
C307.5	**Analyze and compare** the performance of different routing protocols (AODV, DSR, DSDV) and **evaluate** the behavior of IEEE 802.11, IEEE 802.15.4, and SMAC standards in wireless networks.	

Course Name: Data Communications and Networks Lab - EC506PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C307.1	3	3	3	-	3	-	-	-	-	3	-	3
C307.2	3	3	3	3	3	-	-	-	-	3	-	3
C307.3	3	3	3	3	3	-	-	-	-	3	-	3
C307.4	3	3	3	3	3	-	-	-	-	3	-	3
C307.5	3	3	3	3	3	-	-	-	-	3	-	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**-**	**-**	**-**	**-**	**3.0**	**-**	**3.0**

Course Name: Data Communications and Networks Lab - EC506PC		
CO	**PSO1**	**PSO2**
C307.1	3	-
C307.2	3	-
C307.3	3	-
C307.4	3	-
C307.5	3	-
Average	**3.0**	**-**

Course Name: Advanced Communication Skills Lab - EN508HS		**R18**
After completion of course the student will be able to		
C308.1	**Demonstrate** proficiency in interpersonal communication skills, including body language, vocabulary, and appropriate response techniques.	
C308.2	**Improve** reading comprehension by developing skills like scanning, skimming, and critical reading, aiding in **understanding** context and information.	
C308.3	**Develop** structured and coherent writing skills suitable for various formats such as letters, reports, resumes, and emails.	
C308.4	**Enhance** oral and written presentation skills through individual and group activities, such as JAM sessions, seminars, and reports.	
C308.5	**Demonstrate** effective group discussion and interview skills, including voice modulation, organization of ideas, and pre-interview preparation techniques	

Course Name: Advanced Communication Skills Lab - EN508HS									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C308.1	-	-	-	-	3	-	-	-	3	3	-	3
C308.2	-	-	-	-	3	-	-	-	3	3	-	2
C308.3	-	3	-	-	3	-	-	-	3	3	-	2
C308.4	-	3	-	-	3	-	-	-	3	3	-	3
C308.5	-	-	-	-	3	-	-	-	3	3	-	2
Average	**-**	**3.0**	**-**	**-**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**2.4**

Course Name: Advanced Communication Skills Lab - EN508HS		
CO	**PSO1**	**PSO2**
C308.1	-	-
C308.2	-	-
C308.3	-	-
C308.4	-	-
C308.5	-	-
Average	-	-

course Name: Intellectual Property Rights - MC510	**R18**
After completion of course the student will be able to	
C309.1	**Understand** the various types of intellectual property, international treaties, and the importance of intellectual property rights (IPR) in the global context.
C309.2	**Demonstrate** knowledge of trademarks, including their purpose, functions, registration process, and selection of protectable matter.
C309.3	**Explain** the fundamentals of copyright and patent laws, including ownership, rights, registration processes, and international copyright considerations.
C309.4	**Recognize** and **apply** trade secret laws, including misappropriations, trade secret protection, and unfair competition principles such as false advertising.
C309.5	**Analyze** recent developments in intellectual property law and their implications, including international perspectives on trademarks, copyright, patent law, and trade secrets.

Course Name: Intellectual Property Rights - MC510									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C309.1	-	-	-	-	-	3	3	-	-	-	-	-
C309.2	-	-	-	-	-	3	3	-	-	-	-	-
C309.3	-	-	-	-	-	3	3	-	-	-	-	-
C309.4	-	-	-	-	-	3	3	-	-	-	-	-
C309.5	-	-	-	-	-	3	3	-	-	-	-	3
Average	-	-	-	-	-	**3.0**	**3.0**	-	-	-	-	**3.0**

Course Name: Intellectual Property Rights - MC510		
CO	**PSO1**	**PSO2**
C309.1	-	-
C309.2	-	-
C309.3	-	-
C309.4	-	-
C309.5	-	-
Average	-	-

Course Name: Antennas and Propagation - EC601PC	**R18**
After completion of course the student will be able to	
C310.1	**Understand** the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations.
C310.2	**Apply** the concept of radiation Mechanism to Antenna arrays and arrange a setup to carry out the antenna far Field pattern and gain measurements
C310.3	**Design** the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF and UHF antennas
C310.4	**Design** the antennas based on frequency, configure the geometry and establish the radiation patterns of Microwave antennas
C310.5	**Analyze** the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.

Course Name: Antennas and Propagation - EC601PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C310.1	3	3	3	3	-	-	-	-	-	-	-	-
C310.2	3	3	3	2	-	-	-	-	-	-	-	3
C310.3	3	2	2	2	-	-	-	-	-	-	-	3
C310.4	3	2	2	2	-	-	-	-	-	-	-	3
C310.5	3	3	-	3	-	-	-	-	-	-	-	-
Average	**3.0**	**2.6**	**2.5**	**2.4**	-	-	-	-	-	-	-	3.0

Course Name: Antennas and Propagation - EC601PC		
CO	**PSO1**	**PSO2**
C310.1	-	-
C310.2	-	-
C310.3	-	-
C310.4	-	-
C310.5	-	-
Average	-	-

Course Name: Digital Signal Processing - EC602PC		**R18**
After completion of course the student will be able to		
C311.1	**Understand** the fundamentals of discrete-time signals and systems, including stability, causality, and frequency-domain representations, as well as multirate signal processing techniques.	
C311.2	**Analyze** discrete Fourier transforms (DFT) and fast Fourier transforms (FFT), and compute convolutions using overlap-add and overlap-save methods.	
C311.3	**Design** infinite impulse response (IIR) digital filters using analog filter approximations and transformations like bilinear and spectral methods.	
C311.4	**Design** finite impulse response (FIR) digital filters using window techniques, Fourier methods, and frequency sampling methods, and compare IIR and FIR filters.	
C311.5	**Realize** digital filters in various forms**, analyze** finite word length effects, and implement methods to mitigate quantization and overflow issues.	

Course Name: Digital Signal Processing - EC602PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C311.1	3	3	2	3	-	-	-	-	-	-	-	3
C311.2	3	3	3	3	-	-	-	-	-	-	-	-
C311.3	3	3	3	2	-	-	-	-	-	-	-	3
C311.4	3	3	3	2	-	-	-	-	-	-	-	3
C311.5	3	3	3	2	-	-	-	-	-	-	-	2
Average	**3.0**	**3.00**	**2.8**	**2.4**	-	-	-	-	-	-	-	**2.75**

Course Name: Digital Signal Processing - EC602PC		
CO	**PSO1**	**PSO2**
C311.1	-	-
C311.2	-	2
C311.3	-	3
C311.4	-	3
C311.5	-	-
Average	-	2.66

Course Name: VLSI Design - EC603PC		**R18**
After completion of course the student will be able to		
C312.1	**Understand** the fundamentals of IC technology, including MOS, CMOS, BiCMOS circuits, and analyze basic electrical properties such as threshold voltage, transconductance, and inverter designs.	
C312.2	**Demonstrate** the VLSI design flow, apply design rules for stick diagrams and layouts, and **analyze** the impact of scaling on MOS circuits.	
C312.3	**Design** and **analyze** gate-level circuits, logic gates, and understand the effects of capacitance, fan-in, and fan-out on performance.	
C312.4	**Design** and **implement** data path and array subsystems, including adders, ALUs, multipliers, memory arrays, and counters.	
C312.5	**Explore** programmable logic devices (PLDs), including PLA, PAL, FPGAs, and CPLDs, and develop strategies for CMOS testing and chip-level verification.	

Course Name: VLSI Design - EC603PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C312.1	3	3	-	3	-	-	-	-	-	-	-	3
C312.2	3	3	3	3	-	-	-	-	-	-	-	3
C312.3	3	3	3	2	-	-	-	-	-	-	-	3
C312.4	3	3	2	2	-	-	-	-	-	-	-	3
C312.5	3	3	2	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.50**	**2.4**	-	-	-	-	-	-	-	**3.0**

Course Name: VLSI Design - EC603PC		
CO	**PSO1**	**PSO2**
C312.1	-	3
C312.2	-	3
C312.3	-	3
C312.4	-	3
C312.5	-	3
Average	-	**3.0**

Course Name: Object Oriented Programming through Java - EC611PE		**R18**
After completion of course the student will be able to		
C313.1	**Understand** the fundamentals of Object-Oriented Programming (OOP) concepts and Java basics to **develop** robust programs using classes, objects, methods, and exception handling mechanisms.	
C313.2	**Apply** inheritance, polymorphism, packages, and interfaces to create modular, reusable, and extensible object-oriented applications.	
C313.3	**Develop** programs with effective error-handling strategies using exception handling and implement multi-threaded applications for efficient process management.	
C313.4	**Design** interactive user interfaces and implement event-driven programming using Java AWT and event-handling mechanisms.	
C313.5	**Develop** Java applets and Swing-based GUI applications to create platform-independent, visually appealing, and user-friendly interfaces.	

Course Name: Object Oriented Programming through Java - EC611PE									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C313.1	3	3	2	2	-	-	-	-	-	-	-	-
C313.2	3	3	3	3	-	-	-	-	-	-	-	2
C313.3	3	3	3	3	-	-	-	-	-	-	-	2
C313.4	3	2	3	2	-	-	-	-	-	-	-	-
C313.5	3	2	3	2	-	-	-	-	-	-	-	-
Average	**3.0**	**2.6**	**2.8**	**2.4**	-	-	-	-	-	-	-	2.0

Course Name: Object Oriented Programming through Java - EC611PE		
CO	**PSO1**	**PSO2**
C313.1	-	-
C313.2	-	-
C313.3	-	-
C313.4	-	-
C313.5	-	-
Average	-	-

Course Name: ENTREPRENEURSHIP-CS600OE		**R18**
After completion of course the student will be able to		
C314.1	**Understand** the foundational concepts of entrepreneurship, including its evolution, types, competencies, motivations, and training methods, to build entrepreneurial capacity.	
C314.2	**Analyze** models for opportunity evaluation and business planning, and comprehend the procedures and institutional support available for setting up new ventures at the central and state levels.	
C314.3	**Identify and address** challenges faced by MSMEs, understand the causes and symptoms of industrial sickness, and devise strategies for the rehabilitation of sick enterprises.	
C314.4	**Apply** marketing principles, cost and pricing strategies, branding techniques, and **explore** global trade opportunities to ensure the sustainable growth of enterprises.	
C314.5	**Develop** strategic perspectives for entrepreneurial growth, address valuation challenges, and **understand** the role of technology, business incubation, and the development of women entrepreneurs in India	

Course Name: ENTREPRENEURSHIP-CS600OE									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C314.1	-	-	-	-	-	2	2	-	-	-	-	3
C314.2	-	-	-	-	-	2	2	-	-	-	-	3
C314.3	-	-	-	-	-	3	3	-	-	-	-	3
C314.4	-	-	-	-	-	2	2	-	-	-	-	3
C314.5	-	-	-	-	-	3	3	-	-	-	-	3
Average	-	-	-	-	-	**2.4**	**2.4**	-	-	-	-	**3**

Course Name: ENTREPRENEURSHIP-CS600OE		
CO	**PSO1**	**PSO2**
C314.1	-	-
C314.2	-	-
C314.3	-	-
C314.4	-	-
C314.5	-	-
Average	**-**	**-**

Course Name: Digital Signal Processing Lab - EC604PC		**R18**
After completion of course the student will be able to		
C315.1	**Analyze** and synthesize various discrete-time signals using recursive difference equations, Fourier transforms, and frequency-domain methods.	
C315.2	**Design** and **evaluate** digital systems' frequency responses and **understand** the power spectrum of signals using mathematical and computational tools.	
C315.3	**Implement and analyze** FIR and IIR digital filters, and study their applications in signal processing.	
C315.4	**Apply** digital signal processing techniques for generation, transformation, and manipulation of signals such as DTMF signals, decimation, and interpolation.	
C315.5	**Investigate** system responses for first- and second-order systems to **understand** their impulse response and dynamic behavior.	

Course Name: Digital Signal Processing Lab - EC604PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C315.1	3	3	-	3	3	-	-	-	3	3	-	3
C315.2	3	3	3	2	3	-	-	-	3	3	-	3
C315.3	3	3	3	3	3	-	-	-	3	3	-	3
C315.4	3	2	3	2	3	-	-	-	3	3	-	3
C315.5	3	3	-	3	3	-	-	-	3	3	-	3
Average	**3.0**	**2.8**	**3.0**	**2.6**	**3.0**	-	-	-	**3.0**	**3.0**	-	**3.0**

Course Name: Digital Signal Processing Lab - EC604PC		
CO	**PSO1**	**PSO2**
C315.1	-	-
C315.2	-	-
C315.3	-	-
C315.4	-	-
C315.5	-	-
Average	-	-

Course Name: e – CAD Lab - EC605PC		**R18**
After completion of course the student will be able to		
C316.1	**Develop and simulate** basic digital logic circuits and combinational components using HDL, demonstrating proficiency in hardware modeling.	
C316.2	**Design and implement** sequential circuits such as counters, flip-flops, and finite state machines using HDL, showcasing systematic design approaches.	
C316.3	**Analyze and create** CMOS-based schematics for basic and advanced combinational circuits**, understanding** physical design principles.	
C316.4	**Perform** physical verification, placement, routing, and timing analysis for CMOS circuits to ensure design integrity and performance.	
C316.5	**Evaluate** power integrity issues such as IR drop and crosstalk in CMOS layouts and propose optimization techniques for reliable circuit performance.	

Course Name: e – CAD Lab - EC605PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C316.1	3	3	3	2	3	-	-	-	3	3	-	3
C316.2	3	3	3	3	3	-	-	-	3	3	-	3
C316.3	3	3	3	3	3	-	-	-	3	3	-	3
C316.4	3	3	-	2	3	-	-	-	3	3	-	3
C316.5	3	3	-	2	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**2.4**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: e – CAD Lab - EC605PC		
CO	**PSO1**	**PSO2**
C316.1	-	3
C316.2	-	3
C316.3	-	3
C316.4	-	3
C316.5	-	3
Average	**-**	**3.0**

Course Name Scripting Languages Lab - EC606PC	**R18**
After completion of course the student will be able to	
C317.1	**Develop** basic Ruby scripts to perform string manipulations, mathematical computations, and conditional logic for simple problem-solving.
C317.2	**Implement** Ruby scripts to perform array manipulations, control structures, and solve problems using hashes for data representation.
C317.3	**Design** TCL scripts for mathematical computations, sorting, list manipulation, and file operations, demonstrating familiarity with TCL syntax and programming techniques.
C317.4	**Apply** Perl scripts to solve complex problems using subroutines, string manipulation, data validation, and list operations, showcasing modular programming skills.
C317.5	**Develop** Perl scripts for file handling, command-line argument processing, and reverse-order data output to address practical computational challenges.

Course Name: Scripting Languages Lab - EC606PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C317.1	3	3	2	2	3	-	-	-	3	3	-	3
C317.2	3	3	3	2	3	-	-	-	3	3	-	3
C317.3	3	3	3	3	3	-	-	-	3	3	-	3
C317.4	3	3	3	3	3	-	-	-	3	3	-	3
C317.5	3	3	3	3	3	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**2.8**	**2.6**	**3.0**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**3.0**

Course Name: Scripting Languages Lab - EC606PC		
CO	**PSO1**	**PSO2**
C317.1	-	-
C317.2	-	-
C317.3	-	-
C317.4	-	-
C317.5	-	-
Average	-	-

Course Name: Environmental Science - MC609	**R18**
After completion of course the student will be able to	
C318.1	**Understand** the structure, function, and importance of ecosystems, including food chains, energy flow, and biogeochemical cycles, and relate these concepts to field observations.
C318.2	**Analyze** the utilization and conservation of natural resources, including water, minerals, forests, and energy, while assessing their environmental impacts and sustainability.
C318.3	**Evaluate** biodiversity at genetic, species, and ecosystem levels, and **understand** threats to biodiversity and methods for its conservation, including national and international frameworks.
C318.4	**Examine** various types of environmental pollution, their sources, and impacts, and **evaluate** pollution control technologies and global environmental challenges such as climate change and ozone depletion.
C318.5	**Apply** knowledge of environmental laws, policies, and impact assessment (EIA) methods to propose sustainable solutions for contemporary environmental challenges, emphasizing green technologies and ethical practices.

Course Name: Environmental Science - MC609									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C318.1	3	3	-	-	-	3	2	-	-	3	-	3
C318.2	3	3	-	-	-	3	3	-	-	3	-	3
C318.3	3	3	-	-	-	3	3	-	-	3	-	3
C318.4	3	3	-	-	-	3	3	-	-	3	-	3
C318.5	3	3	-	-	-	3	3	-	-	3	-	3
Average	**3.0**	**3.0**	**-**	**-**	**-**	**3.0**	**2.8**	**-**	**-**	**3.0**	**-**	**3.0**

Course Name: Environmental Science - MC609		
CO	**PSO1**	**PSO2**
C318.1	-	-
C318.2	-	-
C318.3	-	-
C318.4	-	-
C318.5	-	-
Average	-	-

IV YEAR

Course Name: Microwave and Optical Communications - EC701PC	**R18**
After completion of course the student will be able to	
C401.1	**Analyze** the operation of O-type and M-type microwave tubes, including klystrons, reflex klystrons, and traveling wave tubes, to **evaluate** their performance characteristics and limitations at microwave frequencies.
C401.2	**Examine** the working principles, characteristics, and applications of solid-state microwave devices such as Gunn, IMPATT, and TRAPATT diodes for microwave frequency generation.
C401.3	**Design and analyze** waveguide components and junctions, including attenuators, phase shifters, and multiport junctions, for efficient microwave signal transmission and manipulation.
C401.4	**Apply** microwave measurement techniques, such as attenuation, VSWR, and impedance measurements, to **evaluate** the performance of microwave systems using a microwave bench setup.
C401.5	**Understand** optical fiber transmission principles, types, losses, and components like sources and detectors to **evaluate** optical link budgets and system performance.

Course Name: Microwave and Optical Communications - EC701PC									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C401.1	3	3	-	3	-	-	-	-	-	-	-	-
C401.2	3	2	-	3	-	-	-	-	-	-	-	-
C401.3	3	3	2	2	-	-	-	-	-	-	-	-
C401.4	3	3	3	2	-	-	-	-	-	-	-	-
C401.5	3	3	2	2	-	-	-	-	-	-	-	-
Average	**3.0**	**2.8**	**2.33**	**2.4**	-	-	-	-	-	-	-	-

Course Name: Microwave and Optical Communications - EC701PC		
CO	**PSO1**	**PSO2**
C401.1	-	-
C401.2	-	-
C401.3	-	-
C401.4	-	-
C401.5	-	-
Average	-	-

Course Name: Digital Image Processing - EC713PE		**R18**
After completion of course the student will be able to		
C402.1	**Understand** the fundamentals of digital image processing, including sampling, quantization, pixel relationships, and various image transforms for feature extraction and analysis.	
C402.2	**Apply** spatial and frequency domain techniques to enhance image quality through filtering, transformation, and histogram manipulation.	
C402.3	**Develop** techniques for restoring degraded images using mathematical models, inverse filtering, and least squares restoration methods.	
C402.4	**Analyze and implement** image segmentation methods and morphological operations for feature detection, edge linking, and region-oriented segmentation.	
C402.5	**Understand** image compression techniques and standards, including error-free and lossy compression, to optimize image storage and transmission.	

Course Name: Digital Image Processing - EC713PE									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C402.1	3	3	-	2	-	-	-	-	-	-	-	-
C402.2	3	3	2	2	-	-	-	-	-	-	-	3
C402.3	3	3	2	2	-	-	-	-	-	-	-	3
C402.4	3	3	3	2	-	-	-	-	-	-	-	3
C402.5	3	2	2	-	-	-	-	-	-	-	-	3
Average	**3.0**	**2.8**	**2.25**	**2.0**	-	-	-	-	-	-	-	**3.0**

Course Name: Digital Image Processing - EC713PE		
CO	**PSO1**	**PSO2**
C402.1	-	-
C402.2	-	-
C402.3	-	-
C402.4	-	-
C402.5	-	-
Average	-	-

Course Name: Network Security and Cryptography - EC723PE		**R18**
After completion of course the student will be able to		
C403.1	**Understand** the fundamental security services, mechanisms, and attacks, along with classical and modern encryption techniques such as DES and its design principles.	
C403.2	**Apply** advanced symmetric encryption techniques like Triple DES, Blowfish, and RC5 while **analyzing** key distribution methods and traffic confidentiality mechanisms.	
C403.3	**Analyze** public key cryptography methods including RSA, Diffie-Hellman, and elliptic curve cryptography, supported by foundational knowledge in number theory.	
C403.4	**Develop** a comprehensive understanding of message authentication, hash functions, and digital signatures to ensure secure communication and authentication protocols.	
C403.5	**Implement** IP security mechanisms, web security protocols, and understand the role of firewalls and trusted systems in protecting against intrusions, viruses, and related threats.	

Course Name: Network Security and Cryptography - EC723PE									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C403.1	3	3	2	2	-	-	-	-	-	-	-	3
C403.2	3	3	3	2	-	-	-	-	-	-	-	3
C403.3	3	3	2	2	-	-	-	-	-	-	-	3
C403.4	3	3	2	3	-	-	-	-	-	-	-	3
C403.5	3	3	3	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.4**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

Course Name: Network Security and Cryptography - EC723PE		
CO	**PSO1**	**PSO2**
C403.1	-	-
C403.2	-	-
C403.3	-	-
C403.4	-	-
C403.5	-	-
Average	-	-

Course Name: Python Programming - CS702OE		**R18**
After completion of course the student will be able to		
C404.1	**Understand** Python basics, objects, and various data types like numbers, strings, lists, and tuples, enabling effective problem-solving using Python.	
C404.2	**Gain knowledge** of file operations, exception handling, and modular programming for building robust applications.	
C404.3	**Develop** proficiency in using regular expressions and multithreaded programming to manage concurrency and process complex patterns in data.	
C404.4	**Design and implement** GUI-based and web-based applications using Python libraries and frameworks.	
C404.5	**Apply** database programming techniques and ORM concepts to manage data-driven applications.	

Course Name: : Python Programming - CS702OE									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C404.1	3	3	2	2	-	-	-	-	-	-	-	2
C404.2	3	3	2	2	-	-	-	-	-	-	-	2
C404.3	3	3	3	2	-	-	-	-	-	-	-	2
C404.4	3	3	3	3	-	-	-	-	-	-	-	3
C404.5	3	3	3	2	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.6**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.4**

Course Name: : Python Programming - CS702OE		
CO	**PSO1**	**PSO2**
C404.1	-	-
C404.2	-	-
C404.3	-	-
C404.4	-	-
C404.5	-	-
Average	**-**	**-**

Course Name: Professional Practice, Law & Ethics - SM702MS		**R18**
After completion of course the student will be able to		
C405.1	**Develop** a comprehensive understanding of professional ethics, ethical responsibilities, and mechanisms like whistle-blowing to address ethical dilemmas in engineering practices.	
C405.2	**Apply** the fundamental principles of contract law, including essential elements, performance, discharge, and remedies, to engineering and business practices.	
C405.3	**Analyze** various dispute resolution methods like arbitration, conciliation, and mediation to resolve engineering and construction-related conflicts effectively.	
C405.4	**Understand and apply** labour engagement practices, industrial dispute laws, and construction-related regulations, including RERA and NBC, in civil engineering projects.	
C405.5	**Acquire** knowledge of intellectual property laws related to copyrights, patents, and trademarks, ensuring compliance and protection of innovative engineering solutions.	

Course Name: Professional Practice, Law & Ethics - SM702MS									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C405.1	-	-	-	-	-	3	-	3	-	-	-	3
C405.2	-	-	-	-	-	2	-	3	-	-	-	3
C405.3	-	-	-	-	-	3	-	3	-	-	-	2
C405.4	-	-	-	-	-	3	-	3	-	-	-	3
C405.5	-	-	-	-	-	2	-	3	-	-	-	3
Average	-	-	-	-	-	**2.6**	-	**3.0**	-	-	-	**2.8**

Course Name: Professional Practice, Law & Ethics - SM702MS		
CO	**PSO1**	**PSO2**
C405.1	-	-
C405.2	-	-
C405.3	-	-
C405.4	-	-
C405.5	-	-
Average	-	-

Course Name: Microwave and Optical Communications Lab - EC703PC		**R18**
After completion of course the student will be able to		
C406.1	**Verify** characteristics of Reflex Klystron	
C406.2	**Analyze** various parameters of Waveguide Components.	
C406.3	**Estimate** the power measurements of RF Components such as directional Couplers.	
C406.4	**Demonstrate** characteristics of various optical sources.	
C406.5	**Measure** data Rate, Numerical Aperture and Losses in Optical Link.	

Course Name: Microwave and Optical Communications Lab - EC703PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C406.1	3	3	-	-	-	-	-	-	3	3	-	-
C406.2	3	3	3	3	-	-	-	-	3	3	-	-
C406.3	3	3	3	3	-	-	-	-	3	3	-	-
C406.4	2	3	-	-	-	-	-	-	3	3	-	-
C406.5	2	3	-	2	-	-	-	-	3	3	-	-
Average	**2.6**	**3.0**	**3.0**	**2.66**	**-**	**-**	**-**	**-**	**3.0**	**3.0**	**-**	**-**

Course Name: Microwave and Optical Communications Lab - EC703PC		
CO	**PSO1**	**PSO2**
C406.1	-	-
C406.2	-	-
C406.3	-	-
C406.4	-	-
C406.5	-	-
Average	-	-

Course Name: Industrial Oriented Mini Project/ Summer Internship - EC704PC		**R18**
After completion of course the student will be able to		
C407.1	**Identify and analyze** real-world engineering problems related to electronics and communication systems using theoretical knowledge.	
C407.2	**Design and develop** innovative solutions or prototypes for industrial problems by **applying** engineering principles and modern tools.	
C407.3	Work collaboratively in a multidisciplinary team and **demonstrate** effective project management, planning, and execution	
C407.4	**Apply** project management and time management skills to deliver solutions within stipulated timelines.	
C407.5	Document the project outcomes effectively and reflect on the **learning process** to foster lifelong learning and adaptability in a professional environment.	

Course Name: Industrial Oriented Mini Project/ Summer Internship - EC704PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C407.1	3	3	3	3	3	3	2	2	3	-	3	3
C407.2	3	3	3	3	3	3	3	3	3	-	3	3
C407.3	-	-	-	-	-	-	-	-	3	3	2	3
C407.4	-	-	-	-	-	-	-	-	3	3	3	3
C407.5	-	-	-	-	3	-	-	-	2	3	3	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.5**	**2.8**	**3.0**	**2.80**	**3.0**

Course Name: Industrial Oriented Mini Project/ Summer Internship - EC704PC		
CO	**PSO1**	**PSO2**
C407.1	3	3
C407.2	3	3
C407.3	3	3
C407.4	3	3
C407.5	3	3
Average	**3.0**	**3.0**

Course Name: Seminar - EC705PC		**R18**
After completion of course the student will be able to		
C408.1	**Identify and analyze** a specialized topic in electronics and communication engineering by reviewing relevant literature and advancements.	
C408.2	**Demonstrate** the ability to organize and synthesize technical knowledge into a well-structured technical report.	
C408.3	Exhibit proficiency in delivering an effective technical presentation with clear communication and engagement with the audience.	
C408.4	**Develop** critical thinking and analytical skills by addressing queries and engaging in technical discussions.	
C408.5	**Cultivate** professional ethics and independent learning skills essential for academic and industry-oriented research.	

Course Name: Seminar - EC705PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C408.1	3	3	-	2	-	3	-	-	-	-	-	3
C408.2	3	3	-	3	-	2	-	2	-	3	-	3
C408.3	-	-	-	-	-	-	-	2	3	3	-	3
C408.4	3	3	-	-	-	-	-	2	-	2	-	3
C408.5	-	-	-	-	-	-	-	3	-	2	-	3
Average	**3.0**	**3.0**	**-**	**2.50**	**-**	**2.50**	**-**	**2.25**	**3.0**	**2.50**	**-**	**3.00**

Course Name: Seminar - EC705PC		
CO	**PSO1**	**PSO2**
C408.1	-	-
C408.2	-	-
C408.3	-	-
C408.4	-	-
C408.5		
Average	**-**	**-**

Course Name: Project Stage-I - EC706PC		**R18**
After completion of course the student will be able to		
C409.1	**Identify** and define a relevant engineering problem or **research** question in electronics and communication engineering through a comprehensive literature survey.	
C409.2	**Conduct** an in-depth review of existing solutions, methodologies, and technologies to **understand** the current state-of-the-art.	
C409.3	**Formulate** clear and measurable project objectives and constraints based on the insights gained from the literature review.	
C409.4	**Develop** a preliminary design and select appropriate methodologies or models to address the identified problem.	
C409.5	**Prepare** and present a detailed report covering the literature survey, problem definition, and preliminary design.	

Course Name: Project Stage-I - EC706PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C408.1	3	3	-	-	-	2	2	-	2	-	2	3
C408.2	3	3	-	3	-	3	3	-	3	2	3	3
C408.3	3	3	3	3	-	-	-	-	3	3	3	3
C408.4	3	3	3	3	3	-	3	3	3	3	3	3
C409.5	-	-	-	-	-	-	-	-	3	3	2	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**2.5**	**2.66**	**3.0**	**2.8**	**2.75**	**2.6**	**3.0**

Course Name Project Stage-I - EC706PC		
CO	**PSO1**	**PSO2**
C408.1	3	3
C408.2	3	3
C408.3	3	3
C408.4	3	3
C409.5	3	3
Average	**3.0**	**3.0**

Course Name: Satellite Communications - EC811PE		**R18**
After completion of course the student will be able to		
C410.1	**Demonstrate an understanding** of satellite communication systems, including their origin, orbital mechanics, and launch vehicle technologies.	
C410.2	**Analyze** the functioning of various satellite subsystems such as attitude and orbit control, telemetry, and communication systems to assess their roles in satellite operations.	
C410.3	**Design** satellite links by applying transmission theory, and **evaluate** the performance of multiple **access** techniques like FDMA, TDMA, and CDMA in satellite communication.	
C410.4	**Examine** the components and technologies used in earth station systems, including transmitters, receivers, antennas, and tracking systems for effective satellite communication.	
C410.5	**Understand** the characteristics of LEO and GEO satellite systems and **apply** GPS principles for accurate positioning and navigation.	

Course Name: Satellite Communications - EC811PE									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C410.1	3	3	-	-	-	-	-	-	-	-	-	3
C410.2	3	3	-	3	-	-	-	-	-	-	-	3
C410.3	3	3	3	3	-	-	-	-	-	-	-	3
C410.4	3	2	2	2	-	-	-	-	-	-	-	3
C410.5	3	3	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.8	2.5	2.66	-	-	-	-	-	-	-	3.0

Course Name: Satellite Communications - EC811PE		
CO	**PSO1**	**PSO2**
C410.1	-	-
C410.2	-	-
C410.3	-	-
C410.4	-	-
C410.5	-	-
Average	-	-

Course Name: Test and Testability - EC822PE		**R18**
After completion of course the student will be able to		
C411.1	**Analyze** different fault models such as stuck-at faults, bridging faults, and intermittent faults in CMOS technology, enhancing fault detection capabilities.	
C411.2	**Develop** skills in generating test patterns for combinational logic circuits using both manual and automatic methods, including advanced techniques like Roth's D-algorithm.	
C411.3	**Design and implement** pseudorandom test pattern generators using Linear Feedback Shift Registers (LFSRs) and Cellular Automata (CAs) to improve test coverage.	
C411.4	**Apply** the concepts of testability to combinational circuits, utilizing techniques such as Reed Muller's expansion and syndrome testable designs to enhance circuit controllability and observability.	
C411.5	**Implement** testability insertion techniques in sequential circuits, with a focus on full scan DFT techniques, scan architectures, and multiple scan designs to ensure comprehensive testing and fault detection.	

Course Name: Test and Testability - EC822PE									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C411.1	3	3	-	3	-	-	-	-	-	-	-	-
C411.2	3	3	3	-	-	-	-	-	-	-	-	-
C411.3	3	3	3	-	-	-	-	-	-	-	-	3
C411.4	3	3	2	-	-	-	-	-	-	-	-	3
C411.5	3	3	2	2	-	-	-	-	-	-	-	3
Average	**3**	**3**	**2.5**	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

Course Name: Test and Testability - EC822PE		
CO	**PSO1**	**PSO2**
C411.1	-	3
C411.2	-	3
C411.3	-	3
C411.4	-	3
C411.5	-	3
Average	**-**	**3**

Course Name: Database Management Systems - CS803OE		**R18**
After completion of course the student will be able to		
C412.1	**Understand** the foundational concepts of database systems, including the data model, data independence, and the ER model for database design.	
C412.2	**Apply** the relational model concepts, integrity constraints, relational algebra, and relational calculus to design and manipulate relational databases.	
C412.3	**Develop** SQL queries with constraints, triggers, and schema refinement, including normalization techniques for optimizing database design.	
C412.4	Analyze transaction management concepts such as concurrency control, atomicity, durability, and recovery techniques to ensure database reliability.	
C412.5	**Examine** file organization and indexing methods, including tree-based and hash-based indexing, to optimize database performance and query execution.	

Course Name: Database Management Systems - CS803OE									**R18**			
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C412.1	3	3	2	-	-	-	-	-	-	-	-	2
C412.2	3	3	2	-	-	-	-	-	-	-	-	-
C412.3	3	3	3	-	-	-	-	-	-	-	-	-
C412.4	3	3	3	2	-	-	-	-	-	-	-	-
C412.5	3	3	-	3	-	-	-	-	-	-	-	3
Average	**3.0**	**3.0**	**2.5**	**2.5**	-	-	-	-	-	-	-	**2.5**

Course Name: Database Management Systems - CS803OE		
CO	**PSO1**	**PSO2**
C412.1	-	-
C412.2	-	-
C412.3	-	-
C412.4	-	-
C412.5	-	-
Average	-	-

Course Name: Project Stage-II - EC801PC		**R18**
After completion of course the student will be able to		
C413.1	Apply engineering principles and advanced tools to refine the conceptual design and create a detailed system model for implementation.	
C413.2	**Implement** the designed solution using appropriate hardware/software tools and methodologies.	
C413.3	**Evaluate** the performance of the implemented solution through rigorous testing and validate it against defined objectives.	
C413.4	**Analyze** and address the societal, environmental, and ethical impacts of the implemented solution**.**	
C413.5	Document the complete project and present it effectively, **demonstrating** technical proficiency and communication skills.	

Course Name: Project Stage-II - EC801PC									**R18**		
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C413.1	3	3	3	3	3	-	-	-	3	3	3	3
C413.2	3	3	3	3	3	-	-	-	3	3	3	3
C413.3	3	3	3	3	3	-	-	-	3	3	3	3
C413.4	-	-	-	-	-	3	3	3	3	3	-	3
C413.5	-	-	-	-	-	-	-	-	3	3	-	3
Average	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

Course Name: Project Stage-II - EC801PC		
CO	**PSO1**	**PSO2**
C413.1	3	3
C413.2	3	3
C413.3	3	3
C413.4	3	3
C413.5	3	3
Average	**3.0**	**3.0**

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