K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

KLNCE R2020 Course Outcomes

S.No	Course Code	Semester	Subject Code	Subject Name	Course Outcomes	Knowledge Level
1	C101	I	20HS101	English for Technical Communication	Listen, Comprehend and Correspond with others at various contexts	AD
					Speak legibly and fluently under various life-time situations by applying proper communication modules	AD
					Read and understand a variety of writings and technical text by analyzing the meaning and language	AD
					Apply clear and legible writing skills in error free style in coherent manner	AD
					Remember and use various communicative skills in precise and efficient way on technological contexts	AD
					Form situational conversations and technical writing styles for interpersonal and effective communication	AD
2	C102	I	20BS101	Fundamentals of Engineering Mathematics	Determine the Eigen values, Eigen vectors to diagonalize a matrix and reduce quadratic form to canonical form.	K3
					Apply the concept of limits, continuity, rules of differentiation, and techniques of differentiation to differentiate standard functions.	K3
					Apply the concepts of Concavity, Convexity to determine the critical points, point of Inflection, Maxima and Minima of Single variable functions.	K3
					Compute the derivatives of functions of two variables and apply them to calculate the maxima and minima.	K3
					Determine integrals using techniques of integration, such as substitution, partial fractions and integration by parts.	K3
					Apply various techniques to solve higher order differential equations	K3

					with constant and variable Coefficients.	
3	C103	I	20BS102	Engineering Physics	Demonstrate the properties of elasticity and measure the different moduli of elasticity	K3
					Discuss the characteristics of laser and optical fiber	K2
					Explain the concepts of ultrasonics in engineering	K2
					Explain black body radiation, properties of matter waves and Schrodinger equation	K2
					Classify the Bravais lattices and different types of crystal structures	K3
					Summarize the informations on growth of crystals and deformations	K2
4	C104	I	20BS103	Engineering Chemistry	Determine the hardness of water and explain the water treatment methods.	K2
					Apply Nernst equation to determine the EMF of the cell and explain various corrosion control methods.	K3
					Describe the phase diagram of one component and two component system and various methods of heat treatment of steel.	K2
					Classify the various types of fuels by their characteristics and explain the flue gas analysis by Orsat method.	K2
					Illustrate the working of Lead acid battery, lithium ion battery and fuel cell.	K2
					Describe the instrumentation and working of UV, IR, 1HNMR, HPLC and flame photometry.	K2
5	C105	I	20GE101	Problem Solving using Python Programming	Explain Components of a Computer System, types of programming languages, types of software with examples and purpose.	K2
					Perform problem analysis, use algorithms and prepare flow charts, pseudo code for solving simple problems.	K3
					Use Conditional, iteration constructs of python programming and apply to solve simple problems.	K3
					Use Functions, recursive function, String functions in python programming and apply to perform	K3

					linear and binary search.	
					Explain the various operations for manipulating Tuples, Sets, Dictionaries and Use List to perform simple and sorting operations.	K2
					Explain file handling operations, exception handling, modules and packages and illustrate programs for word count, file copy, merge operations and exception handling.	K2
6	C106	I	20BS1L1	Basic Science Laboratory	Calculate rigidity modulus and Young's modulus of a given material.	K3
					Examine the size of a given particle, parameters of optical fiber and compute the thickness of a given thin wire.	K3
					Calculate the velocity of ultrasound, compressibility of a given liquid and band gap of a given semiconductor diode.	K3
					Predict dispersive power of prism and wavelength of mercury spectrum.	K2
					Estimate the Chemical quality parameter of a water sample.	K3
					Estimate the strength of acid by conductometric and pH metric titration.	K3
					Estimate the amount of iron content in a given solution using potentiometer and the amount of sodium in water using flame photometer.	K3
					Determine the molecular weight of polyvinyl alcohol using Ostwald viscometer and rate of corrosion by weight loss method. (Demo)	K2
7	C107	I	20GE1L1	Python Programming Laboratory	Develop simple Python programs using conditional and iterative constructs.	K3
					Develop simple Python programs using built-in functions and user-defined functions.	K3
					Develop a Python program using recursion to implement linear and binary search.	K3
					Develop a Python program using list to implement selection and insertion sort	K3
					Develop Python programs to implement matrix operations	K3

					Develop a Python program to implement file handling.	K3
8	C108	II	20GE1L2	Industrial Practices Workshop	Prepare different carpentry joints and pipe connections with different joints.	K3
					Make the models using sheet metal.	K3
					Carry out the basic machining operations.	K3
					Prepare arc welded joints using welding equipment	K3
					Demonstrate wiring for a simple residential house; identify the ratings of tube lamp, and calculate the different Electrical quantities	K3
					Measure the electronics equipment using LCR meter, Transistor & Diode – Terminal identification using Multimeter.	K3
					Experimentally to analyze AC signal parameters using CRO and AFO and to verify the Truth tables of Logic gates.	K3
					Experimentally to design a Simple circuit using soldering in a PCB, measure ripple factor of Half Wave Rectifier and Full Wave Rectifier.	K3
9	C109	II	20HS201	Advanced Technical Communication	Listen, Understand and create technical correspondence at advanced level.	K3
					Respond or answer to the contextual questions, interview questions, form instructions, draft reports	K3
					Speak and analyze social issues, come out with effective ideas for discussion, understand the passages for meaning and vocabulary	K3
					Assess error free technical writings, create legible and coherent technical papers, derive ideas of the given texts in a precise form	K3
					Remember the updated elements of communication skills, nuances of non-verbal communication, business communication	K3
					Create technical instructions, process instructions, self-appraisals, Resumes, reports on various situations	
10	C110	II	20BS201	Laplace Transform and Advanced	Determine the Laplace transform of standard functions using properties	K3

				Calculus	Apply Laplace transform and inverse transform to solve the initial value problems	K3
					Solve the multiple integrals and apply the concept to find areas, volumes	K3
					Determine the line, surface and volume integrals using Green's, Gauss and Stokes theorems	K3
					Determine Analytic functions, Bilinear Transformations and apply the concept of conformal mapping to find the images of given curves.	K3
					Determine the Contour Integrals using Cauchy's Integral and Residue theorems.	K3
11	C111	II	20BS102	Physics for Electronics Engineering	Distinguish classical, quantum electron theories and energy band theory	K2
					Discuss the properties of semiconductors with applications of the p-n Junction and diodes	K2
					Explain dielectric properties of materials	K2
					Apply the concept of optical materials for Opto – electronic applications	K3
					Summarize the basic operations of p-n junction devices like solar cells, LED, LCD etc	K2
					Explain different quantum structures, size effect and carbon nanotubes	K2
12	C112	II	20EC201	Network Analysis	Apply Kirchoff's law for AC & DC circuits.	K3
					Apply basic laws in Network topology.	K3
					Apply network theorems to evaluate AC & DC circuits.	K3
					Explain the concepts of resonance & coupled circuit.	K2
					Apply the transient response for AC & DC circuits.	K3
					Apply the properties of Two port networks in an electrical circuit	K3
13	C113	II	20GE201	Engineering Graphics	Familiarize with the fundamentals and standards of engineering graphics.	K2
					Draw the orthographic projections of points and lines.	K3
					Draw the orthographic projections of plane surfaces.	K3

					Draw the projections of simple solids like prisms, pyramids, cylinder and cone.	K3
					Draw the projections of sectional views of solids and develop its lateral surfaces.	K3
					Draw the isometric projection and free hand sketching of simple objects	K3
14	C114	II	20GE204	Basic Electrical Engineering and Electron Devices	Illustrate the principle of operation, starting and speed control of D.C machines.	K3
					Illustrate the construction, principle of operation and performance of A.C machines.	K3
					Illustrate the operation and circuit model of transformer	K3
					Illustrate the theory, construction and operation of semiconductor diode and special Electronic Devices.	K3
					Demonstrate the concepts and working of Bipolar Junction Transistors	K3
					Demonstrate the concepts and working of Field effect Transistors such as JFET and MOSFET.	K3
15	C115	II	20EC2L1	Circuits and Devices Laboratory	Experimentally verify KVL & KCL in an electrical circuits	K3
					Experimentally verify various Theorems	K3
					Determine the resonant frequency, quality factor & bandwidth of the RLC circuits	K5
					Perform the transient analysis of RL & RC circuits	K3
					Analyze the V-I characteristics of PN diode and its use in rectifier circuits.	K4
					Analyze the V-I characteristics of FET and SCR.	K4
16	C116	II	20GE2L2	Unix and Shell Scripting Laboratory	Demonstrate the various General purpose utilities, Directory, Files and Filtering commands.	K3
					Develop simple shell programs using conditional and looping constructs.	K3
					Develop simple C programs in 'vi' editor using conditional and looping statements.	K3
					Develop simple C programs in 'vi'	K3

					editor using command line arguments.	
					Develop C programs in 'vi' editor for sorting a given set of numbers.	K3
					Develop C programs in 'vi' editor to perform matrix addition, subtraction	K3
17	C201	III	20BS302	Linear Algebra and Partial Differential Equations	Apply the concepts of Vector space to determine bases and dimensions.	K3
					Determine Eigen values and Eigen vectors using Linear transformations.	K3
					Construct the least square fit and orthonormal basis for an inner product space by using Gram-Schmidt process.	K3
					Solve the given first order and higher order partial differential equations with constant coefficients.	K3
					Derive the full range and half range series of the given function.	K3
					Solve One, two dimensional heat flow problems and one dimensional wave equation problems.	K3
18	C202	III	20EC301	Analog Circuits	Determine the stability, Q point and D.C, A.C load line for different biasing types used for transistor operation	K3
					Derive the voltage gain, current gain for different transistor configuration by using the hybrid π model	K2
					Calculate the frequency response of BJT and FET	K3
					Explain the operation of different types of feedback amplifier and power amplifier	K2
					Derive the frequency of oscillation and condition of oscillation of RC, LC oscillators and Multivibrators	K2
					Determine the resonant frequency and Q factor of single tuned and double tuned amplifiers.	K3
19	C203	III	20EC302	Signals and Systems	Classify the continuous time and discrete time signals/systems	K3
					Determine the spectral characteristics of continuous time signal using Fourier and Laplace transform	K3
					Compute the impulse response and output of the continuous time LTI systems using Fourier and Laplace transform	K3
					Discuss the concept of continuous time	K2

					to discrete time signals	
					Determine the spectral characteristics of DT signal using discrete time Fourier and Z transform	K3
					Compute the impulse response and output of the discrete time LTI systems using Fourier and Z transform	K3
20	C204	III	20EC303	Digital System Design	Summarize different types of number systems such as Binary, BCD, Octal and Hexadecimal and conversion between them.	K3
					Apply Boolean laws and reduction techniques namely k-map and tabulation method to minimize the number of literals in a Boolean expression.	K3
					Design combinational circuits like Adders, Subtractors, Encoders, Magnitude Comparators, Multipliers, Multiplexers by using logic gates and Design sequential circuits like Registers and counters by using Flip-flops.	K3
					Analyze Asynchronous sequential circuits and design a hazard-free logic.	K4
					Construct various Programmable Logic Devices with logic gates and Implement combinational logics in Programmable Logic Devices.	K3
					Demonstrate Combinational and Sequential logic circuits by using Verilog Description Language and Demonstrate Finite State Machines by using Verilog Description Language.	K3
21	C205	III	20HS301	Universal Human Values	Explain the significance of value inputs in a classroom and summarize human aspirations.	AD
					Distinguish between Values & Skills to ensure happiness and prosperity.	AD
					Identify the synchronization between Thyself & the Body to ensure competency of an individual	AD
					Generalize the role of a human being in ensuring harmony in society and nature.	AD
					Distinguish between ethical and unethical practices and analyze harmonious social environment.	AD

					Assess the importance of value based life and evaluate the role of professional ethics.	AD
22	C206	III	20CS303	Object Oriented Programming and Data Structures	Illustrate the features of C++	K2
					Implement the concepts of Inheritance and Polymorphism	K3
					Apply the linear data structures like Stack and Queue to various computing problems	K3
					Implement the Non-linear data structures like trees, graphs and their applications	K3
					Implement the sorting and searching algorithms	K3
					Illustrate the algorithm design techniques	K3
23	C207	III	20EC3L1	Analog Circuits Laboratory	Design and test rectifiers, filters , regulated power supplies and frequency response of BJT/FET	K5
					Design and measure the frequency response of Series and Shunt feedback amplifiers and a single tuned amplifier	K5
					Design of various types of oscillators.	K5
					Design of wave shaping circuits and Multivibrators	K5
					Analyze the frequency response of BJT, FET and Tuned amplifiers by using spice	K4
					Analyze the frequency of oscillation for Oscillators and Multivibrators by using spice	K4
24	C208	III	20EC3L2	Digital System Design Laboratory	Construct digital circuits with minimum number of gates by applying Boolean laws.	K3
					Construct combinational circuits like adders, code-converters, parity error checker and magnitude comparators by using logic gates / MSI with respect to the design specifications.	K3
					Realize the application of multiplexers by implementing various combinational logic / Boolean expressions with the help of multiplexers.	K3
					Construct and verify the function table of 4-bit SISO, SIPO, PIPO, PISO shift registers using D Flip-Flops.	K3

					Construct synchronous and asynchronous counters by using Flip-Flops as per the design specifications.	K3
					Model the adders, multiplexers, registers and counters with Verilog HDL.	K3
25	C209	IV	20EC401	Random Process and Information Theory	Apply the concepts of probability and standard distributions with real life phenomenon.	K3
					Apply the concept of random processes to the design of communication systems.	K3
					Apply the concept of correlation and spectral densities to derive the response of LTI system for random Inputs	K3
					Explain the effect of noise on communication systems.	K3
					Calculate information, Entropy, Mutual Information and channel capacity for the given channel	K3
					Compute the coding using source coding schemes.	K3
26	C210	IV	20EC402	Computer Architecture and Organization	Describe the fundamental organization of a computer system	K2
					Illustrate the functional units of a processor and its constraints.	K3
					Develop architectures required for control path design	K3
					Categorize the various parts of a system memory hierarchy.	K2
					Describe the basic concepts of parallel computing, pipelining and vector processing system.	K2
					Demonstrate the computer architecture concepts related to the design of modern processors, memories and commercially available computers.	K3
27	C211	IV	20EC403	Electromagnetic Fields	Define and recognize different co-ordinate systems to describe the spatial variations of the physical quantities dealt in electromagnetic field theory as they are functions of space and time. Apply different techniques of vector calculus to understand different concepts of electromagnetic field theory.	K3

					Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields (Field intensity, Flux density etc.) in different media using the fundamental laws.	K3
					Determine the electromagnetic force exerted on charged particles, current elements, working principle of various electric and electromagnetic energy conversion devices.	K3
					Design electromagnetic energy storage devices like capacitor, inductor which are frequently used in electrical systems	K3
					Deduce the concepts and equations of electromagnetic waves, means of transporting energy or information, in the form of radio waves	K3
					Deduce the concepts and equations of electromagnetic wave propagation in different media.	K4
28	C212	IV	20EC404	Analog Electronics and Integrated Circuits	Explain the characteristics of an operational amplifier	K2
					Design the operational amplifier circuits for various linear and non-linear applications	K3
					Design waveform generator circuits using Op-amp comparator	K3
					Explain the basics of PLL and its applications	K2
					Design the ADC and DAC using op-amps	K3
					Explain the functional operations and applications of 555 timer circuits and IC voltage regulators.	K2
29	C213	IV	20HS401	Environmental Science and Engineering	Describe the environment, ecosystem and their significances.	K2
					Explain the threats to biodiversity.	K2
					Describe the sources, effects, control methods of environmental pollution.	K2
					Explain the knowledge on various natural resources and its effect on environment due to over utilization.	K2
					Describe the disposal techniques of solid waste and record the consequences of natural disasters.	K2

					Outline the social issues as welfare, sustainability etc., and relate with population growth.	K2
30	C214	IV	20EC405	Principles of Digital Signal Processing	Compute DFT and IDFT coefficients of a discrete time sequence using FFT algorithms and output of the discrete time system	K3
					Analyze the spectral components in the audio signal	K4
					Construct and realize FIR digital filters	K3
					Construct and realize IIR digital filters	K3
					Analyze the spectrum of the various types of digital filter outputs	K4
					Identify the effect of quantization error in the implementation of digital filter	K2
					Calculate the fixed point and floating point quantization error using MATLAB / SCILAB / PYTHON / OCTAVE	K3
					Design the sampling rate converter for the given specifications	K3
31	C215	IV	20EC4L1	Analog Integrated Circuits Laboratory	Construct integrator, differentiator and amplifier using Op-amp 741.	K3
					Analyze the applications of an Op-amp: Filters and Oscillators.	K4
					Build multivibrators using special application IC555 and general purpose Op-amp	K3
					Construct digital to analog converter.	K3
					Demonstrate the function of application specific ICs such as voltage regulators LM317 and LM723, applications of PLL in communication	K3
					Analyze the Op-amp applications using SPICE	K4
32	C216	IV	20HS4L1	Professional Communication and Technical presentation	Listen and Respond global English appropriately	K3
					Participate in group discussions towards placement drive	K4
					Communicate with effective technological skills	K3
					Read and Write the context cohesively and coherently and organize ideas logically in workplace situations	K4
					Attend job interviews and be successful in them	K4

					Make effective presentations of technical topics	
33	C301	V	20EC501	Control System Engineering	Develop a transfer function for a given electrical and mechanical system and derive the transfer function using block diagram reduction and signal flow graph.	K3
					Derive the transient and steady state response of first and second order control systems for standard input signals.	K3
					Determine the frequency response parameters for the given open loop system using Bode and Polar plots.	K3
					Analyze the stability of a system using Routh Hurwitz, Root locus and Nyquist criterion.	K4
					Develop a state space model for a given electrical and mechanical system.	K3
					Analyze the stability of the system using controllability and observability.	K4
34	C302	V	20EC502	Transmission lines and Wave Guides	Explain the characteristics of transmission lines and its losses.	K2
					Derive the standing wave ratio and input impedance in high frequency transmission lines.	K3
					Classify various types of measurements in high frequency lines.	K3
					Analyze impedance matching by stubs using smith charts.	K4
					Analyze TE, TM waves between parallel planes and rectangular waveguide, characteristics of TE, TM waves.	K4
					Derive the characteristics of TE and TM waves in circular waveguide.	K3
35	C303	V	20EC503	Analog and Digital Communication Techniques	Analyze the different analog modulation schemes in time and frequency domain.	K4
					Compute the output Signal to Noise ratio of analog modulation schemes in the presence of additive white Gaussian noise.	K3
					Illustrate the principles of pulse modulation techniques and waveform coding techniques.	K3
					Apply the base band pulse for ISI free transmission over finite bandwidth	K3

					channels.	
					Apply the estimation and detection techniques in the design of various digital modulation systems for the analysis of Bit error rate performance.	K3
					Apply the given error control coding techniques to detect and correct the errors present in the communication channel.	K3
36	C304	V	20EC504	Microprocessors and Microcontrollers	Apply programming proficiency for the development of Assembly language codes using the various addressing modes and different types of 8086 instructions	K3
					Explain the different modes of configuration of 8086 to design a microprocessor based system.	K2
					Develop assembly language code to interface various devices with 8086 processors	K3
					Build assembly language program using various addressing modes and different type of instructions in a microcontroller.	K3
					Illustrate the use of peripherals with its various modes of operation.	K3
					Construct microcontroller-based systems for applications like reading and displaying temperature, PWM, length measurement for continuously rolling cloth.	K3
37	C306	V	20EC505	Digital VLSI Design and FPGA Implementation	Discuss the detailed analysis of the static CMOS inverter and illustrate complementary designs in addition to variants such as pseudo-nMOS circuits and novel XOR/XNOR networks	K2
					Make use of Lambda based design rules to express the layout of simple MOS circuit	K3
					Construct the sequential circuits using CMOS transistors	K3
					Design arithmetic circuits like Adders, Multipliers, Shifter and ALU by using different methods	K3
					Derive the power dissipation in memory architectures and discuss the challenges in the low power VLSI architecture	K3

					Explain the basic principles and methods of FPGA and different types of design for testability in VLSI.	K2
					Demonstrate CMOS inverter, basic gates and flip-flops by using a suitable EDA tool and obtain its Layout Generation and Post Layout Extraction.	K4
					Demonstrate Memories, arithmetic circuits like Adders, Multipliers, Shifter and ALU and sequential circuits like Universal Shift register, Finite State Machine in an Integrated Synthesis Environment and test the design by reprogramming FPGA.	K4
38	COE304	V	20OE404	Cloud Infrastructure and Technologies	Explain the main concepts, key technologies, strengths and limitations of cloud computing.	K2
					Describe the key and enabling technologies that help in the development of cloud.	K2
					Discuss and use the architecture of compute and storage cloud with its service and delivery models.	K2
					Explain the core issues of cloud computing such as resource management and security.	K2
					Discuss the Cloud Environment using current cloud technologies	K2
					Illustrate the appropriate technologies, algorithms and approaches for implementation and use of cloud	K3
39	C307	V	20EC5L1	Communication Systems Laboratory	Construct sampling and reconstruction circuit of analog signal to implement Time Division Multiplexing.	K3
					Design and Implement Analog modulation schemes.	K3
					Demonstrate various Pulse modulation schemes.	K3
					Analyze various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system.	K3
					Validate a digital modulation system.	K5
					Simulate signal constellations of BPSK and QPSK.	K3
40	C308	V	20EC5L2	Microprocessors and Microcontrollers	Construct the Assembly language programs in 8086 for arithmetic,	K3

				Laboratory	logical and string operations.	
					Develop the assembly language programs in 8086 for code conversions.	K3
					Construct the interface for different I/Os with 8086 processor.	K3
					Develop the assembly language programs in 8051 for arithmetic and logical operations.	K3
					Apply the serial communication concepts between two 8051.	K3
					Develop C program for 8051 timers and counters applications.	K3
41	C309	VI	20EC601	Modern Antennas in Wireless Telecommunications	Explain the behavior of antenna in terms of its parameter	K2
					Assess the need for antenna arrays and mathematically analyze the types of antenna arrays	K3
					Classify Microwave and sub microwave antennas.	K3
					Illustrate various antenna measurement techniques.	K3
					Analyze different types of antennas for wireless applications	K4
					Identify various factors involved in the propagation of radio waves	K3
42	C311	VI	20EC602	Communication Networks	Identify the components required to build different types of networks.	K3
					Identify the required functionality at data link layer.	K3
					Analyse the routing path of network.	K4
					Construct routing and forwarding solutions for packet switching networks.	K3
					Construct the required functionality at Transport layer for a given application.	K3
					Classify the protocols in the Application Layer.	K3
					Develop C/Java/python Programming to implement the cryptographic techniques and error control algorithms.	K3
					Develop C/Java/python Programming to implement routing and flow control algorithms.	K3
43	C312	VI	20CS604	Machine Learning	Identify the category of the learning	K3

					problem, and measure it's performance like recall, precision etc.	
					Apply the classification algorithms like KNN, Decision Tree, Naive Bayes, Logistic Regression to classify the data set.	K3
					Apply unsupervised algorithms namely K-means and PCA to cluster the given data set.	K3
					Apply Content-based recommender systems and Collaborative Filtering to implement recommender systems.	K3
					Identify and analyze the problem and apply machine learning techniques to solve real world applications	K4
					Formulate a classification model using suitable machine learning techniques	K4
44	C313	VI	20EC6L1	Mini Project	Identify and apply the real world and societal importance problems inthe Electrical and its allied area.	K4
					Identify, analyze, design, implement and handle prototype projects with a complete and organized solution methodologies.	K4
					Apply modern engineering tools for solution.	K4
					Contribute as an individual or in a team in development of technical projects.	K4
					Develop effective communication skills for presentation of project related activities.	K4
					Prepare reports and examination following professional ethics.	K4
45	C317	VI	20EC6A4	Artificial Intelligence for Everyone	Explain the fundamentals of artificial intelligence.	K2
					Apply the appropriate searching algorithms for the given artificial intelligence problems.	K3
					Formulate a problem using first order and predicate logic.	K3
					Develop Artificial Intelligence projects for solving the practical problems of current interest using the strategies introduced during the course.	K3
					Develop proficiency in applying scientific methods to model the machine learning applications.	K3

					Solve the artificial intelligence problems using the facilities of cloud systems.	K3
46	C320	VI	20HS6A1	Intellectual Property Rights	Explain the fundamental aspects of Intellectual property Rights which plays a major role in development and management of innovative projects in industries.	K2
					Describe the patents, patent regime in India and abroad and registration aspects.	K2
					Describe the copyrights and its related rights and registration aspects.	K2
					Explain the trademarks and registration aspects.	K2
					Explain the Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects.	K2
					Analyze the current trends in IPR and Government steps in fostering IPR.	K3
47	C321	VI	20EC6B1	Digital Imaging and Computer Vision	Discuss how digital images are acquired, stored and relationship between pixels.	K2
					Illustrate image enhancement techniques in spatial and frequency domain.	K3
					Elaborate the mathematical modelling of image restoration and compression.	K4
					Describe the various image segmentation techniques.	K2
					Illustrate the morphological image processing and algorithms.	K3
					Discuss the fundamental concepts of Computer vision methods.	K2
48	C324	VI	20EC6B4	Satellite Communication	Describe the Extended and reusable satellite launching vehicles and launching procedures of satellite systems	K3
					Explain about the satellite space segment with various satellite subsystems.	K2
					Derive the satellite Link design with uplink , downlink , rain effects and Ionospheric characteristics	K3
					Apply accessing schemes such as TDMA, FDMA and CDMA for satellite communication.	K3

					Illustrate various satellite applications such as Intelsat series and Mobile satellite services.	K3
					Discuss about Satellite Navigational System-Direct Broadcast satellites (DBS/DTH), Indian Regional Navigation Satellite System (IRNSS).	K3
49	C401	VII	20EC701	Microwave and Optical Communications	Derive the mathematical parameters of various microwave sources.	K3
					Identify the high frequency parameters for Microwave network.	K3
					Explain the working principle of active microwave devices.	K2
					Compute S parameters for passive microwave devices.	K3
					Determine the basic parameters and characteristics of optical fiber.	K3
					Explain the working principle and characteristics of optical sources and detectors.	K2
50	C402	VII	20EC702	Wireless Communication	Apply the cellular concept to determine frequency reuse, cochannel interference	K3
					Derive the free space model and two ray model to characterize the wireless channels.	K3
					Determine the channel parameters for various fading channels.	K3
					Apply various signaling schemes for fading channels.	K3
					Apply equalization and diversity techniques to mitigate multipath fading.	K3
					Apply MIMO systems with transmitter and receiver diversity for fading channels.	K3
51	C403	VII	20EC703	Wireless Networks	Explain the various protocols and standards of wireless LAN.	K2
					Build wireless network environment for mobile application using wireless protocols and standards.	K3
					Determine the various schemes to connect WLANs and 3G networks.	K3
					Explain the 4G technology and its applications.	K2
					Explain the evolution of 5G networks.	K2

					Explain the 5G architecture and its IOT applications.	K2
52	C404	VII	20EC704	Embedded and Real Time Systems	Develop I/O programming using ARM 7 microcontroller	K3
					Demonstrate peripherals with ARM LPC2148 microcontroller using appropriate protocols	K3
					Develop I/O programming using ARM Cortex M4 processor	K3
					Demonstrate peripherals with ARM cortex M4STM32F-446XX microcontroller using appropriate protocolsD	K2
					Discuss the role and features of RT operating system that makes multitask execution possible by processors	K2
					Identify any societal problem and solve by applying acquired knowledge in embedded and real time systems	K3
53		VII	20OE108	Industrial Safety Practices	Illustrate the importance of safety in Boilers and Pressure vessels.	K3
					Identify and prevent chemical, environmental mechanical, fire hazard.	K3
					Collect, analyze and interpret the accidents data based on various safety techniques.	K3
					Apply proper safety techniques on safety engineering and management.	K3
					Perform hazard analysis.	K3
					Design the system with environmental consciousness by implementing safety regulation.	K3
54	C409	VII	20EC7A4	IoT Enabled System Design	Explain IoT architecture, fog, edge and cloud computing	K2
					Build an IoT ecosystem that interfaces with various hardwares and wireless communication modules.	K3
					Make use of data analytics and cloud computing to develop an application with suitable IoT protocol.	K3
					Demonstrate the use of GPIO pins to interface raspberry pi with cloud	K3
					Discuss different business models for IoT	K2
					Identify any societal problem and solve	K3

					by applying acquired knowledge of IoT enabled system design	
55	C405	VII	20EC7L1	Microwave and Optical Laboratory	Demonstrate the characteristics of microwave generators.	K3
					Determine VSWR, frequency, wavelength and radiation pattern.	K3
					Experiment with microwave passive devices and obtain its characteristics.	K3
					Illustrate the characteristics of analog and digital optical fiber link.	K3
					Determine the losses and numerical aperture of the fiber.	K3
					Determine the characteristics of LED.	K3
56	C426	VIII	20HS7A2	Total Quality Management	Explain basic concepts, TQM framework, Barriers Benefits of TQM and importance of customers	K2
					Explain the TQM Principles, understand the importance of employee involvement and supplier partnership	K2
					Explain the basics of Six Sigma, Traditional tools, New tools,	K2
					Explain the process of Benchmarking and FMEA.	K2
					Explain process capability, QFD, TPM, Taguchi quality loss function and performance measures	K2
					Explain the Quality system ISO 9000, ISO 14000, Audit, Certification process and implementation of TQM in manufacturing and service sectors	K2
57	C418	VIII	20HS8A1	Human Relations at Work	Implement the elements of Emotional Intelligence and create a plan for continual improvement.	K3
					Demonstrate the elements of teamwork such as team development stages, leadership skills, team dynamics, problems solving and decision-making approaches, and team building.	K3
					Employ active listening skills including paraphrasing, questioning, empathetic listening, analytic listening, responding and communicating non-verbally while respecting individual differences.	K3
					Identify various Yoga Postures.	K3

					Develop an action plan to increase personal motivation in a personal and or workplace situation.	K3
					Identify different elements of organizational behavior and change including organizational climate, culture, power, ethics, and organizational development techniques to develop a change model for an aspect of their personal and or professional life.	K3
58	C427	VIII	20EC8L1	Project Work	Identify and apply the real world and societal importance problems in the Electronics and Communication Engineering and its allied area.	K4
					Identify, analyze, design, implement and handle prototype projects with a complete and organized solution methodologies.	K4
					Apply modern engineering tools for solution.	K4
					Contribute as an individual or in a team in development of technical projects.	K4
					Develop effective communication skills for presentation of project related activities.	K4
					Prepare reports and examination following professional ethics.	K4