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College Code : 35

B.TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE TITLE	CO	STATEMENT
MATHEMATICS-II(R201201)	CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications(L6)
	CO-2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel(L3)
	CO-3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms(L5)
	CO-4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals(L3)
	CO-5	Apply numerical integral techniques to different Engineering problems(L3)
APPLIED PHYSICS(R201207)	CO-1	Explain the need of coherent sources and the conditions for sustained interference(L2)
	CO-2	Understand the basic concepts of LASER light sources(L2) Apply the concepts to learn the types of lasers
	CO-3	Explain the concept of dual nature of matter(L2) Understand the significance of wave function
	CO-4	Explain the concept of dielectric constant and polarization in dielectric materials
	CO-5	Explain Meissner's effect, BCs theory & Josephson effect in superconductors(L2)
OBJECT ORIENTED PROGRAMMING THROUGH JAVA (R201212)	CO-1	Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard
	CO-2	Illustrate the basic principles of the object-oriented programming
	CO-3	Demonstrate an introductory understanding of graphical user interfaces, multi threaded programming, and event-driven programming.
	CO-4	Basics of Java programming, Data types, Variables, Operators, Control structures including selection
	CO-5	Inheritance in java, Super and subclass, Overriding, Object class,
NETWORK ANALYSIS (R201213)	CO-1	Gain the knowledge on basic network elements.
	CO-2	Will analyze the RLC circuits behavior in detailed
	CO-3	analyze the performance of periodic waveforms.
	CO-4	Gain the knowledge in characteristics of two port network parameters(Z, Y, ABCD, h & g).
	CO-5	Analyze the filter design concepts in real world applications.
BASIC ELECTRICAL ENGINEERING (R201214)	CO-1	Able to explain the operation of DC generator and analyze the characteristics of DC generator.
	CO-2	Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors.
	CO-3	Ability to analyze the performance and speed-torque characteristics of a 3-phase induction motor and understand starting methods of 3-phase induction motor.
	CO-4	Able to explain the operation of Synchronous Machines
	CO-5	Capability to understand the operation of various special machines.

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ELECTRONIC WORKSHOP LAB (R201237)	CO-1	Hands on experience with the use of laboratory equipment
	CO-2	Working experience with prototype board and solder and desolder the discrete components on a project board.
BASIC ELECTRICAL ENGINEERING LAB (R201238)	CO-1	To analyze and solve electrical circuits using network laws and theorems.
	CO-2	To understand and analyze basic Electric and Magnetic circuits
APPLIED PHYSICS LABORATORY (R201233)	CO-1	The students will be able to use the different components and equipment in physics practical.
	CO-2	The students will also be able to work effectively and safely in the laboratory environment independently and as well as in teams.
ENVIRONMENTAL SCIENCE (R201230)	CO-1	The objective is to represent the object in 3D view through isometric views
	CO-2	The student will learn how to visualize 2D & 3D objects.

COURSE OUTCOMES FOR SECOND YEAR FIRST SEMESTER

COURSE TITLE WITH CODE	CO	STATEMENT
ELECTRONIC DEVICES AND CIRCUITS (R201041)	Co-1	Apply the basic concepts of semiconductor physics
	Co-2	Understand the formation of p-n junction and how it can be used as a p-n junction diode in different modes of operation
	Co-3	Know the construction, working, principle of rectifiers with and without filters with the relevant expressions and necessary comparisons
	Co-4	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
	Co-5	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization
SWITCHING THEORY AND LOGIC DESIGN (R201042)	Co-1	Classify different number systems and apply to generate various codes. Use the concept of Boolean algebra in minimization of switching functions
	Co-2	Apply knowledge of flip-flops in designing of Registers and counters
	Co-3	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
	Co-4	Study the following relevant ICs and their relevant functions
	Co-5	Produce innovative designs by modifying the traditional design techniques.
SIGNALS AND SYSTEMS (R201043)	Co-1	Differentiate the various classifications of signals and systems
	Co-2	Analyze the frequency domain representation of signals using Fourier concepts
	Co-3	Classify the systems based on their properties and determine the response of LTI Systems
	Co-4	Know the sampling process and various types of sampling techniques.
	Co-5	Apply Laplace and z-transforms to analyze signals and systems (continuous & discrete).
RANDOM VARIABLES AND STOCHASTIC PROCESSES (R201044)	Co-1	mathematically model and solve simple probabilistic problems.
	Co-2	Identify different types of random variables and compute statistical averages of these random variables.
	Co-3	Characterize the random processes in the time and frequency domains.
	Co-4	Analyze the LTI systems with random inputs
	Co-5	Density Spectra of Input and Output, Bandpass, Band-Limited and Narrowband Processes, Properties.

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MATHEMATICS-III(R2021011)	Co-1	Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals
	Co-2	Line integral – Work done – Area – Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof).
	Co-3	Solving ordinary differential equations (initial value problems) using Laplace transforms.
	Co-4	Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.
	Co-5	Second order PDE: Solutions of linear partial differential equations with constant coefficient – R.H.S term of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.
OOP THROUGH JAVA LAB(R2021045)	Co-1	Identify classes, objects, members of a class and the relationship among them needed for a specific problem
	Co-2	Implement program to distinguish different forms of inheritance
	Co-3	Create packages and to reuse them
	Co-4	Develop programs using Exception Handling mechanism
	Co-5	Design GUI based applications using Swings and AWT.
ELECTRONIC DEVICES AND CIRCUITS LAB(R2021046)	Co-1	Verify the rectifier circuits using diodes and implement them using hardware.
	Co-2	Design the biasing circuits like self biasing
	Co-3	Analyze the concepts of SCR and observe its characteristics.
	Co-4	Remember the concept of unipolar junction transistor and observe its characteristics.
	Co-5	Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifier
SWITCHING THEORY AND LOGIC DESIGN LAB(R2021047)	Co-1	To solve a typical number base conversion, analyze new error coding techniques and behaviour of logic gates
	Co-2	To simplify Boolean functions using Karnaugh maps and Quine McCluskey methods
	Co-3	To understand concepts of combinational circuits
	Co-4	To understand sequential circuits by learning flip-flops and their applications
	Co-5	To develop advanced sequential circuits with meelay and more models
PYTHON LAB (SKILL ORIENTED COURSE) (R2021048)	Co-1	Know comprehensions, generators in python.
	Co-2	Know exception handling in python
	Co-3	Know file I/O
	Co-4	To understand various data types like lists, tuples, string set
	Co-5	To know the usage of various pre-defined functions on the above data types
COURSE OUTCOMES FOR SECOND YEAR SECOND SEMESTER		
COURSE TITLE WITH CODE	CO	STATEMENT
ELECTRONIC CIRCUIT ANALYSIS (R2022041)	Co-1	To design and analysis of small signal high frequency transistor amplifier using BJT and FET.
	Co-2	Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT.
	Co-3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept
	Co-4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison

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	Co-5	Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, staggered tuned amplifiers
DIGITAL IC DESIGN (R2022042)	Co-1	Introduction to Verilog HDL, data types, data operators, module statement, wire statement, if-else statement, case-end case statement, Verilog syntax and semantics (qualitative approach)
	Co-2	Parallel binary adder, carry lookahead adder, BCD adder, Multiplexers and demultiplexers and their use in combinational logic design
	Co-3	Registers, applications of shift registers, ripple or asynchronous counters synchronous counters, synchronous and asynchronous sequential circuits, hazards in sequential circuits
	Co-4	Introduction, MOS logic circuits with depletion MOS loads
	Co-5	Introduction, behavior bistable elements, SR latch circuit, clocked latch and flip-flop circuits: clocked SR latch
ANALOG COMMUNICATIONS (R2022043)	Co-1	Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
	Co-2	Analyze noise characteristics of various analog modulation methods
	Co-3	Analyze various functional blocks of radio transmitters and receivers
	Co-4	Communication Receivers, extension of superheterodyne principle and additional circuits.
	Co-5	Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System,
LINEAR CONTROL SYSTEMS (R2022044)	Co-1	This course introduces the concepts of feedback and its advantages to various control systems
	Co-2	The performance metric to design the control system in time-domain and frequency domain are introduced
	Co-3	Control systems for various applications can be designed using time-domain and frequency domain analysis.
	Co-4	In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
	Co-5	Time invariant state Equations - State Transition Matrix and its Properties - Concept of Controllability and Observability
MANAGEMENT AND ORGANISATIONAL BEHAVIOUR (R2022045)	Co-1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure
	Co-2	Will familiarize with the concepts of functional management that is HRM and Marketing of new product developments
	Co-3	The learner is able to think strategically through contemporary management practices.
	Co-4	4. The learner can develop positive attitude through personality development and can equip with motivational theories.
	Co-5	5. The student can attain the group performance and grievance handling in managing the organizational culture.
ELECTRONIC CIRCUIT ANALYSIS LAB (R2022046)	Co-1	single and multistage amplifiers at low, mid and high frequencies
	Co-2	Designing and analyzing the transistor at high frequencies.
	Co-3	Determine the efficiencies of power amplifiers
	Co-4	Designing and analyzing the transistor at high frequencies.
	Co-5	Determine Frequency response and design of tuned amplifiers
	Co-1	Demonstrate generation and detection of analog and digital modulation techniques.

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ANALOG COMMUNICATIONS LAB (R2022047)	Co-2	Explains sampling, PCM, delta modulation, adaptive delta modulation and superheterodyne receiver.
	Co-3	Compare the different analog and digital modulation techniques.
	Co-4	Distinguish various line coding schemes used for digital data transmission
	Co-5	Apply time division multiplexing concepts in different pulse modulation techniques
DIGITAL IC DESIGN LAB (R2022048)	Co-1	Understand the function of elementary digital circuits under real and simulated
	Co-2	Identify the various digital ICs and understand their operation.
	Co-3	Apply Boolean laws and K-maps to simplify the digital circuits.
	Co-4	Understand the function of elementary digital circuits under real and simulated environment.
	Co-5	Prepare a report on basics of digital electronics and handling of ICs
SOFT SKILLS (SKILL ORIENTED COURSE) (R2022049)	Co-1	Have a clear representation about structure of the course and its assessment.
	Co-2	Be able to set goals and manage your own professional and personal development.
	Co-3	Apply reflective practice to understand your learning processes and articulate and evaluate personal objectives and motivation.
	Co-4	Understand conception of Soft Skills.
	Co-5	Assume responsibility for your learning and self-assessment.

COURSE OUTCOMES FOR THIRD YEAR FIRST SEMESTER

COURSE TITLE WITH	CO	STATEMENT
ANALOG ICs AND APPLICATION (R2031041)	Co-1	Describe the Op-Amp and internal Circuitry: 555 Timer, PLL
	Co-2	Discuss the Applications of Operational amplifier: 555 Timer, PLL
	Co-3	Design the Active filters using Operational Amplifier
	Co-4	Use the Op-Amp in A to D & D to A Converters
	Co-5	Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Bandpass, Band reject and all pass filters.
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES (R2031042)	Co-1	Determine E and H using various laws and applications of electric & magnetic fields
	Co-2	Apply the Maxwell equations to analyze the time varying behavior of EM waves
	Co-3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
	Co-4	Calculate Brewster angle, critical angle and total internal reflection
	Co-5	Derive and Calculate the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc. using smith chart
DIGITAL COMMUNICATIONS (R2031043)	Co-1	Analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system.
	Co-2	Analyze various source coding techniques
	Co-3	Compute and analyze Block codes, cyclic codes and convolution codes
	Co-4	Design a coded communication system.
	Co-5	Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.
	Co-1	Able to understand the renewable energy sources available at present.

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RenewableEnergySources(R203102F)	Co-2	Abletounderstandthesolarenergyoperationanditscharacteristics.
	Co-3	Toeducatethewindenergyoperationanditstypes
	Co-4	Toeducatethetidalandgeothermalenergyprinciplesanditsoperation.
	Co-5	Abletounderstandthebiomassenergygenerationanditstechnologies.
ELECTRONICMEASUREMENTSANDINSTRUMENTATION(R203104B)	Co-1	Selecttheinstrumenttobeusedbasedontherequirements
	Co-2	Understandandanalyzedifferentsignalgeneratorsandanalyzers.
	Co-3	Understandthedesignofoscilloscopesfordifferentapplications.
	Co-4	Designdifferenttransducersformeasurementofdifferentparameters.
ANALOG ICs ANDAPPLICATIONSLAB(R2031044)	Co-5	Transducers-active&passivetransducers:Resistance,Capacitance,inductance,Straingauges,LVDT,PiezoElectrictransducers.
	Co-1	Understandhowprobinginfluencesacircuit
	Co-2	Identifyandexplainthelimitationsofop-ampsinanaloguecircuitdesigns
	Co-3	Identifythecurrents,andhowtheychangewithappliedpotentials,flowingthrougha semiconductor,diode,andtransistor
	Co-4	Designandsimulatetransistoramplifiers
DIGITALCOMMUNICATIONSLAB(R2031045)	Co-5	UseSPICEverifyhandcalculationsandaidinthedesignofanalogintegratedcircuits
	Co-1	Designacodingcommunicationsystem
	Co-2	Analysetheperformanceofadigitalcommunicationsystemforprobability oferror andareabletodesignadigitalcommunicationsystem
	Co-3	Analysevariouserrortechniques
	Co-4	Analysevarioussourcecodingtechniques
DATASTRUCTURESUSING JAVA LAB(R2031046)	Co-5	communteandAnalyseblockcode's,cycliccodesandconvolute
	Co-1	Understandingofdifferentdatastructuresthataresuitableforproblemstobesolved efficiently.
	Co-2	Understandingofthedesignandanalysisofalgorithmsbasedondifferentdata structures.
	Co-3	Understandingofthealgorithmscomplexity forbothiterativeaswellasforrecursive approaches. Understandingofsortingandsearchingtechniques.
	Co-4	Understandingtoimplementdatastructuresandalgorithms.
Co-5	Understandingofhowcommoncomputationalproblemscanbesolvedefficientlyon acomputer.	

COURSEOUTCOMESFORTHIRDYEARSECONDSEMESTER

COURSE TITLE WITH	CO	STATEMENT
MICROPROCESSOR AND MICROCONTROLLERS (R2032041)	Co-1	toUnderstandthearchitectureofmicroprocessor/microcontrollerandtheiroperation
	Co-2	Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface.
	Co-3	Hardware concepts, Input/output ports and circuits, external memory.
	Co-4	Demonstrate programming skills in assembly language for processors and Controllers.
	Co-5	Analyze various interfacing techniques and apply them for the design of processor/Controller based systems.
VLSI DESIGN (R2032042)	Co-1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
	Co-2	Apply the design Rules and draw layout of a given logic circuit.
	Co-3	Analyze the behavior of amplifier circuits with various loads.

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	Co-4	Design MOSFET based logic circuits using various logic styles like static and dynamic CMOS.
	Co-5	Design various applications using FPGA.
DIGITAL SIGNAL PROCESSING (R2032043)	Co-1	Apply the difference equations concept in the analysis of Discrete time systems
	Co-2	Use the FFT algorithm for solving the DFT of a given signal
	Co-3	Design a Digital filter (FIR & IIR) from the given specifications. Realize the FIR and IIR structures from the designed digital filter
	Co-4	Use the Multirate Processing concepts in various applications (eg: Design of phase shifters, Interfacing of digital systems)
	Co-5	Apply the signal processing concepts on DSP Processor.
MOBILE & CELLULAR COMMUNICATION (R203204B)	Co-1	Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement,
	Co-2	Numbering and grouping, setup access and paging channels, channel assignment to cell sites and mobile units:
	Co-3	Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
	Co-4	Understand the frequency management, channel assignment strategies and antennas in cellular systems
	Co-5	To Understand the concepts of handoff and architectures of various cellular systems.
FUNDAMENTALS OF UTILIZATION OF ELECTRICAL ENERGY (R203202G)	Co-1	Maintain/Troubleshoot various lamps and fittings in use
	Co-2	Maintain various electric heating and equipments in industries. welding used in
	Co-3	Maintain Electric Drive and elevator used in industries.
	Co-4	Maintain Electric Traction system.
	Co-5	Maintain various domestic electrical appliances
MICROPROCESSOR AND MICROCONTROLLER SLAB (R203244)	Co-1	To Understand and execute programs based on 8086 microprocessor.
	Co-2	To Design Memory Interfacing circuits.
	Co-3	To Design the biasing circuits like self biasing.
	Co-4	To Design and interface I/O circuits.
	Co-5	To Design and implement 8051 microcontroller based systems.
VLSI DESIGN LAB (R2032045)	Co-1	To Explain the basic building blocks of digital systems like logic gates and adders.
	Co-2	To Comprehend the design and functionality of combinational and sequential circuits like multiplexers, encoders, flip-flops, counters etc.
	Co-3	To apply design techniques and modelling methods like Behavioral, structural and data flow for implementation of digital systems.
	Co-4	To Analyze different logic families, CMOS gate implementations and timing considerations for layout design.
	Co-5	To Evaluate and simulate digital systems designed using HDL and CMOS layouts with respect to functionality, timing and power.
DIGITAL SIGNAL PROCESSING LAB (R2032046)	Co-1	To Formulate engineering problems in terms of DSP operations
	Co-2	To Analyse digital signal and systems
	Co-3	To Analyse discrete time signals in frequency domain
	Co-4	To Design digital filters and implement with different structures
	Co-5	To Understand the key architecture
ARM BASED / ARDUINO	Co-1	To Comprehend Microcontroller-Transducers Interfacet techniques
	Co-2	To Establish Serial Communication link with Arduino

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ASEDPROGRAMMING LAB(R2032047)	Co-3	ToAnalyzebasicsofSPIinterface
	Co-4	ToInterfaceStepperMotorwithArduino
	Co-5	ToAnalyzeAccelerometerinterfacetechniques

COURSEOUTCOMESFORFOURTHYEARFIRSTSEMESTER

COURSE TITLE WITH CODE	CO	STATEMENT
RADAR ENGINEERING (R204104G)	CO-1	ToDerivetheradarrangeequationandtosolvesomeanalyticalproblems.
	CO-2	ToUnderstandthedifferenttypesofradarsanditsapplications.
	CO-3	ToUnderstandtheconceptoftrackinganddifferenttrackingtechniques.
	CO-4	ToUnderstandthevariouscomponentsofradarreceiveranditsperformance.
SATELLITE COMMUNICATION (R204104D)	CO-1	ToUnderstandtheconcepts,applicationsandsubsystems of Satellite communications
	CO-2	ToIntroduction, Transmitters, Receivers, Antennas, Trackingsystems, Terrestrial interface, Primary powertest methods.
	CO-3	ToDerivetheexpressionforG/Tratioandtosolvesomeanalyticalproblemson satellitelinkdesign.
	CO-4	ToUnderstandthevarioustypesofmultipleaccesstechniquesandarchitecture of earthstationdesign.
	CO--5	ToUnderstandtheconcepts of GPS and its architecture.
OPTICAL COMMUNICATION (R204104A)	CO-1	ToChosenecessarycomponentsrequiredinmodernopticalcommunications systems.
	CO-2	ToDesignandbuildopticalfiberexperimentsinthelaboratory, andlearnhowto calculateelectromagneticmodesinwaveguides, theamountoflightlostgoingthroughanoptical system, dispersionofopticalfibers.
	CO-3	Usedifferenttypesofphotodetectorsandopticaltestequipmenttoanalyzeoptical fiberandlightwavesystems.
	CO-4	Choosetheopticalcablesforbettercommunicationwithminimumlosses
	CO--5	Design, buildanddemonstrateopticalfiberexperimentsinthelaboratory
IMAGE PROCESSING (R204105O)	CO-1	ArticulatethefundamentaisofDigitalimageprocesangincludingtheampleimage formationandrelationshipbetweenpixels
	CO-2	Applicationofdifferenttypesoflmagetransformationontechniques, histogram processingandapplicationofspatialfilters
	CO-3	Analysethesignificanceofimagerestorationandprocesingofcolourimages
	CO-4	Illustratetheimagecompressionlike lossy andlosslessimagecompresnontechniques
	CO--5	Understandthefundamentalconceptsofdigitalimageprocessing,
DEEPLARNING TECHNIQUES (R204105E)	CO-1	Distinguishbetween, supervised, unsupervisedandsenu-supervisedlearning
	CO-2	Applytheappropriatemachinelearningstrategyforanygivenproblem
	CO-3	Suggestsupervised, unsupervisedorsemi-supervisedlearningalgorithmsforany givenproblem
	CO-4	Designsystemsthatusestheappropriategraphmodelsofmachinelearning
	CO--5	Modifyexistingmachinelearningalgorithmtstoimproveclassificationefficiency.
UNIVERSAL HUMAN VALUES 2	CO-1	Uponcompletionofthecourse, studentsshallhaveabilitytoUnderstandabout themselvesandtheirsurrroundings
	CO-2	Understandandtakeresponsibilitiesinlifeandhandleproblemstoattainsustainable solutionswhilekeepinghumanrelationships
	CO-3	humannatureinmind. Applyresponsibilitiestowardstheircommitments

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UNDERSTANDING(R20 41011)	CO-4	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made
	CO--5	Analyse ethical and unethical practices, and formulate strategies to [AN] actualize a harmonious environment wherever they work.
DESIGNER TOOLS(R20 4104Z)	CO-1	Describe the principles of heat transfer mechanisms, combustion, refrigeration and air conditioning systems in its fundamental aspect with relation to existing energy systems
	CO-2	Apply relationship between theoretical and practical aspects of heat transfer application
	CO-3	Analyse principles of energy mechanisms to solve a wider range of thermal engineering problems