AMRUTVAHINI COLLEGE OF ENGINEERING, SANGAMNER

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

COURSE OUTCOMES (CO)

Electronic Circuits (204181), SE- Sem- III, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	**Describe** the operation of MOSFET and **Analyze** MOSFET circuits for evaluate the performance of voltage gain, Input Impedance, Output Impedance.	1,4
CO2	**Describe** different applications of MOSET and **Apply** the concepts of positive and negative feedback for design of oscillator and Amplifier.	1,3
CO3	**Explore** different types of voltage regulators and **develop** Adjustable regulated power supply using of LM317 & LM337	4
CO4	**Understand** internal structure of op amp IC and op-amp parameters like input and output offset voltage, bias current, slew rate, common mode rejection ratio.	2
CO5	**Design** and **Analyze** linear and nonlinear applications of Op-Amp, and verify its operation.	3
CO6	**Explain** types of signal converter, their advantages, disadvantages and **design** of signal converter using op-amp and **Understand** the functionalities of PLL	3

Digital Circuits (204182), SE-Sem-III, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	**Understand** types of digital logic family, its classification, characteristics and design examples of TTL and CMOS logic family.	2
CO2	**Understand** various reduction techniques of logical functions**,** minimization of logical functions using K-Map, **Use** of logic gates for design of code converters.	3
CO3	**Analyze**, **design** and **implement** combinational logic circuits.	6
CO4	**Analyze**, **design** and **implement** sequential circuits.	6
CO5	**Differentiate** between Mealy and Moore machines and understand examples of sequence detector circuits.	2
CO6	**Understand** types of semiconductor memories and **Analyze** digital system design using PLD	4

Electrical Circuits (204183), SE-Sem-III, 2020-2021

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL and network theorems.	4
CO2	Design and analyze transformers and their applications.	4
CO3	Explain the working principle of AC machines, Select proper electrical motor for given application.	3
CO4	Explain the working principle of DC machines, Select proper electrical motor for given application.	3
CO5	Identify Special purpose motors and their applications	3
CO6	Aware about all the types of motors and their working principle.	2

Data Structures (204184), SE- Sem- III, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Apply the knowledge of fundamentals in C to develop the programs for solving simple problems.	3
CO2	Implement sorting and searching algorithms; and calculate their complexity.	2
CO3	Describe the concepts of stacks and queues; and apply these for expression evaluation & conversion; and recursion.	3
CO4	Describe the concepts of Linked List; and apply these for representation of stack, queue; and polynomial.	3
CO5	Illustrate the terminologies, types, and traversals of binary trees.	2
CO6	Illustrate the terminologies, types, and traversals of graphs; and apply the knowledge of graphs for solving the problems of spanning tree and shortest path algorithms.	3

Signals and Systems (204191), SE-Sem-IV, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Develop the mathematical equations of continuous and discrete time signals and systems and perform fundamental specific as well as multiple operations on signals and categorize signals and systems into different categories	6
CO2	Predict the output of continuous and discrete time Linear Time Invariant (LTI) systems by applying convolution integral and convolution sum methods respectively.	5
CO3	Apply Fourier series for continuous and discrete time signals and decompose into equivalent components.	4
CO4	Apply Fourier transform and Laplace transform for appropriate signals and perform continuous time system analysis. Also understand the basics of discrete time Fourier transform.	3
CO5	Apply the basic statistical concepts and develop the ability to find probability, CDF, PDF of a given event. Also understand correlation, energy spectral density and power spectral density.	3
CO6	To solve the numericals by applying concepts of Signals and Systems indivisually and in group through discussion and interactions.	5

Control System (204192), SE-Sem-IV, 2020-2021

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Model Electrical, Translational and rotational mechanical systems for analysis.	4
CO2	Analyze First Order and Second Order systems in the context of Time response analysis.	3
CO3	Perform time domain analysis of control systems required for stability analysis.Apply root-locus technique to analyze control systems.	3
CO4	Apply Frequency domain technique to analyze control systems	3
CO5	Express and solve system equations in state variable form	2
CO6	Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.	3

Principles of Communication Systems(204193), SE- Sem-IV, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Familiarize with basic mathematical tools for time and frequency domain analysis of communication signal and systems.	2
CO2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems in time and frequency domain	4
CO3	Explain generation and detection of FM systems and compare with AM systems in time and frequency domain.	4
CO4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).	3
CO5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).	2
CO6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.	2

Object Oriented Programming (204194), SE - Sem-IV, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Describe the basic concepts of object oriented programming; and apply the basic program construct in C++ to develop the programs for solving simple problems.	3
CO2	Apply the concepts of classes, methods, and objects to write programs in C++.	3
CO3	Apply the concepts of operator overloading and friend functions to write programs in C++.	3
CO4	Apply the concepts of inheritance and polymorphism to write programs in C++.	3
CO5	Apply Templates, Namespaces, and Exception Handling concepts to write programs in C++.	3
CO6	Describe the fundamentals of file handling in C++.	2

Employability Skills Development (204199), SE - Sem-IV, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	**Define** personal and career goals using introspective skills and SWOC assessment. **Identify** and **estimate** short-term and long-term goals.	5
CO2	**Develop** effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.	6
CO3	**Understand** a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.	2
CO4	Comprehend the importance of professional ethics, etiquettes & morals and **demonstrate** sensitivity towards it throughout certified career.	2
CO5	**Develop** practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.	6
CO6	Have skills and preparedness to **solve** the arithmetic and mathematical aptitude& logical reasoning.	4

Digital Communication(304181), TE - Sem-V, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Demonstrate working of waveform coding techniques and analyze their performance.	4
CO2	Understand processing of digital data in terms of its representation, multiplexing , synchronization, scrambling and inter symbol interference.	2
CO3	Examine the basic stationarity property of a random process and analyze effect on it when passed throgh a LTI system and undesrtand the role of noise in communication system.	4
CO4	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.	4
CO5	Describe working of spread spectrum communication system and analyze its performance in terms of jamming margin, processing gain and bandwidth.	4
CO6	Demonstrate working of building blocks of a digital communication system and given the specifications design the block of digital communication system in a group and as a individual.	4

Digital Signal Processing (304182), TE - Sem-V, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Select proper tools for analog to digital conversion. Use concepts of trigonometry, Complex algebra, vector algebra and matrices to analyze the operations on signals and Acquire knowledge about Systems.	4
CO2	Understand the use of different transforms and analyze the discrete time signals and Systems. Also compare these transforms on the basis of computational complexity.	4
CO3	Use of Z transform to carry out analysis of discrete time systems. Also give its Relationship with other transforms	4
CO4	Design, implementation, analysis and comparison of digital filters for processing of Discrete time signals	6
CO5	Understand the real world applications of digital signal processing and Multidisciplinary team activities.	2
CO6	Assess the techniques, skills, and modern engineering tools necessary for analysis of different signals and filtering out noise signals in engineering practice. Also develop Creative and innovative algorithms that achieve desired performance criteria within Specified objectives and constraints, understand the	4

	need for lifelong learning an Continuing professional education.	

Electromagnetics (304183), TE - Sem-V, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Solve the problems on Electric Field Intensity, Electric Flux Density and Electric Potential using the concepts of Del Operator, Gradient, Divergence, Curl, Coulomb's law, Gauss Law for Electrostatic environment.	3
CO2	Apply the fundamentals of electrostatics to solve the problems on Boundary Conditions.	3
CO3	Solve the problems on Magnetic Field Intensity, Magnetic Flux Density, Boundary Conditions using Biot–Savart's Law, Ampere's Circuit Law for Magnetostatic environment.	3
CO4	Solve the problems on electrodynamic Fields using Faraday's law, Maxwell's equations and Poynting theorem.	3
CO5	Apply the fundamentals of transmission line theory to solve the problems on reflection, dissipation, standing waves.	3
CO6	Understand the fundamentals of uniform plane waves (UPW).	2

Microcontroller (304184), TE - Sem-V, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Clarify the fundamentals architecture of microcontroller 8051.	2
CO2	Understand the various input output peripheral devices and Recognize the use of various programming environments (IDE's).	2
CO3	Desgin and develop a code for interfacing to input-output peripherals with 8051.	3
CO4	Review the fundamentals of architecture of PIC18F microcontroller and its basics.	2
CO5	Desgin and develop a code for interfacing to input-output peripherals with PIC 18F.	3
CO6	Build, simulate and verify real word interfcing of various input-output peripherals with microcontrollers 8051 and PICF.	3

Mechatronics (304185), TE - Sem-V, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Represent key elements of mechatronics system in terms of block diagram and determine the characteristics of the same	2 & 3
CO2	Select appropriate sensor/transducer given a physical quantity to be measured	4
CO3	Describe the components of hydraulic and pneumatic systems.	2
CO4	Design circuits (pneumatic/hydraulic/electro-pneumatic/electro- hydraulic) for given set of specifications by choosing appropriate actuators	3
CO5	Prepare case study of a given mechatronics system	4
CO6	Carry out experiments as an individual and in a team using appropriate engineering tools. Comprehend and write a laboratory record following academic ethics, and draw conclusions at technical level by analyzing the output.	4

Electronic System Design (304193), TE - Sem-V, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Design the Electronic circuits by applying the fundamental concepts & working principles of electronic devices.	4
CO2	Compare & select appropriate components & devices by interpreting information from datasheet	4
CO3	Design a prototype of Data Acquisition system by appropriate selection of transducer & signal conditioning circuits	4
CO4	Design & Performance analysis of Electronic System/subsystem using EDA tools.	4
CO5	Create,Manage & handle the Query of Database using Suitable software tools	4
CO6	Design and develop electronic system designs (SMPS, DC system, DAC and DBMS) in a team and as an individual using appropriate engineering tools. Comprehend and write laboratory record following academic ethics and, draw conclusions at technical level	4

Power Electronics (304186), TE - Sem-VI, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Select the appropriate power electronics device for required applications by proper analysis of their important specification, features and functional working.	5
CO2	Design the AC to variable DC controlled converter for typical applications with proper analysis of various circuit configurations.	6
CO3	Analyze the basic configurations of DC to variable DC converter (Inverter) and apply Fourier analysis.	3
CO4	Design the AC to variable AC controlled converter and DC to variable DC (Choppers) and analyze with specific loads.	6
CO5	Apply the concepts of Power electronics and resonance converters for industrial applications and energy efficient systems.	3
CO6	Perform the experiments on Power Electronics Converters in a team and as an indivisual using appropriate engineering tools. Comprehend and write laboratory record following academic ethics and draw conclusions at technical level.	5

Information Theory, Coding & Comm. Network (304187), TE - Sem-VI, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	**Understand** fundamentals of information theory and apply algorithms of source coding techniques for data compression like Huffman coding, Shannon-Fano coding, Run length encoding and Lampel Ziv encoding techniques.	4
CO2	**Design** a channel coding scheme for a communication system. and understand error detection and correction capability.	3
CO3	**Design** of encoder and decoder for cyclic codes using systematic and non systematic type cyclic codes	3
CO4	**Understand** methods of BCH and convolutional codes used in communication system.	2
CO5	**Understand** the fundamental concepts of data communication network, physical layer and data link layer .	2
CO6	To **implement** source and channel coding and decoding techniques using MATLAB simulation software. Also comprehend and write laboratory record.	4

Business Management (304188), TE - Sem-VI, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Understand management science aspects useful for business	2
CO2	Apply quality aspects for systematically running the business	3
CO3	Apply different project management aspect and acquire financial management skills.	4
CO4	Understand human resource management principles.	2
CO5	Understand the characteristics, roles & responsbilities of entrepreneur	2
CO6	Understand marketing strategies for the business.	2

Advanced Processor (304189), TE - Sem-VI, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Understand applications and architectures of ARM7, ARM9, ARM11 and Tiva TM4C123G Series processors.	2
CO2	Understand the architecture of LPC2148 microcontroller and its assembly language instruction set.	2
CO3	Design interfacing of various input-output peripherals with LPC2148 microcontroller and understand the programming of its on-chip ADC and DAC.	3
CO4	Understand the fundamentals of DSP processors and internal architecture and applications of DSP processor TMS320C67X.	2
CO5	Understand the functional units, on-chip memories, instruction set, and operational features of TMS320C67X.	2
CO6	Interface various input-output peripherals with LPC2148 and TMS320C6748, draw conclusions and write a laboratory record.	3

System Programming & Operating System (304190), TE - Sem-VI, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Demonstrate the knowledge of Systems Programming and analyse the structure of OS and basic architectural components involved in OS design.	4
CO2	Compare and analyse the different implementation approach of operating system Abstractions. (Process control, Threads, Scheduling,	4
CO3	Understand the Mutual exclusion, Deadlock detection and agreement protocols of the operating system.	4
CO4	Analyse the various memory management techniques for timesharing and Distributed systems.	4
CO5	Interpret various OS functions used in Linux / Ubuntu for I/O management, Disk Scheduling and File Management.	2
CO6	Implement shell scripting on Linux, lexical analyser and algorithms for job scheduling, deadlock detection and avoidance and page replacement. Also design macro pass I, Understand the need for lifelong learning and continuing professional education	6

Employability Skills and Mini Project (304196), TE - Sem-VI, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Identify and formulate the problem statement based on interested domain, recent trends and real life problems.	2
CO2	Apply engineering knowledge for comparison and selection of appropriate software and hardware resources to solve the identified engineering problem.	3
CO3	Schedule, distribute and implement the project work as an individual and in a team.	4
CO4	Demonstrate compliance to the prescribed standards/safety norms and environmental factors through implementation of the identified engineering problem.	3
CO5	Demonstrate effectively the ability to present the project works in oral and written communication through the project report.	3

VLSI Design & Technology (404181), BE - Sem-VII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Write effective HDL coding for digital design.	6
CO2	Apply knowledge of real time issues in digital design.	3
CO3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs (CPLD and FPGA).	6
CO4	Apply concepts of CMOS circuits for specified applications and Analyze various issues and constraints in design of an ASIC.	4
CO5	Apply knowledge of testability in design and build self-test circuit.	3
CO6	Perform the experiments on VLSI Design and Technology in a team and as an indivisual using appropriate engineering tools. Comprehend and write laboratory record following academic ethics and draw conclusions at technical level.	6

Computer Network & Security (404182), BE - Sem-VII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Explore the Fundamental principles of Local Area Networks including wired & wireless standard network	2
CO2	Compile the hardware, software requirements for network layer and define IPv4 & IPv6. Compare IPv4 and IPv6 and discuss transition of IPv6 from IPv4.	3
CO3	Select the appropriate protocol for transport layer of computer network.	4
CO4	Summarize application layer protocols and select appropriate protocol for given application.	3
CO5	Develop encryption and decryption algorithms for coding plain text.	4
CO6	Carry out experiment on networking in a group and as an individual. Comprehend and write laboratory record by adopting professional and academic ethics and draw conclusions at technical level.	4

Radiation & Microwave Techniques (404183), BE - Sem-VII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of radiating elements.	3
CO2	Analyze and compare various radiating elements & arrays. Construct radiation pattern using pattern multiplication rule.	4
CO3	Identify various modes in the waveguide. Compare, investigate: coaxial line, rectangular waveguides & striplines and identify applications of the same.	4
CO4	Explore construction and working of principles passive and active microwave devices/components.	2
CO5	Devise set ups of microwave measurement devices to measure performance parameters of microwave components in various applications. Demonstrate the effect of radiations on environmental sustainability.	3
CO6	Carry out experiments as an individual and in a team using suitable hardware/software tools. Comprehend and write a laboratory record following academic ethics and draw conclusions at a technical level.	4

Digital Image & Video Processing (EL-I) (404184), BE - Sem-VII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Implement basic operations, enhancement operations in spatial domain/frequency domain and image restoration operations on digital images through investigation of the problem domain	3
CO2	Calculate compression ratio by applying 2D compression techniques for digital images	3
CO3	Identify appropriate thresholding, edge detection or morphological technique for object segmentation and recognition	4
CO4	Represent objects and regions of the image by choosing appropriate method	2
CO5	Explore video signal representation and different algorithm for video processing	2
CO6	Perform operations on digital images as an individual and in team using appropriate software tools. Comprehend and write a laboratory record following academic ethics, and draw conclusions at technical level by analyzing output.	3

Electronic Product Design (EL-II) (404185), BE - Sem-VII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Explain the stages of product (hardware/ software) design and development. Also know the basic parameters of product design like elements of successful design, grounding, shielding, energy coupling etc.	2
CO2	Identify different considerations of hardware design such as functional design, architectural design, module debug and testing.	2
CO3	Use of different considerations of software design like waterfall model, good programming practice , software design limitations and software testing of electronics product.	3
CO4	Apply methods of PCB design- routing topology, partitioning, grounding and to know different tools used for PCB Design.	3
CO5	Use the product debugging and testing process, component selection and testing. for product development.	3
CO6	Use the processes and importance of documentation, types of documents, document preparation, presentation and preservation.	3

Mobile Communication (404189), BE - Sem-VIII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Apply the concepts of switching technique to design multistage networks.	4
CO2	Apply the concepts of Traffic Engineering to design Mobile networks.	4
CO3	Explore the cellular concept & propagation mechanism to develop optimal cellular networks	4
CO4	Identify elements of GSM, explore its services, applications, radio transmission parameters, call setup procedure and handover mechanism for cellular communication.	4
CO5	Differentiate thoroughly the generations of mobile technologies (1G to 5G).	4
CO6	Carry out experiment on mobile communication in a group and as an individual, comprehend, write laboratory record by adopting professional and academic ethics and draw conclusions at technical level.	4

Broadband Communication System (404190), BE - Sem-VIII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Explore the basic working mechanism and components of optical fiber communication system.	2
CO2	Set up Link power budget and Rise Time Budget analysis of optical fiber communication system; and judge its viability.	4
CO3	Illustrate the construction and working mechanism of advanced WDM optical components including isolator, circulator, coupler and fiber bragg grating.	2
CO4	Explore the basic working mechanism and components of satellite communication.	2
CO5	Set up Link power budget analysis of a satellite communication system; and judge its viability.	4
CO6	Carry out experiments as an individual and in a team, comprehend and write a laboratory record and draw conclusions at a technical level.	4

Audio Video Engineering (EL-III) (404191), BE - Sem-VIII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Explore the basic fundamentals of television systems, discriminate their construction and working principle. Discuss different Colour Television standards.	3
CO2	Recall the fundamentals of digital television systems (DTV) its standards, parameters and Distinguish them with High definition television systems (HDTV)	2
CO3	Classify various HD Television standards and Digital Television broadcasting systems and acquainted with different types of analog TV, digital TV and HDTV systems	2
CO4	Recommend the proper advanced television systems and their alternatives. Enlist the fundamentals of Audio Video Recording & reproduction techniques.	3
CO5	Understand acoustic fundamentals and various acoustic systems.	2
CO6	Test and verify various compression tools used for audio/ video/ image files. Carry out experiments as an individual and in a team, comprehend and write a laboratory record. Test and find out the possible faults in the television set.	3

Wireless Sensor Network (EL-IV) (404192), BE - Sem-VIII, 2020-21

After successfully completing the course students will be able to,

Co. No.	Description	Bloom's Taxonomy Level
CO1	Summerize fundamental concepts and terminologies used in Wireless Sensor Network.	2
CO2	Describe importance and applications (use) of radio communication and link management in Wireless Sensor Network.	3
CO3	Distinguish between various wireless standards and classify the protocols associated with Wireless Sensor Network.	4
CO4	Identify importance of localization, select appropriate routing techniques and deployment schemes in Wireless Sensor Network.	3
CO5	Explore various data aggregation techniques and identify different security issues and threats in Wireless Sensor Network.	3
CO6	Analyes challenges in the Design and deployement of WSN based applications.	4