SUDHARSAN ENGINEERING COLLEGE

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)

Sathiyamangalam, Kulathur(TK), Pudukkottai District-622 501

Ph: 04339-240830, 240840 Fax: 04339-240205

Website: **www.sec.ac.in** Email: principal@sec.ac.in

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE OUTCOMES

As per Anna University Regulation 2017, the list of courses for the batch 2019 - 2023 is given in the Table.

S.NO.	COURSE CODE (NAAC)	COURSE CODE (UNIVERSITY)	TITLE OF THE COURSE
Semester - I			
1	C101	HS8151	Communicative English
2	C102	MA8151	Engineering Mathematics – I
3	C103	PH8151	Engineering Physics
4	C104	CY8151	Engineering Chemistry
5	C105	GE8151	Problem Solving and Python Programming
6	C106	GE8152	Engineering Graphics
7	C107	GE8161	Problem Solving and Python Programming Laboratory
8	C108	BS8161	Physics and Chemistry Laboratory
Semester - II			
9	C109	HS8251	Technical English
10	C110	MA8251	Engineering Mathematics – II
11	C111	PH8253	Physics for Electronics Engineering
12	C112	BE8254	Basic Electrical and Instrumentation Engineering

13	C113	EC8251	Circuit Analysis
14	C114	EC8252	Electronic Devices
15	C115	EC8261	Circuits and Devices Laboratory
16	C116	GE8261	Engineering Practices Laboratory
Semester - III			
17	C201	MA8352	Linear Algebra and Partial Differential Equations
18	C202	EC8393	Fundamentals of Data Structures in C
19	C203	EC8351	Electronic Circuits-I
20	C204	EC8352	Signals and Systems
21	C205	EC8392	Digital Electronics
22	C206	EC8391	Control System Engineering
23	C207	EC8381	Fundamentals of Data Structures in C Laboratory
24	C208	EC8361	Analog and Digital Circuits Laboratory
25	C209	HS8381	Interpersonal Skills/Listening & Speaking
Semester - IV			
26	C210	MA8451	Probability and Random Processes
27	C211	EC8452	Electronic Circuits-II
28	C212	EC8491	Communication Theory
29	C213	EC8451	Electromagnetic Fields

30	C214	EC8453	Linear Integrated Circuits
31	C215	GE8291	Environmental Science and Engineering
32	C216	EC8461	Circuits Design and Simulation Laboratory
33	C217	EC8462	Linear Integrated Circuits Laboratory
Semester - V			
34	C301	EC8501	Digital Communication
35	C302	EC8553	Discrete-Time Signal Processing
36	C303	EC8552	Computer Architecture and Organization
37	C304	EC8551	Communication Networks
38	C305	EC8073	Medical Electronics
39	C306	ORO551	Renewable Energy Sources
40	C307	EC8562	Digital Signal Processing Laboratory
41	C308	EC8561	Communication Systems Laboratory
42	C309	EC8563	Communication Networks Laboratory
Semester - VI			
43	C310	EC8691	Microprocessors and Microcontrollers
44	C311	EC8095	VLSI Design
45	C312	EC8652	Wireless Communication
46	C313	MG8591	Principles of Management
47	C314	EC8651	Transmission Lines and RF Systems
48	C315	EC8004	Wireless Networks
49	C316	EC8681	Microprocessors and Microcontrollers Laboratory

50	C317	EC8661	VLSI Design Laboratory
51	C318	EC8611	Technical Seminar
52	C319	HS8581	Professional Communication
Semester - VII			
53	C401	EC8701	Antennas and Microwave Engineering
54	C402	EC8751	Optical Communication
55	C403	EC8791	Embedded and Real Time Systems
56	C404	EC8702	Adhoc and Wireless Sensor Networks
57	C405	OIE751	Robotics
58	C406	EC8711	Embedded Laboratory
59	C407	EC8761	Advanced Communication Laboratory
Semester - VIII			
60	C408	EC8093	Digital Image Processing
61	C409	EC8094	Satellite Communication
62	C410	EC8811	Project Work

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SEMESTER 1

Course Code & Title: C101 & HS8151 - Communicative English		
	CO Statements	**Knowledge Level**
The students should be able to		
C101.1	**Enhance** their reading and technical writing skills in the first year itself.	K2
C101.2	**Read** comfortably and **understand** articles in Science and Engineering journals and articles in dailies.	K2
C101.3	**Ge**t themselves involved in an active manner during informal conversations, state opinions and express willingness.	K3
C101.4	**Communicate** effectively in short conversations and talks uttered in English.	K4
C101.5	**Draft** essays related to their subjects and write personal letters and emails in comfortable manner for lifelong learning.	K4

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Course Code & Title: C102 & MA8151 - Engineering Mathematics - I		
	CO Statements	**Knowledge Level**
The students should be able to		
C102.1	**Analyze** and **apply** the Engineering knowledge in differentiation to solve maxima and minima problems.	K4
C102.2	**Solve** the problems of integrals using different methods of calculus.	K4
C102.3	**Design** and **develop** the problems of integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.	K4
C102.4	**Analyze** the problems of integrals by using various methods of integration, such as substitution, partial fractions and integration by parts.	K4
C102.5	**Apply** various tools in solving the differential equations to recognize the need for life-long learning.	K3

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Course Code & Title: C103 &PH8151 - Engineering Physics		
	CO Statements	**Knowledge Level**
The students should be able to		
C103.1	**Analyse** the problems in columns and beams and gain the engineering knowledge in properties of matter to formulate.	K4
C103.2	**Understand** the fundamental concepts and applications of waves, lasers and fiber optics to give theoretical approaches to design modern devices.	K2
C103.3	**Interpret** the knowledge in thermal properties of materials and can determine expansion joints and heat exchangers in devices.	K3
C103.4	**Understand** the fundamental concepts of quantum theory and how modern electron microscope techniques use it to make predictions in the field of physics.	K2
C103.5	**Describe** the behavior of solids, the fundamentals of crystals, their structures and the various crystal development processes.	K2

Course Code & Title: C104 &CY8151 - Engineering Chemistry		
	CO Statements	**Knowledge Level**
The students should be able to		
C104.1	**Apply** the water treatment techniques in the industries and domestic water using the latest techniques by using engineering knowledge.	K3
C104.2	**Understand** the adsorption methods used in the field of water and air pollution purification to assess societal, health, safety and cultural issues in the environmental.	K2
C104.3	**Know** the significance of alloying and the behavior of one component and two component systems using phase diagram and apply appropriate techniques in the field of metallurgy.	K2
C104.4	**Discuss** the types of fuels, calorific value calculations, and analyze the need for alternative fuels to solve current social problems by using engineering techniques.	K4
C104.5	**Review** the principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells with appropriate consideration for the societal and environmental considerations.	K2

Course Code & Title: C105 &GE8151- Problem Solving and Python Programming		
	CO Statements	**Knowledge Level**
The students should be able to		
C105.1	**Understand** the concepts of computational thinking and algorithmic problem-solving techniques.	K2
C105.2	**Develop** simple python programs for applying the concepts of data types, expressions, and python statements.	K3
C105.3	**Develop** Python programs for solving real-time computational problems by using conditionals, looping, functions, and strings.	K3
C105.4	**Understand** the concepts of compound data using Python lists, tuples, and dictionaries.	K2
C105.5	**Develop** python programs for solving computational problems by using modules, files and python packages.	K3

Course Code & Title: C106 & GE8152- Engineering Graphics		
	CO Statements	**Knowledge Level**
The students should be able to		
C106.1	**Sketch** the conic sections, special curves, and draw orthographic views from pictorial views and models.	K4
C106.2	**Apply** the principles of orthographic projections of points in all quadrants, lines and planes in first quadrant.	K3
C106.3	**Sketch** the projections of simple solids like prisms, pyramids, cylinder and cone and obtain the traces of plane figures.	K4
C106.4	**Practice** the sectional views of solids like cube, prisms, pyramids, cylinders & cones and extend its lateral surfaces.	K3
C106.5	**Sketch** the perspective projection of simple solids, truncated prisms, pyramids, cone and cylinders and sketch the isometric projection of simple machine parts.	K4

Course Code & Title: C107 &GE8161- Problem Solving and Python Programming Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C107.1	**Develop** simple python programs for applying the concepts of data types, expressions and python statements.	K3
C107.2	**Develop** Python programs using conditionals, looping, functions and strings for solving real-time computational problems.	K3
C107.3	**Understand** the concepts of compound data using Python lists, tuples and dictionaries.	K2
C107.4	**Develop** python programs for solving problems by using modules, files and python packages.	K3
C107.5	**Utilize** Python packages for developing real-world software applications.	K6

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Course Code & Title: C108 & BS8161 - Physics and Chemistry Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C108.1	**Manipulate** the fundamental concepts like torque, elasticity and bending moment of beams for various engineering applications by the determination of rigidity modulus of the wire and young's modulus of the material of the beam by non-uniform bending.	K3
C108.2	**Practice** the fundamentals of thermal properties of material of the bad conductor by Lee's disc method.	K3
C108.3	**Understand** the basic knowledge and estimation of DO content in water sample by Winkler's method and molecular weight of polymer by Ostwald viscometer.	K2
C108.4	**Dramatize** the strength of an acid using pH meter and conduct meter for applications in the field of engineering.	K3
C108.5	**Experiment** the estimation of total, permanent and temporary hardness of water for our environment.	K3

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SEMESTER 2

Course Code & Title: C109 & HS8251 - Technical English		
	CO Statements	**Knowledge Level**
The students should be able to		
C109.1	**Read** and **write** their technical and area-specific texts in an effortless manner.	K3
C109.2	**Listen** comfortably and respond confidently to lectures and talks pertaining to their domain skills.	K2
C109.3	**Speak** in an appropriate manner in both formal and informal situations for lifelong learning.	K3
C109.4	**Create** CVs and draft Job applications in confident manner.	K6
C109.5	**Communicate** confidently by using all the four skills with their peers and in real life situations.	K4

Course Code & Title: C110 & MA8251 - Engineering Mathematics - II		
	CO Statements	**Knowledge Level**
The students should be able to		
C110.1	**Analyze** the different types of matrices for solving practical problems.	K4
C110.2	**Apply** gradient, divergence and curl of a vector point function and related identities in engineering field.	K3
C110.3	**Acquire** the knowledge to solve the engineering problems in analytic functions.	K2
C110.4	**Analyze** and **apply** the different methods to solve complex integration problems.	K4
C110.5	**Apply** and **analyze** the fundamentals of Laplace transforms for the projects.	K4

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Course Code & Title: C111 & PH8253 - Physics for Electronics Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C111.1	**Comprehend** the materials for their diverse applications, it is necessary to grasp the energy band structures and the classical and quantum electron theories.	K3
C111.2	**Provide** a balanced understanding of diverse semiconductor electronic devices, such as hall devices, ohmic contacts, Schottky diodes, and power transistors, by explaining the fundamental principles of semiconductor physics.	K2
C111.3	**Interpret** the properties of magnetic and dielectric materials, manipulate them and then analyze them for the purposes for which they are used in modern devices.	K3
C111.4	**Understand** the fundamental properties of optical materials in optoelectronics which is essential to comprehend the theoretical methods for designing modern optoelectronic devices.	K2
C111.5	**Comprehend** the fundamentals of quantum structures and the nano scale manipulation of modern materials in spintronics and carbon electronics.	K2

Course Code & Title: C112 & BE8254 - Basic Electrical and Instrumentation Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C112.1	**Understand** the operation of three phase electrical circuits and power system.	K2
C112.2	**Analyse** the regulation and efficiency of transformers.	K4
C112.3	**Understand** the characteristics of DC Generator and Motor.	K2
C112.4	**Analyse** the performance of AC and DC machines.	K4
C112.5	**Apply** the concepts of measurements and instruments for real time applications.	K3

Course Code & Title: C113 & EC8251- Circuit Analysis		
	CO Statements	**Knowledge Level**
The students should be able to		
C113.1	**Understand** the basic concepts of circuit elements and fundamental laws applied for circuits.	K2
C113.2	**Apply** circuit theorems for DC and AC circuits to find the electrical parameters.	K3
C113.3	**Understand** the concept of resonant theory and coupled circuits.	K2
C113.4	**Analyze** the transient response of DC and AC circuits in series and parallel configurations.	K4
C113.5	**Construct** the two port networks and to verify its properties.	K2

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Course Code & Title: C114 &EC8252 - Electronic Devices		
	CO Statements	**Knowledge Level**
The students should be able to		
C114.1	**Understand** the fundamental concepts of semiconductor diode and its operation.	K2
C114.2	**Elaborate** the construction and operation of transistors with its equivalent circuits.	K2
C114.3	**Describe** the construction and operation of FET and its characteristics.	K2
C114.4	**Understand** the principle of operation and characteristics of special semiconductor devices.	K2
C114.5	**Discuss** the operation of various semiconductor photo devices and power electronic devices.	K2

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Course Code & Title: C115 & EC8261 - Circuits and Devices Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C115.1	**Demonstrate** VI characteristics of basic electronic devices.	K2
C115.2	**Apply** network theorems for electrical circuits.	K3
C115.3	**Demonstrate** the transient analysis and resonance of the RLC circuits.	K2

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Course Code & Title: C116 & GE8261 - Engineering Practices Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C116.1	**Fabricate** carpentry joints.	K6
C116.2	**Use** Welding equipment's to join the structures.	K3
C116.3	**Perform** sheet metal works.	K6
C116.4	**Perform** basic fitting operations and plumbing.	K3
C116.5	**Carry** out basic home electrical works and appliances.	K3

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E-Box Colleges

SEMESTER 3

Course Code & Title: C201 & MA8352 - Linear Algebra and Partial Differential Equations		
	CO Statements	**Knowledge Level**
The students should be able to		
C201.1	**Analyze** the fundamental concepts of advanced algebra and their rolein modern Mathematics and applied contexts.	K3
C201.2	**Apply** the accurate and efficient use of advanced algebraic techniquesin engineering field.	K4
C201.3	**Solve** non - trivial problems related to the concepts and by proving simple theorems.	K3
C201.4	**Apply** the engineering knowledge to manage the projects in transforms and partial differential equations to formulate and solve some of the physical engineering problems.	K6
C201.5	**Identify** and **analyze** the partial differential equations using Fourier series analysis in engineering applications.	K3

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Course Code & Title: C202 & EC8393 - Fundamentals of Data Structures in C		
	CO Statements	**Knowledge Level**
The students should be able to		
C202.1	**Understand** the fundamentals of basic C programming.	K2
C202.2	**Create** an application program using functions, pointers, structures and unions.	K3
C202.3	**Implement** linear data structures such as arrays, stacks, queues and linked list operations using C.	K3
C202.4	**Implement** non-linear data structures Trees and Graphs for an application.	K4
C202.5	**Apply** various sorting algorithms for an application using C program.	K4

Course Code & Title: C203 & EC8351 - Electronic Circuits- I		
	CO Statements	**Knowledge Level**
The students should be able to		
C203.1	**Understand** the fundamental concepts of biasing of BJT.	K2
C203.2	**Design** the single stage and multistage BJT amplifiers.	K2
C203.3	**Analyze** the FET and MOSFET small signal amplifiers.	K4
C203.4	**Analyze** the frequency response characteristics of FET and MOSFET small signal amplifiers.	K4
C203.5	**Illustrate** different types of rectifiers and power supplies.	K3

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Course Code & Title: C204 & EC8352 - Signals and Systems		
	CO Statements	**Knowledge Level**
The students should be able to		
C204.1	**Analyze** the properties of signals and systems.	K4
C204.2	**Apply** Fourier Series and Fourier transform in continuous time signals.	K3
C204.3	**Examine** linear time invariant continuous time systems in the time domain and frequency domain.	K4
C204.4	**Apply** Z transform and discrete time Fourier transform in discrete time signals.	K3
C204.5	**Analyze** LTI DT systems in the time domain and frequency domain.	K4

Course Code & Title: C205 & EC8392- Digital Electronics		
	CO Statements	**Knowledge Level**
The students should be able to		
C205.1	**Understand** and **apply** the Boolean laws and formulate the different minimization techniques using Boolean functions.	K2
C205.2	**Implement** the various combinational circuits using logic gates.	K3
C205.3	**Analyze** and **design** the various synchronous sequential circuits using logic gates.	K4
C205.4	**Analyze** the asynchronous sequential circuits for stability and hazards.	K4
C205.5	**Apply** suitable memory devices and digital integrated circuits for real time applications.	K3

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Course Code & Title: C206 & EC8391 - Control Systems Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C206.1	**Identify** the various control system components and their representations.	K2
C206.2	**Attain** the time response and steady state error of control systems.	K3
C206.3	**Analyze** the stability of the system from its frequency response plots.	K4
C206.4	**Apply** the concepts of Routh Hurwitz, Root Locus and Nyquist stability criterions to analyze the stability of the system.	K4
C206.5	**Analyze** the system stability with state space models using state variables.	K4

Course Code & Title: C207 & EC8381- Fundamentals of Data Structures in C Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C207.1	**Write** basic C programs using looping, data manipulations, arrays and strings.	K2
C207.2	**Develop** a C program using functions with argument passing.	K3
C207.3	**Create** an application using linear and nonlinear data structures.	K4
C207.4	**Implement** various sorting algorithms using C program.	K4
C207.5	**Create** an application using search algorithms and hashing function.	K4

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Course Code & Title: C208 & EC8361 - Analog and Digital Circuits Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C208.1	**Analyze** the rectifiers, filters and regulated power supplies.	K4
C208.2	**Demonstrate** the working of BJT and JFET amplifiers and to obtain its frequency response.	K2
C208.3	**Design** a Cascode and Cascade amplifiers.	K3
C208.4	**Design** a Combinational and Sequential Circuit using Logic Gates & Flip-flop.	K3
C208.5	**Simulate** the electronic circuits like amplifiers and rectifiers using PSPICE Model.	K3

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Course Code & Title: C209 &HS8381 - Interpersonal Skills/Listening &Speaking		
	CO Statements	**Knowledge Level**
The students should be able to		
C209.1	**Listen** and **react** to English in an appropriate manner.	K2
C209.2	**Get** themselves actively involved in group discussion activities.	K3
C209.3	**Feel** comfortable in making oral presentations.	K2
C209.4	**React** well in both formal and informal contexts in professional situations.	K4
C209.5	**Persuade** their audience by making appropriate expressions.	K5

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SEMESTER 4

Course Code & Title: C210 & MA8451- Probability and Random Processes		
	CO Statements	**Knowledge Level**
The students should be able to		
C210.1	**Understand** the basic notion of the concepts of probability and have knowledge of standard distributions which can apply to real life phenomenon.	K2
C210.2	**Apply** the Engineering knowledge of one- and two-dimensional random variables.	K3
C210.3	**Identify** and **apply** the concept of random processes in engineering field.	K3
C210.4	**Interpret** and **apply** the concept of correlation and spectral densities to manage the projects.	K3
C210.5	**Analyze** various distribution functions and to attain the knowledge to handle the response of random inputs to linear time invariant systems.	K5

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Course Code & Title: C211 & EC8452- Electronic Circuits -II		
	CO Statements	**Knowledge Level**
The students should be able to		
C211.1	**Construct** the various feedback amplifiers using BJT.	K3
C211.2	**Design** low frequency and high frequency oscillators using BJT.	K3
C211.3	**Analyze** the performance of different types of tuned amplifiers using BJT.	K4
C211.4	**Design** wave shaping circuits and multivibrators using BJT.	K3
C211.5	**Describe** power amplifiers and DC-DC converters.	K2

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Course Code & Title: C212 & EC8491 Communication Theory		
	CO Statements	**Knowledge Level**
The students should be able to		
C212.1	**Understand** the implementation of AM in communication systems.	K2
C212.2	**Design** angle modulated communication systems.	K4
C212.3	**Apply** the concepts of Random Process to design communication systems.	K3
C212.4	**Analyze** the noise performance of AM and FM systems.	K4
C212.5	**Apply** the concepts of sampling and quantization in communication.	K3

Course Code & Title: C213 & EC8451 Electromagnetic Fields		
	CO Statements	**Knowledge Level**
The students should be able to		
C213.1	**Apply** the basic concepts of vector algebra that related to electromagnetic model in different co-ordinate systems.	K3
C213.2	**Understand** the applications of electric field, potential and energy density.	K2
C213.3	**Apply** the magnetic field, potential, energy density forces, torques for their applications.	K3
C213.4	**Categorize** the relation between electric and magnetic fields using Maxwell's equations.	K4
C213.5	**Understand** the various wave propagation techniques in lossless and in lossy media.	K2

Course Code & Title: C214 & EC8453 Linear Integrated Circuits		
	CO Statements	**Knowledge Level**
The students should be able to		
C214.1	**Understand** the construction and working of op-amp and also its AC and DC characteristics.	K2
C214.2	**Design** the circuits using op-amp for linear and nonlinear applications.	K3
C214.3	**Apply** the concepts of analog multiplier and PLL for various applications.	K3
C214.4	**Interpret** the principle of conversion of ADC and DAC using op-amps.	K2
C214.5	**Design** various waveform generators and other circuits using different ICs.	K3

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Course Code & Title: C215 & GE8291 Environmental Science and Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C215.1	**Apply** the finding and implementing scientific, technological, economic and political solutions to environmental problems with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.	K3
C215.2	**Understand** the impact of the professional engineering solutions in societal and environmental contexts for the importance of public participation in conservation of natural resources.	K2
C215.3	**Discuss** the types of natural energy sources and analyze the need for alternative fuels to solve current social problems by using engineering techniques.	K2
C215.4	**Transforming** the concepts from unsustainable to sustainable development and urban problems related to energy, water conservation, rain water harvesting.	K2
C215.5	**Apply** the basics of information technology in environment and human health function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.	K3

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Course Code & Title: C216 & EC8461 Circuits Design and Simulation Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C216.1	**Analyze** the characteristics of various types of feedback amplifiers.	K4
C216.2	**Design** oscillators, tuned amplifiers, wave-shaping circuits and multivibrators using BJT.	K3
C216.3	**Simulate** oscillators, tuned amplifiers, wave-shaping circuits and multivibrators using SPICE tool.	K3

Course Code & Title: C217& EC8462 Linear Integrated Circuit Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C217.1	**Design** oscillators and amplifiers using operational amplifiers.	K3
C217.2	**Design** filters using op-amp and perform experiments to obtain frequency response.	K3
C217.3	**Analyze** the working of PLL and use PLL as frequency multiplier.	K4
C217.4	**Design** DC power supply using ICs.	K3
C217.5	**Analyze** the performance of oscillators and multivibrators using SPICE.	K4

SEMESTER 5

Course Code & Title: C301 & EC8501 Digital Communication		
	CO Statements	**Knowledge Level**
The students should be able to		
C301.1	**Compute** the information capacity using Huffman and Shannon-Fano encoding methods.	K3
C301.2	**Understand** the implementation of DPCM, DM, ADPCM and ADM techniques.	K2
C301.3	**Apply** the base band transmission and reception techniques in digital communication systems.	K3
C301.4	**Analyze** the noise performance of various digital modulation techniques.	K4
C301.5	**Compute** error control coding techniques in digital communication system.	K3

Course Code & Title: C302 & EC8553 Discrete-Time Signal Processing		
	CO Statements	**Knowledge Level**
The students should be able to		
C302.1	**Understand** the fundamental concepts of DFT for the analysis of discrete time signals.	K2
C302.2	**Implement** the digital Infinite Impulse Response filters and formulate various realizations.	K3
C302.3	**Develop** the linear phase Finite Impulse Response filters using windowing and frequency sampling techniques.	K4
C302.4	**Examine** the finite word length effects in digital signal processing.	K2
C302.5	**Understand** the architecture, addressing modes and instruction sets of Digital Signal Processors.	K2

Course Code & Title: C303 & EC8552 Computer Architecture and Organization		
	CO Statements	**Knowledge Level**
The students should be able to		
C303.1	**Understand** the basic organization of modern computer systems.	K2
C303.2	**Implement** fixed-and floating-point arithmetic operations in computer architecture.	K3
C303.3	**Design** pipelined control units for implementing parallel processing.	K2
C303.4	**Analyze** the performance of memory systems and I/O devices.	K4
C303.5	**Understand** the parallel processing and advanced computer architectures.	K2

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Course Code & Title: C304 & EC8551 Communication Networks		
	CO Statements	**Knowledge Level**
The students should be able to		
C304.1	**Understand** the basic building block of networks and formulate the different error detection and correction techniques.	K2
C304.2	**Relate** various media access and internetworking protocols.	K2
C304.3	**Apply** various routing protocols and algorithms for a given network along with IP addresses.	K3
C304.4	**Demonstrate** the flow of information in transport layer.	K2
C304.5	**Study** the various application layer paradigms and the basics of cryptography and network security.	K2

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Course Code & Title: C305 & EC8073 Medical Electronics		
	CO Statements	**Knowledge Level**
The students should be able to		
C305.1	**Understand** the human body electro- physiological parameters and recording of bio-potentials.	K2
C305.2	**Examine** the non-electrical physiological parameters and their measurement.	K2
C305.3	**Interpret** the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators.	K2
C305.4	**Utilize** physical medicine methods like ultrasonic, shortwave, microwave surgical diathermies, and bio-telemetry principles.	K2
C305.5	**Outline** about recent trends in medical instrumentation.	K2

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Course Code & Title: C306 & ORO551 Renewable Energy Sources		
	CO Statements	**Knowledge Level**
The students should be able to		
C306.1	**Understanding** the physics of solar radiation.	K2
C306.2	**Examine** ability to classify the solar energy collectors and methodologies of storing solar energy**.**	K2
C306.3	**Apply** solar energy in a useful way.	K3
C306.4	**Outline** knowledge in wind energy and biomass with its economic aspects.	K2
C306.5	**Analyze** knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies**.**	K4

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Course Code & Title: C307 & EC8562 Digital Signal Processing Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C307.1	**Demonstrate** convolution and correlation using MATLAB.	K3
C307.2	**Design** and implementation of FIR and IIR Filters using MATLAB.	K4
C307.3	**Design** and implementation of FIR and IIR Filters using digital signal processor.	K4

Course Code & Title: C308 & EC8561 Communication Systems Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C308.1	**Analyse** the effects of sampling and TDM.	K4
C308.2	**Demonstrate** the various analog and digital modulation and demodulation techniques.	K3
C308.3	**Apply** various channel coding schemes and demonstrate their capabilities towards the improvement of the noise performance of communication system.	K3
C308.4	**Simulate** digital modulation schemes using MATLAB.	K3
C308.5	**Simulate** error control coding schemes using MATLAB.	K3

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Course Code & Title: C309 & EC8563 Communication Networks Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C309.1	**Demonstrate** communication between two desktop computers.	K2
C309.2	**Implement** various networking protocols and establish connection between computers.	K3
C309.3	**Construct** a network using sockets and exchange information.	K3
C309.4	**Implement** various routing protocols and maintain a secure data transfer.	K3
C309.5	**Simulate** various types of topologies and understand the differences between them.	K3

SEMESTER 6

Course Code & Title: C310 & EC8691 Microprocessors and Microcontrollers		
	CO Statements	**Knowledge Level**
The students should be able to		
C310.1	**Understand** the fundamental concepts of 8086 microprocessor architecture, addressing modes and instruction set.	K2
C310.2	**Understand** the design aspects of I/O and memory interfacing circuits.	K2
C310.3	**Develop** assembly language program to interface 8086 microprocessors with supporting chips for different applications.	K4
C310.4	**Understand** the fundamental concepts of 8051 microcontroller architecture, addressing modes and instruction set.	K2
C310.5	**Develop** assembly language program to interface 8051 microcontrollers with supporting chips for different applications.	K4

Course Code & Title: C311 & EC8095 VLSI Design		
	CO Statements	**Knowledge Level**
The students should be able to		
C311.1	**Understand** the concepts of digital building blocks using MOS transistor.	K2
C311.2	**Design** various combinational MOS logic circuits like CPL, DPL.	K3
C311.3	**Construct s**equential circuits and timing systems.	K2
C311.4	**Design** arithmetic building blocks and memory subsystem.	K3
C311.5	**Implement** FPGA design flow and testing.	K3

Course Code & Title: C312 & EC8652 Wireless Communication		
	CO Statements	**Knowledge Level**
The students should be able to		
C312.1	**Characterize** a wireless channel and evolve the system design specifications.	K2
C312.2	**Illustrate** the multiple access techniques and channel assignment used in cellular architecture.	K2
C312.3	**Apply** the various digital signaling techniques for the wireless channels and systems.	K3
C312.4	**Identify** multipath mitigation techniques for the wireless channel and system under consideration.	K2
C312.5	**Understand** the concept of Multiple Antenna techniques with transmitter and receiver diversity.	K2

Course Code & Title: C313 & MG8591 Principles of Management		
	CO Statements	**Knowledge Level**
The students should be able to		
C313.1	**Discuss** the evolution of management, functions and roles of managers.	K2
C313.2	**Explain** the different types of planning, process and tools used for planning.	K2
C313.3	**Elaborate** different organization structures and functions of Human Resources manager.	K2
C313.4	**Illustrate** the different theories of motivation and leadership.	K2
C313.5	**Describe** the control techniques and the role of technology in management.	K2

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Course Code & Title: C314 & EC8651 Transmission Lines and RF Systems		
	CO Statements	**Knowledge Level**
The students should be able to		
C314.1	**Understand** the parameters of basic transmission lines.	K2
C314.2	**Understand** the parameters of high frequency transmission lines.	K2
C314.3	**Analyze** impedance matching by stubs using smith charts.	K4
C314.4	**Derive** the field equations for TE and TM waves.	K3
C314.5	**Illustrate** RF active components, gain and stability considerations.	K3

Course Code & Title: C315 & EC8004 Wireless Networks		
	CO Statements	**Knowledge Level**
The students should be able to		
C315.1	**Illustrate** the latest 3G/4G networks and its architecture.	K3
C315.2	**Examine** the suitable network depending on the availability and requirement.	K4
C315.3	**Categorize** and **implement** wireless network environment for any application using latest wireless protocols and standards.	K4
C315.4	**Implement** different type of applications for smart phones and mobile devices with latest network strategies.	K3
C315.5	**Apply** multiple antenna techniques for capacity/ performance gains and explore other research areas in 5G.	K3

Course Code & Title: C316 & EC8681 Microprocessors and Microcontrollers Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C316.1	**Develop** assembly language programs for fixed point arithmetic circuits.	K3
C316.2	**Demonstrate** the interfacing circuits for different I/Os.	K3
C316.3	**Develop** the assembly language program for generating waveforms such as square wave and triangular wave using microprocessors.	K3
C316.4	**Develop** assembly language program for arithmetic and logical operations using 8051 microcontrollers.	K3
C316.5	**Demonstrate** the performance in simulator and emulator.	K2

Course Code & Title: C317 & EC8661 VLSI Design Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C317.1	**Develop** the HDL code for basic combinational digital integrated circuits.	K4
C317.2	**Develop** the HDL code for basic sequential digital integrated circuits.	K4
C317.3	**Implement** the logic modules in FPGA boards.	K3
C317.4	**Synthesize** place and route the digital IPs.	K4
C317.5	**Design**, **simulate** and **extract** the layouts of Analog IC Blocks using EDA tools.	K4

Course Code & Title: C318 & EC8611 Technical Seminar		
	CO Statements	**Knowledge Level**
The students should be able to		
C318.1	**Identify** and **formulate** the problem.	K3
C318.2	**Make** effective literature survey for the identified problem.	K3
C318.3	**Infer** promising new directions of various cutting-edge technologies.	K4
C318.4	**Inspect** skills in preparing detailed report describing the project.	K3
C318.5	**Communicate** effectively by making an oral presentation before an evaluation committee.	K5

Course Code & Title: C319 & HS8581 Professional Communication		
	CO Statements	**Knowledge Level**
The students should be able to		
C319.1	**Enhance** the employability and career skills in engineering domain.	K3
C319.2	**Improve** professional communication.	K4
C319.3	**Build** confidence in employability skills.	K4
C319.4	**Face** interviews with necessary skills.	K5
C319.5	**Acquire** required skills to excel in their career.	K3

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Course Code & Title: C401 & EC8701 Antennas and Microwave Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C401.1	**Understand** the basic principles of antenna and microwave system design.	K2
C401.2	**Apply** the knowledge of radiation mechanism to design various antennas.	K3
C401.3	**Apply** the knowledge of radiation principles of antenna to construct arrays.	K3
C401.4	**Understand** the fundamentals of active and passive microwave devices.	K2
C401.5	**Design** a microwave system for a given specifications.	K3

Course Code & Title: C402 & EC8751 Optical Communication		
	CO Statements	**Knowledge Level**
The students should be able to		
C402.1	**Understand and apply** the basic elements of optical fibers, different operating modes and configurations.	K3
C402.2	**Analyze** the transmission characteristics associated with dispersion and polarization techniques.	K4
C402.3	**Identify** the characteristics of various fiber optical sources and detectors and apply for suitable applications.	K3
C402.4	**Understand** the fiber optic receiver systems, measurements and coupling techniques.	K2
C402.5	**Understand** the optical communication systems and its networks.	K2

Course Code & Title: C403 & EC8791 Embedded and Real Time Systems		
	CO Statements	**Knowledge Level**
The students should be able to		
C403.1	**Outline** the concepts of embedded systems.	K3
C403.2	**Analyze** the ARM architecture and instruction set to understand ARM based MCU with peripherals.	K4
C403.3	**Apply** the models of programs in embedded programming to analyze the program level performance analysis.	K3
C403.4	**Analyze** the task assignment and scheduling in the real time system.	K4
C403.5	**Enhance** the model for real time applications using embedded system concepts.	K2

Course Code & Title: C404 & EC8702 Ad hoc and Wireless Sensor Networks		
	CO Statements	**Knowledge Level**
The students should be able to		
C404.1	**Understand** the basics of Adhoc networks and Wireless Sensor Networks.	K2
C404.2	**Apply** the knowledge to identify the suitable routing algorithm based on the network and user requirement.	K3
C404.3	**Apply** the knowledge to identify appropriate physical and MAC layer protocols.	K3
C404.4	**Understand** the transport layer and security issues possible in Adhoc and Sensor networks.	K2
C404.5	**Recognize** the OS used in Wireless Sensor Networks and build basic modules.	K2

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Course Code & Title: C405 & OIE751 Robotics		
	CO Statements	**Knowledge Level**
The students should be able to		
C405.1	**Understand** the functions of the basic components of a Robot	K2
C405.2	**Study** the use of various types of End of Effectors	K2
C405.3	**Apply** the use of various types of Sensors.	K3
C405.4	**Recognize** the impart knowledge in Robot Kinematics and Programming	K2
C405.5	**Learn** Robot safety issues and economics.	K2

Course Code & Title: C406 & EC8711 Embedded Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C406.1	**Develop** programs in ARM for specific applications.	K3
C406.2	**Interface** memory, A/D and D/A converters with ARM systems.	K4
C406.3	**Analyze** the performance of the interrupt.	K4
C406.4	**Develop** program for interfacing keyboard, display, motor and sensor.	K3
C406.5	**Formulate** the mini project using embedded system.	K5

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Course Code & Title: C407 & EC8761 Advanced Communication Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C407.1	**Determine** the performance of simple analog and digital optical link to analyze its frequency response.	K4
C407.2	**Experiment** with optical fiber to measure the losses and to analyze the mode characteristics.	K4
C407.3	**Model** the wireless channel for the study of characteristics and performance of wireless communication system.	K3
C407.4	**Determine** the characteristics of active microwave devices.	K2
C407.5	**Determine** the characteristics of passive microwave devices.	K2

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SEMESTER 8

Course Code & Title: C408 & EC8093 Digital Image Processing		
	CO Statements	**Knowledge Level**
The students should be able to		
C408.1	**Understand** the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms	K2
C408.2	**Analyze** on images using the techniques of smoothing, sharpening and enhancement.	K4
C408.3	**Understand** the restoration concepts and filtering techniques.	K2
C408.4	**Learn** the basics of segmentation, features extraction, compression.	K2
C408.5	**Learn** the basics of recognition methods for color models.	K2

Course Code & Title: C409 & EC8094 Satellite Communication		
	CO Statements	**Knowledge Level**
The students should be able to		
C409.1	**Understand** the basics of satellite orbits.	K2
C409.2	**Distinguish** the satellite segment and earth segment.	K2
C409.3	**Analyze** the satellite link design.	K3
C409.4	**Understand** the multiple access techniques and coding methods used in satellite networks.	K2
C409.5	**Understand** the development of satellites for various applications.	K2

Course Code & Title: C410 & EC8811 Project Work		
	CO Statements	**Knowledge Level**
The students should be able to		
C410.1	**Conduct** a literature survey in the selected domain to identify requirements for the real-world problems and propose a methodology.	K2
C410.2	**Model** the problem at hand and experiment with Hardware/Software skill sets to suit the requirements.	K3
C410.3	**Build** and **demonstrate** the project effectively as a team with the attitudes of professional engineers.	K4
C410.4	**Evaluate** the challenges and risks involved in the execution of the project and take appropriate actions to circumvent them.	K5
C410.5	**Communicate** the results of an engineering project by means of an oral presentation, written reports and practical demonstration of the project outcomes.	K6