GOVERNMENT OF INDIA
MINISTRY OF
PARLIAMENTARY AFFAIRS

PREAMBLE TO THE CONSTITUTION

PREAMBLE

WE, THE PEOPLE OF INDIA.

having solemnly resolved to constitute India
into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC
REPUBLIC and to secure to all its citizens:
JUSTICE, social, economic and political;
LIBERTY of thought, expression, belief, faith and worship:
EQUALITY of status and of opportunity;
and to promote among them all
FRATERNITY assuring the dignity of the individual and
the unity and integrity of the Nation;
IN OUR CONSTITUENT ASSEMBLY this 26th day of
November, 1949, do HEREBY ADOPT, ENACT AND GIVE
TO OURSELVES THIS CONSTITUTION.

I have read the Preamble

Signature

23-01-2026

SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

("Deemed to be University u/s 3 of the UGC Act, 1956")
Accredited 'A+' Grade by NAAC(2nd Cycle)
Agalakote, B.H.Road, Tumkur – 572 107.KARNATAKA, INDIA.

No. SSAHE/ACA-S&C/111/UG (BE)/2026 **Date: 23/09/2026**

NOTIFICATION

Sub:- Ordinance pertaining to Curriculum of Undergraduate Programme in Bachelor Engineering (2nd year Electronics and Communication Engineering)

Ref: Proceedings of the 32nd Academic Council meeting held on 28/07/2026 vide agenda no. SSAHE/AC/XXXII-52/2026 .

In exercise of the powers vested under section 6 of 6.05 of MoA / Rules of SSAHE, the Revised Ordinance pertaining to Curriculum of Undergraduate Programme in Bachelor of Engineering disciplines (2nd year Electronics and Communication Engineering) is notified herewith as per Annexure.

By Order,

REGISTRAR

REGISTRAR
Sri Siddhartha Academy of Higher Education
Agalakote, B.H. Road, Tumkur - 572 107.

To,

Dean / Principal, Sri Siddhartha Institute of Technology,

Copy to:

1) **Office of the Chancellor, SSAHE, for kind information,**
2) **PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE**
3) **All Officers of the Academy Examination Branch / Academic Section / Guard File / Office copy.**

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF TEACHING AND EXAMINATION FOR BE DEGREE COURSE
Academic Year 2026-27 ``

Vision

Mould quality technocrats in the field of Electronics and Communication with human values to cater the societal needs

Mission

- To impart high-quality academic environment.
- To provide training in new tools and technologies.
- To facilitate continuous learning and research environment.
- To inculcate professionalism with ethical values, with little impact on environment.

Program Educational Objectives

PEO-1: Proficient to apply the knowledge gained in mathematics, science and engineering to the field of electronics and communication engineering for the synthesis and analysis of systems

PEO-2: Competent to pursue higher studies and research, with effective communication

PEO-3: Aware of new technologies in the domain field, apply the same for the societal requirement minimizing the impact on environment and ethical practices in their domain

Knowledge and Attitude Profile (Washington Knowledge)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information

science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender,

age, physical ability, etc., with mutual understanding and respect, and of inclusive attitudes.

Program Outcomes (POs)

Engineering graduates will be able to:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop solutions to complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling, recognizing their limitations to

solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team Work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for: i) Independent and life-long learning ii) Adaptability to new and emerging technologies iii) Critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes (PSOs)

PSO1: The ability to identify, analyze and design systems related to modern engineering hardware and software tools, in Electronics and Communication Engineering in the areas of electronics, communication, image processing, VLSI, signal processing and embedded systems for solving day to day problems.

PSO2: Impact the awareness about the impact of professional engineering solutions in societal and environmental context, professional ethics and be able to communicate effectively.

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(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF TEACHING AND EXAMINATION FOR BE DEGREE COURSE

Academic Year 2026-27 ``

3rd SEMESTER **Academic Year: 2026-27**

Sl No	Course Code		Course Title	Teaching Dept.	Teaching Hours					Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
					L	T	P	S	Total					
1	ASC	25ES301	Integral Transforms and Numerical Techniques	MA	42	-	-	48	90	3	50	50	100	3
2	PCC	25EC302	Network Theory	EC	42	-	-	48	90	3	50	50	100	3
3	IPCC	25ECI303	Digital Circuit Design using Verilog	EC	42	-	28	50	120	4	50	50	100	3
4	PCC	25EC304	Analog Electronic Circuits	EC	42	-	-	48	90	3	50	50	100	3
5	PCC	25EC305	Signals and Systems	EC	42	-	-	48	90	3	50	50	100	3
6	PCC	25AI306	Foundations of Artificial Intelligence	EC	28	-	-	32	60	2	50	50	100	3
7	PCC	25ECL307	Analog Electronic Circuits Lab	EC	-	-	28	2	30	1	50	50	100	3
8	AECL	25ECAEL308	IoT and Signal Processing Lab	EC	14	-	28	18	60	2	50	50	100	3
9	HSC	25IK309	Indian Knowledge System	Any	14	-	-	16	30	1	100	-	100	-
L: Lecture, T-Tutorial, P-Practical, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				**Total**	**266**	**-**	**84**	**310**	**660**	**22**	**500**	**400**	**900**	-
For lateral entry students only														
1	HSC	25HV310	Universal Human Values	Any	14	-	-	16	30	1	100	-	100	-

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Integral Transforms and Numerical Techniques (Common to EC, EE, ET, & BM)				
Subject Code:	**25ES301**		**L–T – P - S:**	**42-0-0-48**
			Credits:	**3**

Sl. No	Course Objectives
1	**Introduce** the concept of Numerical methods, Curve fitting and Regression lines.
2	**Introduce** the concept of Fourier series and Fourier transforms to study behavior of periodic functions arising in Engineering field.
3	**Illustrate** the applications of Laplace Transform and Inverse Laplace transform in control Theory.
4	**To utilize** a modern tool for Computations and visualizations.

Module	Description	Hrs
I	**Numerical solution of Ordinary differential equations of first order and first degree**: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's and Adams-Bashforth Predictor and Corrector methods (only formulae) -problems. **Numerical Integration:** Simpson's $1/3^{rd}, 3/8^{th}$ rule, Weddle's rule, (without proof) - problems. Using modern tool to solve numerical methods. Text I: 32.3 to 32.10, 30.7, 30.8, 30.10. Text II: 19.2.	**08**
II	**Laplace Transforms:** Basic definition, Laplace transforms of elementary functions, Properties of Laplace transforms, Laplace transforms of Periodic function, Unit step function (All results without proof)-Problems only. **Inverse Laplace transforms**: Basic definition, Evaluation of inverse Laplace transforms by standard methods. Convolution theorem - Problems only. Solutions of second order linear differential equations using Laplace transforms method. Solving and visualizing Laplace transforms using modern tools. Text I: 21.3 to 21.5, 21.12, 21.14, 21.15, 21.17 , Text II: 5.1 to 5.5	**09**

III	**Statistical Methods:** Definition of Correlation-Karl Pearson's coefficient of correlation–problems. Regression lines (All results without proof)–Problems. **Curve fitting:** Curve fitting by the method of least squares-Fitting of the straight line, second degree parabola and exponential form of the curve □ = □b□ (All results without proof) –Problems. Using modern tool to solve and visualize statistical analysis problems. Text I: 25.7.25.14, 24.5, 25.6	**08**
IV	**Fourier Series:** Periodic function, Dirichlet's conditions. Fourier series of even and odd functions. Fourier series of periodic functions with period 2π and 2l -problems only. Applications to Engineering problems: Fourier series for Periodic square wave, Full wave rectified form, Saw-tooth wave with graphical representation. Half range Fourier series- problems. Practical harmonic analysis - problems. Solving and visualizing Fourier series using modern tools. Text I: 10.1 to 10.11, Text II: 10.1 to 10.4	**09**
V	**Fourier Transforms:** Infinite Fourier transforms, Fourier Sine and Cosine transforms. Inverse Fourier transforms and simple problems. **Z-Transforms:** Basic definitions of Z-transform, Standard Z-transforms, Damping rule, Shifting rule, Initial value and Final value theorems(without proof)-problems. Inverse Z-transform-problems. Application to difference equations using Z-transforms. Using modern tool to analyze and visualization of Fourier transforms and Z-transforms. Text I: 23.1 to 23.6, 23.15, 23.16 Text II: 10.9,10.10 .	**08**

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
I	Higher Engineering Mathematics	B.S. Grewal	44th Edition Khanna Publications, 2021.ISBN:9788193328491
II	Advanced Engineering Mathematics	E. Kreyszig, John Wiley & Sons	10th Edition JonWiley &Sons, 2018. ISBN:

			9781119446842

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Advanced Engineering Mathematics	C. Ray Wylie, Louis C. Barrett, McGraw-Hill Book Co	6th Edition. 2017, ISBN:9780070722064
2	A Text Book of Engineering Mathematics	N.P.Bali and Manish Goyal	10th Edition Lakshmi Publishers, 2022, ISBN: 9788131808320.
3	Higher Engineering Mathematics	B.V.Ramana, Tata McGraw-Hill	11th Edition, Tata McGraw-Hill, 2017, ISBN:9780070634190
4	Higher Engineering Mathematics	H. K. Das and Er. Rajanish Varma	3rd Edition, S Chand Publication, 2014, ISBN: 9788121938907
5	MATLAB Programming for Engineers	Stephen J Chapman	7th Edition,Cengage,2024, ISBN:9798214001531

Course Outcomes:

Course outcome	Description
CO1	Understand the basic concepts of Numerical and Statistical methods, Laplace transforms, Inverse Laplace transforms, Fourier series, Fourier transforms and Z- transforms. (L1)
CO2	utline the concepts of numerical methods, Laplace transforms and integral transforms. (L2)
CO3	Demonstrate Fourier series and Fourier transforms to study behavior of periodic functions problems and Statistical methods, Laplace transform arising in Engineering fields. (L2)
CO4	se modern tools to solve/visualize engineering problems (L3)

CO5	nalyze the computations associated with Z- transforms, Numerical Integration, Correlation, regression lines and Statistical Methods in Engineering fields. (L3)

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1										
CO2	3	2	1										
CO3	3	3	2								1		
CO4					1						1		
CO5	3	2	1								1		

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module **Activity Based Learning(ABL):** Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-						

study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc
Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs. The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions. **Minimum passing Marks : 40% of Max Marks.**

Department: Electronics and Communication	**Semester**	**3**

Syllabus for the Academic Year 2026-27

Engineering			**:**	
Subject: Network Theory				
Subject Code:	**25EC302**	**L – T – P - S:**	**42-0-0-48**	
			Credits:	**3**

Sl. No.	Course Objectives
1	**Explain** the basic laws of electric circuits and network theorems.
2	**Understand** the network reduction techniques and Laplace transforms.
3	**Learn** the concepts of resonance and network topology applied to circuits.
4	**Study** two port network models in terms of Z, Y, h and T-parameters.

Module	Description	Hrs
I	**FUNDAMENTAL CONCEPTS OF NETWORKS**: Introduction to Voltage and current sources, Kirchhoff's Laws, source Transformation and shifting, Loop Variable Analysis, Node Variable Analysis, Network reduction using star to delta conversion (DC circuits only). Text 1: 3.1-3.5, Text 2: 2.1,2.2,2.3	10
II	**NETWORK THEOREMS**: Introduction, Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Mill man's Theorem, Maximum power transfer theorem (DC circuits only). Text 1: 4.5, Text 2: 9.4	8
III	**NETWORK TOPOLOGY AND RESONANCE IN CIRCUITS**: Introduction, Graph of a network, Concept of tree and links, Incidence matrix, tie-set and cut set schedules, Duality, Series resonance- Variation of Current and Voltage with Frequency, Selectivity and Bandwidth-factor, Circuit magnification factor, Parallel resonance-Selectivity and Bandwidth, Maximum Impedance Conditions with C,L and f variable. Text 1: 2.1-2.4, 3.7	8
IV	**INITIAL CONDITIONS**: Introduction to initial conditions in elements, Transients, Initial value and final value theorem, Wave form synthesis of periodic & non periodic signals. Text 1: 5.1-5.3, 7.1-7.3, 7.8	8
V	**TWO PORT NETWORK**: Introduction to single & two port Networks, Relationship between Two-port variables, open	8

	circuit impedance parameters, Short circuit admittance parameters, Hybrid parameters and Transmission parameters, Relationships between Z and Y parameter sets. Text 1: 9.1,9.2	

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Network Analysis	M. E. Van Valkenburg	Third edition, 2016
2	Engineering Circuit Analysis	Hayt, Kemmerly and Durbin	6th Edition, 2002

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Networks and systems	Roy Choudhury	2nd edition, 2014
2	Network Analysis and Synthesis	Franklin F. Kuo	Second edition (2006)
3	Electrical Networks	Ravish R singh	Tenth reprint 2013

Course Outcomes:

Course outcome	Description
CO1	**Calculate** electrical circuit Parameters using mesh and node voltage analysis.
CO2	**Interpret** different network theorems to simplify a given electrical Network.
CO3	**Apply** Laplace Transform technique and Initial conditions for the circuits, periodic and non-periodic waveforms.
CO4	**Describe** the resonance parameters and two port network parameters of a given electrical circuit.
CO5	**Compute** Network parameters using network reduction and topological methods.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1									CO1	3
CO2	3	2	1									CO2	3
CO3	3	3	2								1	CO3	3
CO4					1						1	CO4	
CO5	3	2	1								1	CO5	3

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc

Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs.
The question paper shall contain 10 full questions (20 marks each), with **2**

questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

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Syllabus for the Academic Year 2026-27

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Digital Circuit Design using Verilog				
Subject Code:	**25ECI303**	**L – T – P- S:**	**42 – 0 – 28 – 50 (In Hrs)**	
			Credits:	**4**

Sl. No.	Course Objectives
1	**Introduce** basic concepts of the Boolean expression simplification method and Hardware description language (Verilog) used to design the digital system.
2	**Study** logic processes and logical operations to design combinational and sequential circuits.
3	**Learn** concepts of Verilog models for digital circuit design.
4	**Acquire** knowledge of various logic families of digital IC Technology.

Module	Description	Hrs
I	**Introduction to digital systems:** Introduction**,** Canonical formulas and its complements, Synthesis procedure for combinational networks, Karnaugh maps- 3 and 4 Variables to obtain minimal expressions for complete and incomplete Boolean functions. Text 1:3.5, 3.6.7, 3.7.4, 3.7.5, 4.5, 4.6. Introduction of HDL: Typical design flow, Verilog data types, Modules and ports, Gate types, Gate delays, Verilog operators. Different types of modeling (Data flow, Behavioral & Structural) Text 2: 1.3, 3.2.1 to 3.2.6, 4.1, 4.2, 5.1 to 5.1.3, 5.2.1, 6.4.	**10**
II	**Combinational Circuits**: Introduction**,** Binary subtractor, Parallel adder and subtractor, Carry look ahead adder, Decimal adder, Comparator, Decoder, Encoder, Multiplexer. Text 1:5.1.1, 5.1.2, 5.2 to 5.6. Components of a simulation, continuous assignment and gate level modeling of combinational circuits. Text 2: 2.5, 5.1.4, 6.1, 6.5.1, 6.5.2.	**8**
III	**Sequential Circuits:** Introduction**,** the basic bistable element, latches, clocked S-R flip flop, clocked JK flip flop, timing considerations, Master-Slave J-K flip flop, D and T Flip flop, negative-edge triggered D flip-flop, asynchronous inputs,	**8**

	characteristic equations. Text 1- 6.1, 6.2, 6.3,6.4.2 to 6.4.4, 6.5.2, 6.5.3, 6.6. Verilog procedural statements (if else, case, loops, always) and Verilog procedural blocks for sequential circuits. Text 2: 7.1, 7.2, 7.4, 7.5, 7.6, 7.9.1.	
IV	**Sequential Circuits continued:** Registers**,** shift registers, counters, asynchronous and synchronous counter, design of synchronous counter, introduction to Melay and Moore model, state tables and state diagrams. Text 1: 6.7, 6.8, 6.9.1, 6.9.2, 7.1, 7.2.5, 7.2.6 Verilog models for synchronous sequential circuits - BCD and binary counter. Text 2: 6.5.3, 7.9.2.	**8**
V	**Digital IC Technology:** Gate properties: noise margins, fan-out, propagation delays, power dissipation, programmable logic devices: PROMs, PLAs, PAL, transistor-transistor logic(TTL), the CMOS Logic. Text 1: 3.10, 5.7 to 5.10, A.7.1 to A.7.3, A.11.1.	**8**

Lab Contents:

Sl. No.	Experiment Description
1	Realization of half / full subtractor using basic and ex-or gates, and Verilog realization of half / full adder using three types of modeling.
2	Realization of parallel adder /subtractor using IC 7483.
3	Realization of half/full subtractor with MUX IC 74153.
4	Verilog realization of the following combinational circuits: i. Decoder in dataflow ii. Encoder in behavioral iii. Multiplexer in structural iv. Demultiplexer in dataflow
5	Realization of SR and MS JK flip flop using universal gates.
6	Verilog realization of D, JK and T flip-flops in behavioral modeling.
7	Realization of 3 bit asynchronous up/down counter using IC 7476.
8	Verilog realization of 3 bit binary up/down counter.
9	Realization of the decoder to drive 7 segment LED display using trainer kits.
10	Verilog realization of comparator (n-bit), and BCD counter.

Text Books:

Sl. No.	Book title	Author	Volume and Year of Edition
1	Digital Principles and Design	Donald D. Givone	2017, McGraw-Hill , I edition
2	Verilog HDL	Samir Palnitkar	2009, Pearson Education, II Edition

Reference Books:

Sl. No.	Book title	Author	Volume and Year of Edition
1	Digital Logic Applications and Design	John M Yarbrough	2015, Thomson learning 2006
2	Digital Systems Design using Verilog	Charles H. Roth. Jr	2015, Thomson Learning, Inc, I edition
3	Digital principles and Applications	Donald P Leach, Albert Paul Malvino	2016, Tata Mc graw Hill, 8th Edition/

Course Outcomes:

Course outcome	Description
CO1	**Simplify** Boolean equations using K-map techniques.
CO2	**Design** combinational and sequential circuits based on simplified Boolean expressions.
CO3	**Analyze** combinational and sequential circuits.
CO4	**Outline** the characteristics of various logic families and methodology to design digital computational blocks.
CO5	**Apply** Verilog modelling for functional verification of digital logic design.

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Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2							1				
CO2	3		1		2				1				
CO3	1	1	1		2								
CO4	2								1				
CO5			2		2								

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	15	12
		IA-2	90	50	15	
2	Periodic Lab Assessment		-	30	10	4
3	Lab CIE		-	20	5	2
4	One Open Ended Experiment/ Project		-	10	5	2
	Total CIE			**150**	**50**	**20**

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Syllabus for the Academic Year 2026-27

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module **Rubrics for Periodic Lab Assessment:** Attendance (5M), Lab record (10 M), Conduction of Experiments(10M) and Viva(5M)-**Total 30M** **Lab CIE:** Write-up(5M), Conduction/Execution/Demonstration(10M) and Viva(5M)-**Total 20M** **One Open Ended Experiment/ Project:** Experimental / project Design (4 marks), Execution/demonstration (3 marks) and Analysis/Viva (3 marks)-**Total 10M**
Semester End Examination(SEE) : **Max 100 Marks,** Duration: 3 Hrs The question paper shall contain 10 full questions (20 marks each)**,** with 2 questions from each of the 5 Modules, ensuring 100% syllabus coverage. Students shall answer any 5 full questions with 1:1 choice**.** Each question may have a maximum of 4 sub-divisions**.** **Minimum passing Marks : 40% of Max Marks**

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Analog Electronic Circuits				
Subject Code:	**25EC304**	**L – T – P - S:**	**42-0-0-48 (In Hrs)**	
			Credits	**3**

Sl. No.	**Course Objectives**
1	**Summarize** the fundamentals of MOSFETs and power semiconductor physics and electronic devices.
2	**Explain** the small-signal analysis and operation of MOSFET amplifiers and differential amplifiers.
3	**Study** analog circuits using feedback, oscillators, and operational amplifiers.
4	**Introduce** ADCs, DACs, waveform generators, and power semiconductor devices along with their practical applications in electronic systems.

Module	**Description**	**Hrs**
I	**MOS Field-Effect Transistor (MOSFETs):** Introduction, Device Structure and Physical Operation, Symbol, Derivation of I_D-V_{DS} Relationship, I_D-V_{DS} Characteristics, Regions of Operation, MOSFET as a Switch, MOSFET as a Linear Amplifier. MOSFET Amplifiers: Small Signal Operation and Models, Trans-conductance gm, T-Equivalent Circuit Model, Common Source Amplifier, Common Source Amplifier with Source Resistance, Common Drain Amplifier. Text 1: 4.1.1 to 4.4.4,4.6.4 to 4.7.6	**9**
II	**Frequency Response and Differential Amplifiers:** Frequency Response of CS Amplifier, MOS Differential Pair, Common Mode and Differential Mode Operation, Differential Gain and CMRR, Differential Amplifier with Active Load. Feedback Amplifiers and Oscillators: General Feedback Structure, Properties of Negative Feedback, Four Feedback topologies, Positive Feedback Concept, LC Oscillators, Crystal Oscillator (Qualitative). Text 1:7.1.1, 7.2.1 to 7.2.4, 8.1.1, 8.1.2, 8.2.1, 8.2.2, 8.5.2	**9**
III	**Operational Amplifiers:** Introduction, Ideal and Practical Op-	**8**

	Amp, Op-Amp Parameters, CMRR, PSRR, Offset Voltage and Current, Input and Output Impedance, Slew Rate. Operational Amplifier Applications: Comparator, Zero Crossing Detector, Inverting and Non-Inverting Schmitt Trigger, Precision Half-Wave and Full-Wave Rectifiers. Text 1: 7.3.1 to 7.3.4, 7.3.8 Text 2: 3.2	
IV	**Active Filters:** First and Second Order Low Pass Filters, High Pass Filters. **Data Converters:** working principles of Digital-to-Analog Converters (Binary Weighted and R-2R Ladder DAC), Analog-to-Digital Converters (Flash, Successive Approximation ADC). Text 2: 8.2–8.10,8.12, 8.13	**8**
V	**Waveform Generators:** RC Phase Shift Oscillator, Wien Bridge Oscillator, Basic 555 Timer, Astable and Monostable Multivibrators. Power Amplifiers: Classification of power amplifiers, Transformer coupled Class A amplifier & Class B Push-pull amplifier, Class C Amplifier. Text 2:8.12, 8.13, 10.4, 10.4.1, 10.4.3, 10.4.4, 12.1,12.2.5	**8**

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Microelectronic Circuits, Theory and Applications	Adel s. Sedra kenneth c. Smith	5th Edition,Oxford, 2014
2	Op-Amp and linear integrated circuits.	Ramakanth A Gayakawad	3 rd Edition, Pearson Education, 2015

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Power Electronics: Circuits, Devices and Applications	Muhammad H. Rashid	3rd Edition, Pearson Education / PHI Learning, 2003–2004 (Rokomari)
2	Fundamentals of Microelectronics	Behzad razavi	2nd Edition, Whiley, 2006

Course Outcomes:

Course outcome	Description
CO1	**Describe** the fundamental concepts and principles of analog electronic components such as rectifiers, amplifiers, and oscillators.
CO2	**Analyze** MOSFET amplifiers, differential amplifiers, and feedback circuits using appropriate circuit models.
CO3	**Design** analog electronic circuits including Op-Amp applications, oscillators, ADCs, and DACs to meet given specifications.
CO4	**Evaluate** the performance of waveform generators, power semiconductor devices, and data converter circuits for engineering applications.
CO5	**Apply** analog electronic circuit concepts to solve practical engineering problems and interpret circuit performance parameters.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2											
CO2	2	3											
CO3		2	3										
CO4		2	2	3									
CO5	2	2		3									

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc

Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs.
The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Signals And Systems				
Subject Code:	**25EC305**	**L – T – P - S:**	**42-0-0-48(In Hrs)**	
			Credits:	**3**

Sl. No	**Course Objectives**
1	**Outline** the basic signal processing operations by applying mathematical models.
2	**Study** the representation and properties of signals and systems in time and frequency domains.
3	**Understand** the behaviour of an LTI System.
4	**Learn** the different transformations techniques on Signals.

Module	**Description**	**Hrs**
I	**Introduction to Signals and Systems:** Introduction to Signals and Systems: Definition of Signals, Classification of signals, Basic operations on Signals, elementary Signals. Definition of Systems, System Viewed as Interconnection of Operations, Properties of Systems: Statement with Examples (No numerical problems on Properties). Text 1: 1.1 to 1.8	**9**
II	**Time domain representations of Linear Time Invariant Systems**: Introduction, Convolution Sum and Convolution Integral. Differential and Difference Equation Representation of LTI Systems and solving difference equation, Block diagram representation. Text 1: 2.1 to 2.5	**9**
III	**Fourier representation of Non-Periodic Signals:** Introduction, Fourier Transform representation of Continuous time Signals (FT), Properties and Significance of FT. Fourier Transform representation of Discrete time Signals (DTFT), Properties of DTFT. Inverse Fourier Transforms Text 1: 3.1,3.4 to 3.6	**8**
IV	**Applications of Fourier Transform Representations:** Introduction, Frequency Response of LTI systems, Fourier Transform Representation for discrete time signals, Frequency domain,Sampling theorem. Text 1: 4.1 to 4.4	**8**
V	**Z-Transform and its applications:** Introduction, Properties of ROC, Transform Analysis of LTI System: Transfer function and	**8**

	impulse response, Relationship between Transfer Function and Difference Equation, Stability and Causality, Inverse Systems Unilateral Z-transform and its application to solve difference equations. Text 1: 7.1 to 7.3, 7.6,7.8	

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Signals and Systems	Simon Haykin and Barry Van Veen,	Wiley India Edition. 13 978-81-265- 1257-7, 3rd Edition, 2020 (Reprint)

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of Signals & Systems	Michael Roberts	Tata McGraw- Hill, 6, 2nd edition, 2019
2	Signals and Systems (with MATLAB Programs)	Sanjay Sharma	S.K. Kataria & Sons, New Delhi, 2, 2018
3	Signals and Systems	S Hamid Nawab Alan V Oppenheim, Alan S Willsk	Pearson Technical 2nd edition 2016

Course Outcomes:

Course outcome	Descriptions
CO1	**Describe** different classes of signals.
CO2	**Apply** convolution techniques and difference/differential equations for analysis of Linear Time Invariant (LTI) systems.
CO3	**Analyze** non periodic signals in frequency domain.
CO4	**Solve** discrete-time system equations using Z-Transform techniques to asses the stability and behaviour of the system.

CO5	**Evaluate** the use of Fourier techniques in LTI system responses.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2											
CO2	2	2											
CO3		2	2	2									
CO4	2	2	1	1									
CO5		2	2										

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or

offline), ……Etc
Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs. The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions. **Minimum passing Marks : 40% of Max Marks.**

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Foundations of Artificial Intelligence				
Subject Code:	**25AI306**	**L – T – P – S:**	**28-0-0-32 (In Hrs)**	
			Credits:	**2**

Sl. No	**Course Objectives**
1	**Introduce** basic concepts of Artificial Intelligence.
2	**Learn** the techniques in Artificial Intelligence.
3	**Understand** the Engineering applications and basics of Robotics.
4	**Realize** ethical approaches in Artificial Intelligence.

Module	**Description**	
I	**Introduction to Artificial Intelligence:** Definition of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning. Text Book 1: 1.1-1.5	**5**
II	**Artificial Intelligence Technologies:** Techniques in AI, Machine Learning Model, Types of Machine Learning Algorithms, Regression Analysis in Machine Learning, Working of Regression Analysis, Model Evaluation Metrics, Types of Regression Text Book 1: 2.1-2.3	**6**
III	**Classification Techniques**: K-Nearest Algorithm, Decision Trees, Random Forests **Clustering Techniques**: K-Means Algorithm, Applications of Clustering in Real-World Scenarios, Evaluation Metrics for Clustering, Working of K-Means Algorithm, Pros and Cons of K-Means Algorithm, Density-Based Spatial Clustering of Applications with Noise (Dbscan) Text Book 1: 2.4-2.5	**6**
IV	**AI to all:** AI and Society, AI and Privacy, AI in Healthcare, AI in Finance, AI in Marketing, AI and Automation, AI-Powered Communication, AI in Customer Service, Future Trends in AI, AI for Personal Growth. Text Book 2: 10-21 **Robotics - An Application of AI:** Drones Using AI, Future of	**5**

	AI, No Code AI, Low Code AI Text Book 1: 1.7, 1.8, 1.9, 1.10	
V	**Ethical Decision-Making:** Introduction, Ethical Theories, Values, Ethics in Practice, Implementing Ethical Reasoning**.** **Taking Responsibility:** Introduction, Responsible Research and Innovation, The ART of AI: Accountability, Responsibility, Transparency, Design for Values. Text Book 3: 3, 4, 5-5.1,5.2, 5.3	**6**

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Artificial Intelligence: Beyond Classical AI,	Reema Thareja	Pearson Education, 2023
2	AI for Everyone	Kai L Thornton	Lars Meiertoberens
3	Responsible Artificial Intelligence	Virginia Dignum	Springer Artificial Intelligence: Foundations, Theory, and Algorithms

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Artificial Intelligence Structure and Strategies for Complex Problem Solving	George F Lugar	Pearson Education, 5th Edition, 2011
2	Principles of Artificial Intelligence	Nils J. Nilsson	Elsevier, 1980
3	Artificial Intelligence	Saroj Kaushik	Cengage learning, 2014

E Recourses Links: (url of the recourses related to the course for self study)

1. https://nptel.ac.in/courses/112103280
2. https://www.youtube.com/playlist?list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH
3. https://nptel.ac.in/courses/106106472

4. https://www.youtube.com/watch?v=mmrlkO4vpts

Course Outcomes:

Course outcome	Descriptions
CO1	**Outline** the types of Artificial Intelligence.(L2)
CO2	**Identify** the different Regression models. (L3)
CO3	**Analyze** the classification techniques in Artificial Intelligence.(L4)
CO4	**Extend** the applications of Artificial Intelligence. (L2)
CO5	**Relate** ethical decision making.(L2)

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2											
CO2	2		2	1									
CO3	2		2	1									
CO4	2	2	2	1									
CO5	2					2	3						

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks					
Sl. No.	Components	Duration (min)	Marks Conducted for	Marks reduced to	40% Min Marks in each component to write SEE

1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc

Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs.
The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Analog Electronic Circuits Lab				
Subject Code:	**25ECL307**	**L – T – P – S:**	**0-0-28-2 (In Hrs)**	
			Credits:	**1**

Sl. No.	**Course Objectives**
1	**Understand** the characteristics and operation of MOSFETs and other analog electronic devices through experimentation.
2	**Study** analog circuits such as amplifiers, oscillators, filters, and timer circuits using hardware and simulation tools.
3	**Learn** Op-Amp based circuits, ADCs, and DACs for various engineering applications.
4	**Develop** practical skills in circuit measurement, troubleshooting, and performance evaluation of analog electronic systems.

LAB CONTENT

Sl. No.	**Experiment Description**
1	Plot the Input and Output Characteristics of MOSFET and determine its parameters.
2	Design and implement a Single Stage RC Coupled Amplifier using Transistor and determine voltage gain.
3	Design and test an Op-Amp based Schmitt Trigger Circuit for given UTP and LTP values.
4	Design and test Astable multivibrator circuit using 555 timer for given frequency, duty cycle and Vout.
5	Design and test Monostable multivibratorcircuit using 555 timer.
6	Design and simulate an RC Phase Shift Oscillator for a specified frequency using Multisim.
7	Design and simulate Hartley and Colpitts Oscillators for a specified frequency using Multisim.
8	Design and verify the frequency response of First Order Active Low Pass and High Pass Filters.
9	Design and implement an R-2R Ladder DAC and verify analog output

	levels.
10	Design and study a Successive Approximation ADC using simulation tools.

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Microelectronic Circuits: Theory and Applications	Adel S. Sedra, Kenneth C. Smith	5th Edition, Oxford University Press, 2014
2	Op-Amps and Linear Integrated Circuits	Ramakant A. Gayakwad	4th Edition, Pearson Education, 2015

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of Microelectronics	Behzad Razavi	2nd Edition, Wiley, 2008
2	Electronic Devices and Circuit Theory	Robert L. Boylestad, Louis Nashelsky	11th Edition, Pearson, 2015

Course Outcomes:

Course outcome	Descriptions
CO1	**Perform** experimental verification of MOSFETs and power semiconductor device characteristics.
CO2	**Demonstrate** analog amplifier and oscillator circuits to meet given specifications.
CO3	**Design and analyze** Op-Amp based circuits and active filters for practical applications.
CO4	**Implement and evaluate** ADC and DAC circuits using hardware or simulation tools.
CO5	**Interpret** experimental results and evaluate the performance of analog electronic circuits.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2			1								
CO2	2	2	3		2								
CO3		2	3	2	2								
CO4		2	2	3	2								
CO5	2	2		3	1								

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks			
Sl. No.	**Components**	**Marks Conducted for**	**40% Min Marks in each component to write SEE**
1	Periodic Lab Assessment	30	12
2	Lab CIE	20	8
	Total CIE	50	20
Rubrics for Periodic Lab Assessment: Attendance (5M), Lab record(10M), Conduction of Experiments(10M) and Viva((5M)-**Total 30M.** **Lab CIE**: Write-up(5M), Conduction/Execution/Demonstration(10M) and Viva(5M**)-Total 20M.**			
Semester End Examination (SEE) : Max 50 Marks, Duration: 3 Hrs. **Rubrics for Lab Examination:** Write-up(8M), Conduction/Execution/Demonstration(35M) and Viva(7M)-**Total 50M.** **Minimum passing Marks : 40% of Max Marks.**			

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Department is Accredited by NBA
Syllabus for the Academic Year 2026-27

Department: Electronics and Communication Engineering			**Semester :**	**3**
Subject: IoT and Signal Processing Lab				
Subject Code:	**25ECAEL308**	**L – T – P – S:**	**14-0-28-18(In Hrs)**	
			Credits:	**2**

Sl. No	Course Objectives
1	**Understand** the fundamentals of IoT systems, embedded platforms, and sensor interfacing.
2	**Familiarize** programming skills using Arduino, and MATLAB for engineering applications.
3	**Outline** the acquisition and monitoring of real-time sensor data using cloud platforms and visualization tools.
4	**Learn** basic signal generation, analysis, and operations using MATLAB.

LAB CONTENT:

Sl. No	Experiment Description
1	Write an Arduino program to interface and demonstrate LED and buzzer operation, including different LED blinking patterns.
2	Interface a DHT sensor with Arduino and measure temperature and humidity. Display the readings on the Serial Monitor.
3	Interface any one of the following sensors with Arduino and demonstrate its operation: LDR, Ultrasonic Sensor, Gas Sensor, or Soil Moisture Sensor.
4	Interface a 16×2 LCD display with Arduino and display sensor parameters on the LCD.
5	Generate and analyze any one of the following signals using simulation tool : Unit Impulse, Unit Step, Ramp, Sinusoidal, Square, or Triangular Signal.
6	Perform any one of the following signal operations using simulation tool : Addition, Multiplication, Scaling, Time Shifting, or Folding.
7	Determine the even and odd components, real and imaginary parts of a given

	signal using simulation tool.
8	Perform any one of the following advanced signal analysis operations using simulation tool : Linear Convolution, Sampling of a Sinusoidal Signal at Different Sampling Frequencies,
9	Implement and demonstrate a project based on the concepts learnt in the experiments 1 to 8.

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Internet of Things: A Hands-On Approach	Arshdeep Bahga, Vijay Madisetti	Universities Press, 2015
2	Signals and Systems Using MATLAB	Luis F. Chaparro	Academic Press, 3rd Edition, 2018

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	The Internet of Things: Key Applications and Protocols	Olivier Hersent, David Boswarthick, Omar Elloumi	Wiley, 2012
2	Arduino Cookbook	Michael Margolis	O'Reilly Media, 2nd Edition, 2011
3	Programming Raspberry Pi: Getting Started with Python	Simon Monk	McGraw-Hill, 2015
4	Learning Internet of Things	Peter Waher	Packt Publishing, 2015
5	Signals and Systems	Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab	Pearson, 2nd Edition

Course Outcomes:

Course outcome	Descriptions
CO1	**Interpret** the fundamentals of IoT systems, sensors, actuators, and embedded platforms.
CO2	**Interface** sensor and actuator to an Arduino platform.
CO3	**Apply** Python programming and cloud platforms for data acquisition, monitoring, and visualization.
CO4	**Implement** basic operations on signals and sequences using simulation tool.
CO5	**Design** and develop simple IoT-based hardware systems and PCB layouts for practical applications.

Course Articulation Matrix:

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1											
CO2	2	2			2				1				
CO3	1	2		1	2				1				
CO4	2	2			2				1				
CO5	1	1	2		2				1	1			

Course Assessment and Evaluation: LAB (Ability Enhancement Course)

This course consists of experimental and project-based learning.

- Part A: 5 weeks of experimental learning with 5 experiments. Students shall conduct the experiments individually.

CIE for Part A shall be conducted in the 7th week.

- Part B: 5 weeks of project-based learning. A team of maximum 4 students

shall carry out a project. The project shall be completed by the 13th week, CIE for Part B may be conducted in the 14th week.

		Continuous Internal Evaluation (CIE): 50 Marks		
Sl.No	**Components**	**Marks Conducted for**	**Marks Reduced to**	**40% Min Marks in each component to write SEE**
CIE for PART A(Experimental Learning)				
1	Periodic Lab Assessment	30	15	6
2	Lab CIE	20	10	4
	Total CIE for Part A	50	25	10
Rubrics for Periodic Lab Assessment: Attendance (5M), Lab record (10 M), Conduction of Experiments(10) and Viva(5M)-**Total 30M** **Lab CIE**: Write-up(5M), Conduction/Execution/Demonstration(10M) and Viva(5M**)- Total 20M**				
CIE for PART B (Project based Learning)				
1	Lab CIE Part B	50	25	10
	Total CIE(Part A and PartB)	**100**	**50**	**20**
Rubric for Lab CIE Part B: Write-up (10M), Presentation(10M) Demonstration(20M) Viva(10M)- **Total 50 Marks**				
Semester End Examination(SEE) : 50 Marks, Duration: 3 Hrs **PART A (25 Marks):** **Rubrics for Part A:** Write-up(5M), Conduction/Execution/Demonstration(15M) and Viva(5M)-**Total 25M.** **PART B (25 Marks):** **Rubrics for Part B:** Write-up(5M), Presentation/Demonstration(15M) and Viva(5M)-**Total 25M.** **Minimum passing Marks: 40% in Part A and Part B each**				

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Syllabus for the Academic Year 2026-27

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Indian Knowledge System				
Subject Code:	**25IK309**	**L – T – P - S**	**14-0-0-16(in Hrs)**	
			Credits	**1**

Sl. No.	Course Objectives
1	**Rejuvenate** and mainstream Indian Knowledge Systems by integrating it into the fabric of education research ecosystem
2	**Bridge** the gap between Traditional Indian Knowledge Systems and contemporary knowledge systems
3	**Make** a tangible difference to the contemporary world by mainstreaming Indian Knowledge Systems
4	**Understand** the traditional knowledge, analyze and apply to their day-to-day life.

Module	Description	
I	**Introduction to Indian Knowledge Systems:** Meaning, definition and scope of IKS, civilizational continuity of Indian culture, holistic nature of knowledge in India, Gurukul system, Patashalas, Takshashila, Nalanda, overview of Indian philosophical traditions (Darshanas)	**3**
II	**Science and Technology in Ancient & medieval India** Mathematics: Baudhayana Sulba Sutra, Aryabhata, Bhaskara, concept of zero and decimal system; Medicine: Ayurveda, Charaka and Sushruta; Engineering & Technology: Iron Pillar of Delhi, water management systems, town planning, architecture, arts, Astronomy, Astrology, Crafts, Trade in India, Ancient sculptures and monuments, space programs	**3**
III	**Society, Governance and Ethics:** Concept of dharma and social order, ethical teachings in Indian texts, Chanakya's Arthashastra and governance, traditional economic and administrative systems, Anubhava mantapa- first parliament, Indian health systems: Ayurveda and other Indian medicine, Yoga	**3**
IV	**Language, Literature and Knowledge Transmission:** Sanskrit as a scientific language, different languages, Ancient	**2**

	literatures, Books, Indian literary, famous poets and literarists, Indian Inventions and Contributions, Awards	
V	**Indian Cultural Traditions and Practices:** Festivals and cultural diversity of India**,** Traditional family and community systems, social values, folk, arts, music, dance and theatre traditions**,** industrial revolution and indigenous technologies**,** role of traditions in promoting social harmony and cultural identity	**3**

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Introduction to Indian Knowledge System-concepts and applications	B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N,	PHI Learning Private Ltd, ISBN-978-93-91818-21-0, 2022
2	Traditional Knowledge System in India	Amit Jha	Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230, 2009,

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Knowledge Traditions and Practices of India	Kapil Kapoor, Avadesh Kumar Singh	DK Print World (P) Ltd., ISBN 81-246-0334, Vol. 1, 2005
2	http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System ,IIT Kharagpur)		

Course Outcomes:

Course outcome	Descriptions
CO1	**Provide** an overview of the concept of the Indian Knowledge System and its importance.

CO2	**Appreciate** the need and importance of protecting traditional knowledge
CO3	**Recognize** the relevance of Traditional knowledge in different domains
CO4	**Establish** the significance of Indian Knowledge systems in the contemporary world.
CO5	**Recognize** the relevance of traditional knowledge in Humanities and Social sciences

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2							3				1	
CO2		1				2				2			
CO3			2										
CO4				2							1		
CO5					3		1						

Course Assessment and Evaluation: Humanities and Social Science Courses (CIP, UHV, Environmental Science, Communicative English, Skill Development)

Sl.No	Components		Duration(min)	Marks Conducted for	Min Marks To pass the Course
1	Theory-Internal Assessment	IA-1	90	50	40
		IA-2	90	50	
	Total CIE			100	40
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module					

Department: Electronics and Communication Engineering			**Semester:**	**3**
Subject: Universal Human Values				
Subject Code:	**25HV310**	**L – T – P - S**	**14-0-0-16**	
			Credits	**1**

Sl. No.	Course Objectives
1	**Understand** the essentials of human 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity.
2	**Study** the development of a Holistic perspective among students towards life and profession: happiness and prosperity.
3	**Learn** the plausible implications of ethical human conduct, trustful mutually fulfilling human behaviour with nature.
4	**Provide** a much needed orientation input in value education to the young enquiring minds.

Module	Description	
I	**Introduction to Value Education :**Understanding Value Education – Need, Guidelines, Content, Role of Education and Sanskar. Process for Value Education – Self-exploration and the Dialogue Within. Continuous Happiness and Prosperity – The Basic Human Aspirations. Right Understanding, Relationship and Physical Facility. Exploring the Meaning of Happiness and Prosperity. Method to Fulfill the Basic Human Aspirations. Text 1: Ch 1 to 6	**3**
II	**Harmony in the Human Being:** Understanding the Human Being as the Co-existence of Self and Body. Distinguishing between the Needs of the Self and the Body. The Body as an Instrument of the Self. Understanding Harmony in the Self. Understanding Harmony of the Self with the Body. Programme to Ensure Self-regulation and Health. Text 1: Ch 7 to 12	**3**

III	**Understanding Harmony in Family and Society :**Harmony in the Family – The Basic Unit of Human Interaction. Values in Human-to-Human Relationship. Trust – The Foundational Value in Relationship. Respect – As the Right Evaluation. Other Naturally Acceptable Feelings in Relationship such as Affection, Care, Guidance, Reverence, Glory, Gratitude and Love. Vision for the Universal Human Order – From Family to World Family. Text 1: Ch 13 to 18	**3**
IV	**Understanding Harmony in Nature:** Understanding Harmony in Nature. Interconnectedness, Self-regulation and Mutual Fulfillment among the Four Orders of Nature. Realizing Existence as Co-existence at All Levels. The Holistic Perception of Harmony in Existence. Text 1: Ch 19 to 22	**3**
V	**Implications of Holistic Understanding:** Natural Acceptance of Human Values. Definitiveness of Ethical Human Conduct. A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order. Competence in Professional Ethics. Holistic Technologies, Production Systems and Management Models – Typical Case Studies. Strategies for Transition towards Value-based Life and Profession. Text 1: Ch 23 to 28	**2**

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	A Foundation Course in Human Values and Professional Ethics,	R R Gaur, RSangal G P Bagaria,	Excel Books, New Delhi,2010

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Jeevan Vidya: Ek Parichaya,	A Nagaraj,	Jeevan Vidya Prakashan, Amarkantak, 1999.
2	Human Values,	A.N. Tripathi,	New Age Intl. Publishers, New

			Delhi, 2004
3	The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and, Professional Ethics,	- R R Gaur, R Asthana, G P Bagaria	2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Course Outcomes:

Course outcome	Descriptions
CO1	**Describe** the significance of human values, self-exploration, happiness, and prosperity in human life.
CO2	**Illustrate** harmony within the individual and between the self and the body.
CO3	**Apply** the principles of trust, respect, and mutual fulfillment in family and societal relationships.
CO4	**Analyze** harmony in nature, existence, and professional life to promote sustainable and ethical living.
CO5	**Inculcate** ethical and professional responsibility by applying human values, sustainability principles, and social concerns in personal and professional life.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						2		1					
CO2						1	1						
CO3								2					
CO4						1			1				

CO5						2		1					

Course Assessment and Evaluation: Humanities and Social Science Courses (CIP, UHV, Environmental Science, Communicative English, Skill Development)

Sl.No	Components		Duration(min)	Marks Conducted for	Min Marks To pass the Course
1	Theory-Internal Assessment	IA-1	90	50	40
		IA-2	90	50	
	Total CIE			100	40
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module					

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Scheme of Teaching and Examination for NEP 160 Credits (2025 Scheme)

4TH SEMESTER **Academic Year: 2026-27**

Sl No	Course Code		Course Title	Teaching Dept.	L	T	P	S	Total	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	ASC	25ES401	Probability and Advanced Linear Algebra	MA	42	-	-	48	90	3	50	50	100	3
2	PCC	25EC402	Fields and Waves	EC	42	-	-	48	90	3	50	50	100	3
3	IPCC	25ECI403	Microcontroller and Its applications	EC	42	-	28	50	120	4	50	50	100	3
4	PCC	25EC404	Analog and Digital Communication	EC	42	-	-	48	90	3	50	50	100	3
5	PCC	25EC405	Control Systems	EC	42	-	-	48	90	3	50	50	100	3
6	PCC	25ECL406	Communication Lab	EC	-	-	28	2	30	1	50	50	100	3
7	AECL	25ECAEL407	RTL Based Digital system design Lab	EC	14	-	28	18	60	2	50	50	100	3
8	HSC	25CI408	Constitution of India	Any	14	-	-	16	30	1	100	-	100	-
9	EEC	25SK409	Fundamentals of Aptitude and Employability Skills	T&P	14	-	-	16	30	1	100	-	100	-
				Total	**252**	**-**	**84**	**294**	**630**	**21**	**550**	**350**	**900**	**-**
For lateral entry students only														
1	HSC	25EN410	Environmental Studies(Lateral Entry)	Any	14	-	-	16	30	1	100	-	100	-

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Syllabus for the Academic Year 2026-27

Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Probability and Advanced Linear Algebra				
Subject Code:	**25ES401**	**L – T – P – S:**	**42–0–0–48**	
			Credits:	**3**

Sl. No	Course Objectives
1	**Introduce** the concept of vector space, linear transformations, probability and joint probability distributions and complex analysis.
2	**Apply** discrete and continuous probability distributions for single and two variables in analyzing the probability models arising in engineering field.
3	**Apply** the vector space and linear transformation problems in engineering fields. .
4	**To utilize** a modern tool for Computations and visualizations.

Module	Description	Hrs
I	**Vector spaces:** Solution of system of equations by LU decomposition method. Vector space, Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence (all statements only).**Basis and Dimensions**: Basis and Dimensions of Vector space and problems. Using modern tool to solve vector spaces and dimensions. Text I: 26.2, 26.7, 26.8, 26.9, 26.14 to 26.16. Text II: 4.1, 4.3, 4.5, Text III: 2.1, 2.2, 2.3.	**08**
II	**Linear transformation:** Introduction, Linear Mappings, Kernel and Image of a linear transformations, Matrix representation of linear transformations, Range space, Null space, Nullity, Rank-Nullity Theorem, Singular and Non-singular linear transformations (all statements only), Problems. Solving and visualizing linear transformation using modern tools. Text II:1.8, 1.9	**08**

III	**Probability Distributions**: Review of basic probability theory. Random variables (Discrete and Continuous), Probability of mass/density functions and problems. Binomial distribution, Poisson's distribution and Normal distribution (without derivations) and problems. Solve exact probabilities, plot distributions using modern digital tools. Text I: 26.2, 26.7, 26.8, 26.9, 26.14 to 26.16.Text III: 2.1, 2.2, 2.3.	**09**
IV	**Joint probability distribution:** Joint probability distribution for discrete random variables, Marginal distributions, Expectation, covariance, problems. **Stochastic Process:** Probability Vector, Stochastic Matrix, Regular Stochastic Matrix, definition of Markov chain, Transition Probabilities and Transition probability Matrix, Higher Transition Probabilities, stationary distribution of regular Markov chains, problems. Using modern tool to solve and visualize the joint probability distributions. Text III: 2.5, 4.1, 8.1	**09**
V	**Complex Analysis**: Review of function of a complex variables, limits, continuity and differentiability. Analytic functions, Cauchy-Riemann equations in Cartesian and polar forms (without proof). Properties and construction of analytic functions by Milne-Thompson Method. Bilinear Transformations, problems. Solving and visualizing complex analytical problems using modern tools. Text I: 20.1, 20.3, 20.5, 20.13.	**08**

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Higher Engineering Mathematics	B.S. Grewal	44th Edition Khanna Publications, 2021.ISBN:9788193328491
2	Linear Algebra and its Applications	David C. lay	3rd Edition, 2002, Pearson Education India, ISBN-13: 978-81-7758-333-5.
3	Introduction to Probability Models	Sheldon M. Ross	Elsevier, 9th Edition, 2007

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Advanced Engineering Mathematics	C. Ray Wylie, Louis C. Barrett, McGraw-Hill Book Co	6th Edition. 2017, ISBN:9780070722064
2	A Text Book of Engineering Mathematics	N.P. Bali and Manish Goyal	10th Edition Lakshmi Publishers, 2022, ISBN: 9788131808320.
3	Higher Engineering Mathematics	B.V.Ramana, Tata McGraw-Hill	11th Edition, Tata McGraw-Hill, 2017, ISBN:9780070634190
4	Higher Engineering Mathematics	H. K. Das and Er. Rajanish Varma	3rd Edition, S Chand Publication, 2014, ISBN: 9788121938907
5	MATLAB Programming for Engineers	Stephen J Chapman	7th Edition,Cengage,2024, ISBN:9798214001531

Course Outcomes:

Course outcome	Descriptions
CO1	**Understand** the concept of stochastic process, vector space, Basis and Dimensions, linear transformations, Complex analysis and Probability distributions.
CO2	**Formulate** and solve mathematical problems on probability distribution, stochastic process, Vector spaces, LU-decomposition method and linear transformations.
CO3	**Make use of** linear transformations, Joint probability distribution stochastic models Linear Transformations and complex analysis to solve the Engineering problems.
CO4	**Use** modern tools to solve/visualize engineering problems .

CO5	**Analyze** the concept of vector space, Basis and Dimensions, linear transformations, Complex analysis in Engineering fields.

Course Articulation Matrix:

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3										3	3
CO2	3	3	2									3	3
CO3	3	3	2								1	3	3
CO4					1						1		
CO5	3	2			1						1	3	2

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module **Activity Based Learning(ABL):** Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc						
Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs. The question paper shall contain 10 full questions (20 marks each), with **2** questions from each of the 5 Modules, ensuring 100% syllabus coverage.						

Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

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Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Fields and Waves				
Subject Code:	**25EC402**	**L – T – P - S:**	**42-0-0-48 (In Hrs)**	
			Credits:	**3**

Sl. No	Course Objectives
1	**Understand** the concepts of Electrostatic and Magneto static fields.
2	**Study** the applications of Coulombs law, Gauss law for different charge distributions and Laplace equation.
3	**Acquire** the knowledge of characteristics of transmission lines.
4	**Learn** the wave equation and wave propagation in different mediums.

Module	Description	Hrs
I	**Electrostatics I:** Review of Vector Calculus and Columb's Law, Different types of charge distributions, Electric field Intensity, Electric field due to line charge, Field due to Sheet charge, Field due to Surface charge distribution, Electric flux density, Relationship between Force, Electric field and Displacement flux density, Numerical problems. Text 1: 2.1, 2.2, 2.3, 2.4, 2.5, 3.1	09
II	**Electrostatics II:** Review of Gauss law, Application of Gauss law: Line charge and Surface charge, Work done in moving a point charge in an electric field, Relation between E and V, Numerical problems. **Poisson's and Laplace's Equations:** Poisson's and Laplace's Equations, Applications of Laplace equation (Examples on capacitors –Parallel plate, Spherical & Cylindrical), Numerical problems. Text1: 3.2, 3.3, 3.5, 3.7, 4.6, 7.1, 7.3	09
III	**Magneto statics:** Steady magnetic Field: Introduction to Biot-savart Law, Magnetic field intensity due to Solenoid & on the axis of Solenoid, due to infinite straight conductor, due to centre of a circular coil & on the axis of circular coil, Numerical problems.	08

	Text1: 8.1, 8.2, 8.3, 8.5	
IV	**Wave Propagation:** Introduction to Maxwell's Equations in Point form and Integral form. Uniform Plane Wave: Wave equation of E & H in free space and its solution, Relation between E & H, Wave propagation in free space, in good dielectric and in good conductor, Numerical problems. Text1: 10.3, 10.4, 12.1, 12.2, 12.4	08
V	**Transmission Lines:** Introduction, A line of cascaded T sections, Transmission line- general solutions, relation between primary and secondary constants in transmission line, Attenuation constant and phase constant, Distortion-less line, Reflection coefficient, Smith Chart, Numerical problems. Text 2: 6.1, 6.2, 6.6, 6.7, 6.11	08

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Engineering Electromagnetics	W.H. Hayt and Jr John. A. Buck	Tata McGraw-Hill, 2012, 7th Edition, ISBN:978-0-07-061223-5
2	Networks, Lines and Fields	John D Ryder	Prentice-Hall India, 2004, 2nd Edition, ISBN: 81-23-0299-6

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Element of Electromagnetics	Matthew N.O., Sadiku,	Oxford university, 2018, 7th Edition ISBN: 978-0-19-069861-4
2	Fields and Waves in Communication Electronics	Simon Ramo and John R Whinnery	John Wiley & Sons, Inc, 3rd Edition ISBN: 978-0471-58551-0
3	Electromagnetic Waves and Radiating systems	E.C. Jordan and K.G. Balman,	Prentice-Hall India, 2008, 2nd Edition ISBN: 978-81-2003-0054-5

Course Outcomes:

CO's	Descriptions
CO1	**Illustrate** the various fundamental laws and concepts related to Electrostatic Fields and Magneto static Fields.
CO2	**Calculate** the electric and Magnetic field intensity due to different charge distributions by using various laws and Analytical methods.
CO3	**Interpret** the use of Laplace's equation in determining capacitance in different coordinate systems.
CO4	**Apply** Maxwell's equation to illustrate wave equations and propagation EM waves in different mediums.
CO5	**Describe** the transmission lines and Interpret the importance of Poisson's and Laplace equation.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2												
CO2	1	2											
CO3	2	1											
CO4		1	2										
CO5		2											

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	Components		Duration (min)	Marks Conducted for	Marks reduced to	40% Min Marks in each component to write SEE
1	Theory-	IA-1	90	50	20	16

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	Internal Assessment	IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc

Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs.
The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

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Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Microcontroller and Its applications				
Subject Code:	**25ECI403**	**L – T – P - S:**	**42-0-28-50 (In Hrs)**	
			Credits	**4**

Sl. No.	**Course Objectives**
1	**Understand** the fundamentals and differences between microprocessors, micro controllers, an embedded systems.
2	**Study** the architecture, memory organization, and instruction set of the 8051 micro controller.
3	**Learn** concepts of I/O, timers, counters, serial communication, and interrupts in 8051.
4	**Familiarize** interfacing techniques with external devices and introduce ARM7 architecture and its applications.

Module	**Description**	**Hrs**
I	**Microprocessor, Microcontroller and Embedded Micro Controllers**: Introduction, Difference between Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, the 8051 Microcontroller: Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, Stacks, Addressing Modes. Text 1: Chapter 2.1 to chapter 2.7 and chapter 5.1 to 5.3	**9**
II	**8051 Instruction Set:** Introduction, Instruction set of 8051: Data transfer instructions, Arithmetic Instructions, Logical Instructions, Branch control instructions, Bit oriented instructions. Application Programs: Incrementing, Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, sorting programs. Text 1: Chapter 3.1 to 3.3, chapter 4.1 to4.2 and chapter 6.1 to 6.5	**9**
III	**8051 I/O Ports, Timer/counter programming**: Introduction,	**8**

	8051 Peripherals: I/O Ports: Input/output port structures of 8051, Programming of ports. Timer/Counter: Programming 8051 Timers, Counter Programming (Programming using Assembly language) Text1: 9.1 to 9.3 ,10.1 to 10.4	
IV	**8051 Serial communication and Interrupts Programming**: Introduction, Basics of Serial Data Communication, 8051 Serial Communication, connections to RS-232, Serial Communication Programming in assembly. Basics of interrupts, 8051 interrupt structure, Priority of interrupts and Programming External Hardware Interrupts. Text 1: 11.1 to 11.5	**8**
V	**Introduction to ARM processors and embedded computing systems:** ARM architecture fundamentals: ARM programmer's model, register organization (R0–R15, CPSR), pipeline concept and processor operation. ARM instruction set overview: data processing instructions, data transfer instructions, branch instructions, conditional execution and addressing modes. Introduction to ARM assembly language programming: program structure, arithmetic and logical operations, simple assembly program. Text 3: 2.1 to 2.3,2.4 to 2.7,3.1 to 3.6,4.1 to 4.5	**8**

LAB CONTENT

Sl. No.	Experiment Description
1	(a) Write an Assembly Language Program to transfer a block of data from source to destination memory location. (b) Write an Assembly Language Program to interchange a block of data between source and destination memory locations.
2	(a) Write an Assembly Language Program for addition of two multi-byte numbers. (b) Write an Assembly Language Program for subtraction of two multi-byte numbers.
3	(a) Write an Assembly Language Program to find the cube of a given number. (b) Write an Assembly Language Program to find the average of N numbers stored in memory.

4	Write an Assembly Language Program for implementation of a decimal up/down counter.
5	(a) Write an Assembly Language Program for realization of a Boolean expression. (b) Write an Assembly Language Program for identifying a valid Two-Out-of-Five code.
6	(a) Write an Assembly Language Program for finding positive and negative numbers in a given array. (b) Write an Assembly Language Program for counting the number of ones and zeros in a given byte.
7	(a) Generate a Ramp Waveform using DAC interfacing. (b) Generate Square and Triangular Waveforms using DAC interfacing.
8	(a) Generate a Square Wave using Timer. (b) Generate a PWM Signal with specified duty cycle using Timer.
9	(a) Write a C Program for ARM Arithmetic Operations. (b) Write a C Program for ARM Data Transfer Operations.
10	(a) Implement LED Blinking. (b) Implement Switch Interfacing.
11	Develop and demonstrate an ARM-based Traffic Light Controller using GPIO and Timer peripherals in C Programming.

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	The 8051 Microcontroller Architecture,Programming and Application	Kenneth J Ayala	3rd Edition ,2016, Pen ram International publication
2	The 8051 Microcontroller and Embedded Systems – using assembly and C	Muhammad Ali Mazidi, Janice Gillespie Mazidi and RollinD.	2nd edition, 2014, Pearson Publication
3	ARM System Developer's Guide	Andrew N. Sloss, Dominic Symes and Chris Wright	2004, Morgan Kaufmann publication

Reference Books:

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Sl No	Text Book title	Author	Volume and Year of Edition
1	Microcontrollers Architecture, programming, Interfacing and System Design	Raj Kamal	2011, Dorling Kindersley (India) publication

Course Outcomes:

Course outcome	Descriptions
CO1	**Compare** microprocessors and microcontrollers, CPU architectures like RISC, CISC, Harvard, and Von-Neumann.
CO2	**Describe** the architecture, memory organization, and addressing modes of 8051 and ARM7TDMI microcontroller.
CO3	**Simulate** the programs of ARM processor and 8051 microcontroller
CO4	**Program** timers, counters, serial communication, and interrupts in 8051.
CO5	**Illustrate** ARM processor architecture, instruction set fundamentals and programming concepts, and compare ARM processors with 8051 microcontrollers for modern embedded system applications.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3												
CO2	1	2											
CO3	1				3				1		1		

CO4			3	1	2								
CO5			3	1	3								

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-Internal Assessment	IA-1	90	50	15	12
		IA-2	90	50	15	
2	Periodic Lab Assessment		-	30	10	4
3	Lab CIE		-	20	5	2
4	One Open Ended Experiment/ Project		-	10	5	2
	Total CIE			**150**	**50**	**20**

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Rubrics for Periodic Lab Assessment: Attendance (5M), Lab record (10 M), Conduction of Experiments(10M) and Viva(5M)-**Total 30M**
Lab CIE: Write-up(5M), Conduction/Execution/Demonstration(10M) and Viva(5M)-**Total 20M**
One Open Ended Experiment/ Project: Experimental / project Design (4 marks), Execution/demonstration (3 marks) and Analysis/Viva (3 marks)-**Total 10M**

Semester End Examination(SEE) : **Max 100 Marks,** Duration: 3 Hrs
The question paper shall contain 10 full questions (20 marks each)**,** with 2 questions from each of the 5 Modules, ensuring 100% syllabus coverage. Students shall answer any 5 full questions with 1:1 choice**.** Each question may have a maximum of 4 sub-divisions**.**
Minimum passing Marks : 40% of Max Marks

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Department: Electronics and Communication Engineering			**Semester :**	**4**
Subject: Analog and Digital Communication				
Subject Code:	**25EC404**	**L – T – P – S:**	**42-0-0-48 (In Hrs)**	
			Credits:	**3**

Sl. No.	**Course Objectives**
1	**Study** the fundamentals of analog and digital modulation techniques.
2	**Learn** the time and frequency domain representations of AM, DSB-SC, and FM signals.
3	**Understand** the effects of noise and performance measures in communication systems.
4	**Outline** waveform coding and baseband transmission techniques used to reduce distortion and inter-symbol interference.

Module	**Description**	**Hrs**
I	**Amplitude modulation:** Introduction, Amplitude Modulation, Time-Domain description, Frequency Domain description, Single tone modulation, Generation of AM wave: Square law modulator, Detection of AM waves: Envelop detector. **Double Side Band Suppressed Carrier (DSBSC):** Introduction, Time-Domain description, Frequency-Domain representation, Generation of DSBSC waves: Ring modulator, Coherent detection of DSBSC modulated waves. Text1:7.1,7.2	9
II	**Angle Modulation:** Introduction, Basic definitions, FM, Narrowband FM, Wideband FM, Transmission bandwidth of FM, Generation of FM waves : Direct method , Indirect method, Demodulation of FM waves, Phase locked loop, FM Stereo multiplexing, FM radio. Text1: section:7.10 to 7.14 except 7.13	9
III	**Noise in Analog modulation systems:** Introduction, Signal-to-Noise ratios, Receiver model, Noise in DSB-SC receivers, Noise in AM receivers using envelope detection, Noise in FM	8

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	receivers, Pre-emphasis and de-emphasis in FM system (Qualitative analysis), **Waveform coding techniques**: Introduction, PCM, Quantization noise and SNR, Robust quantization, DPCM, DM, Digital multiplexer for telephony. Text1: 9.1to 9.5,9.8,5.2 to 5.8,5.11	
IV	**Base-band shaping for data transmission:** Introduction, Base-Band Shaping for Data Transmission, Discrete PAM signals, Power spectra of discrete PAM signals, ISI, Nyquist's criterion for distortion less base-band binary transmission, Correlative coding, Eye pattern, Base-band M-ary PAM systems, Adaptive equalization for data transmission. Text1: :6.1 to 6.8	8
V	**Digital modulation techniques :** Introduction**,** Digital Modulation formats, Coherent binary modulation techniques, Coherent Quadrature modulation techniques, Non-coherent binary modulation techniques. Text2: Section 7.1 to 7.4	8

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	An Introduction to Analog and Digital Communication	Simon Haykin	2ndedition,2010, JohnWiley
2	Digital communications	Simon Haykin	2006, John wiley

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Analog communications Introduction to Communication Systems	Jerry D Gibson	1st Edition,2023,Springer
2	Principles of communication systems	Taub and Schilling	3rd Edition,2011,TMH
3	Modern Digital and Analog communication	B.P.Lathi and Zhiding	4th Edition,2010,Oxfordpress

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	systems		

Course Outcomes:

Course outcome	Descriptions
CO1	**Analyze** AM, DSB-SC, FM, and digital modulation schemes to determine bandwidth, power, and spectral characteristics.
CO2	**Interpret** the operation of modulation and demodulation techniques including envelope detector, ring modulator, PLL, and digital detectors.
CO3	**Classify** waveform coding, baseband transmission, and digital modulation methods based on their features, limitations, and applications**.**
CO4	**Evaluate** the performance of communication systems under noise by computing SNR and comparing analog and digital techniques.
CO5	**Design** basic communication system models incorporating modulation, coding, and baseband transmission techniques to achieve reliable signal transmission.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1		3											
CO2	3												
CO3	2												
CO4		2											
CO5		2	2										

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks					
Sl. No.	**Components**	**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component**

						to write SEE
1	Theory-Internal Assessment	IA-1	90	50	20	16
		IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc

Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs.
The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

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Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Control Systems				
Subject Code:	**25EC405**	**L – T – P – S:**	**42-0-0-48(In Hrs)**	
			Credits:	**3**

Sl. No	**Course Objectives**
1	**Study** the mathematical modelling of electrical and mechanical systems.
2	**Familiarize** the system transfer function using block diagram and signal flow graph representations.
3	**Learn** the concept of transient responses and steady state response of the system.
4	**Acquire** the knowledge of frequency domain analysis of a system using graphical method.

Module	**Description**	**Hrs**
I	**Mathematical models of physical systems:** Introduction, Laplace transform, significance of poles and zeros in open loop and closed loop control systems, differential equations of physical systems (Translational and rotational system), analogous circuit (force voltage and force current method). Text 1: 1.1-1.6, 2.1-2.3, 3.1-3.7	9
II	**Block diagram algebra and signal flow graph**: Introduction, block diagrams and signal flow graph: block diagram reduction techniques, signal flow graphs, mason's gain formula, relative advantages, conversion from electrical circuit to SFG and block diagram to SFG Text 1: 2.4-2.7	9
III	**Time response analysis:** Introduction, time response of feedback control systems: Standard test signals, step	8

	response of first order and second order systems, time domain specifications: type and order of the system, steady state error and static error constants and servo applications. Text 1: 5.1-5.5	
IV	**Root Locus and stability analysis:** Introduction, stability analysis-concepts of stability, types of stability, RH criterion, relative stability analysis, root locus concepts, construction of root loci-construction rules, determination of roots from root locus, root contours. Text 1: 6.1-6.5, 7.1-7.4	8
V	**Frequency response analysis and control system applications:** Introduction, correlation between time and frequency response, bode plots- bode diagrams for frequency domain analysis. DC motor speed control, AVR, servo systems and industrial process control. Text 1: 8.1, 8.2, 8.4, 9.1-9.4	8

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Control System Engineering	I.J Nagrath and M Gopal	7th edition, new age international publishers, 2015

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Feedback Control of Dynamic Systems	I J Nagrath and M Gopal	10th edition, john wiley & sons, 2018
2	Modern control engineering	Katsuhiko Ogata	6th edition, person education asia/PHI, 2020

Course Outcomes:

Course outcome	Descriptions
CO1	**Illustrate** the concepts of closed-loop and open-loop control systems with suitable examples.
CO2	**Compute** the transfer function for the given control systems using standard techniques.
CO3	**Apply** the principles of time domain and frequency domain analysis to evaluate the performance of the given control systems.
CO4	**Analyze** the stability of a given system using its transfer function and standard stability criteria.
CO5	**Interpret** the system behaviour from its transfer function and compare the results from different analytical methods.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3												
CO2	2												
CO3		3			1								
CO4		2	3		1								
CO5		2		2									

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks						
Sl. No.	**Components**		**Duration (min)**	**Marks Conducted for**	**Marks reduced to**	**40% Min Marks in each component to write SEE**
1	Theory-	IA-1	90	50	20	16

	Internal Assessment	IA-2	90	50	20	
2	Activity Based Learning	ABL1	-	25	5	4
		ABL2	-	25	5	
Total CIE				150	50	20

IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module
Activity Based Learning(ABL): Online course with certification, Hobby project, Simulations, Industrial Visits, Community-Based Learning, Case-study, Problem-Based Learning, Peer Teaching, web page design, student publications, Hackathons, Quiz (Leetcode, GitHub, Hackaranks and company specific quiz), Student Development program(1 week/online or offline), ……Etc

Semester End Examination(SEE) : Max 100 Marks, Duration: 3 Hrs.
The question paper shall contain 10 full questions (20 marks each)**,** with **2** questions from each of the 5 Modules**,** ensuring 100% syllabus coverage**.** Students shall answer any 5 full questions with 1:1 choice. Each question may have a maximum of 4 sub-divisions.
Minimum passing Marks : 40% of Max Marks.

Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Communication Lab				
Subject Code:	**25ECL406**	**L – T – P – S:**	**0-0-28-2 (In Hrs)**	
			Credits:	**1**

Sl. No.	Course Objectives
1	**Demonstrate** the principles and operations of analog and digital communication techniques, multiplexing methods and synchronization circuits.
2	**Implement** communication systems using hardware circuits and Simulation tools for signal generation, modulation, demodulation, multiplexing and signal reconstruction.
3	**Determine** the performance characteristics of communication systems through experimental measurements and simulation based analysis.

LAB CONTENT:

Sl. No.	Experiment Description
	EXPERIMENTS USING HARDWARE
1	Design and generate an Amplitude modulation signal using AFT,IFT and transistor and demodulate the original signal using envelope detector.
2	Design and generate a Frequency modulation(FM) using IC 8038 and also find the modulation index and transmission bandwidth of generated FM signal.
3	Design and generate Amplitude Shift Keying(ASK) Generation using discrete components and Detection of mesage signal from ASK.
4	Design and generate Frequency Shift Keying(FSK) Generation using discrete components and Detection of message signal from FSK.
5	Design and generate Phase Shift Keying(PSK) Generation using discrete components and Detection of message signal from PSK.
	EXPERIMENTS USING SIMULATION TOOL
6	Design and verify the Phase Lock Loop (PLL) and its capture range, lock range and Free running VCO Frequency.

7	Design and generate a Frequency Division Multiplexed(FDM) signal and reconstruct the message signals.
8	Design and generate a) Differential Pulse Code Modulation b) Delta Modulation
9	Design, generate and interpret eye pattern for a given sequence.
10	Design and generate a Quadrature PSK AND Differential PSK signal and reconstruct the message sequence.

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	An Introduction to Analog and Digital Communication	Simon Haykin	2nd edition,2010,JohnWiley
2	Digital communications	Simon Haykin	2006, John wiley

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Analog communications Introduction to Communication Systems	Jerry D Gibson	1stEdition,2023,Springer
2	Principles of communication systems	Taub and Schilling	3rdEdition,2011,TMH
3	Modern Digital and Analog communication systems	B.P.Lathi and Zhiding	4thEdition,2010,Oxfordpress

Course Outcomes:

Course outcome	Descriptions
CO1	**Analyze** the performance of analog and digital communication techniques using experimental results.

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CO2	**Generate** AM and FM signals using hardware circuits.
CO3	**Implement** ASK, FSK, and PSK modulation and demodulation techniques using discrete components.
CO4	**Construct** and verify PLL and FDM systems using simulation tools
CO5	**Develop** DPCM, DM, QPSK, DPSK, and eye pattern models using simulation tools.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3												
CO2	3												
CO3	2	2	2										
CO4	3				2								
CO5		2	2		2								

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks			
Sl. No.	**Components**	**Marks Conducted for**	**40% Min Marks in each component to write SEE**
1	Periodic Lab Assessment	30	12
2	Lab CIE	20	8
	Total CIE	50	20
Rubrics for Periodic Lab Assessment: Attendance (5M), Lab record(10M), Conduction of Experiments(10M) and Viva((5M)-**Total 30M.**			

Lab CIE: Write-up(5M), Conduction/Execution/Demonstration(10M) and Viva(5M**)-Total 20M.**
Semester End Examination (SEE) : Max 50 Marks, Duration: 3 Hrs. **Rubrics for Lab Examination:** Write-up(8M), Conduction/Execution/Demonstration(35M) and Viva(7M)-**Total 50M.** **Minimum passing Marks : 40% of Max Marks.**

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Department: Electronics & Communication Engineering			**Semester:**	**4**
Subject: RTL Based Digital system design Lab				
Subject Code:	**25ECAEL407**		**L-T-P-S**	**14-0-28-18**
			Credits	**2**

Sl. No.	Course Objectives
1	**Cultivate** design skills using RTL based verilog HDL for digital system design.
2	**Train** to write testbenches and verify digital circuits
3	**Learn** to Implement and debug designs on FPGA platforms.
4	**Study** system-level digital applications using Verilog

LAB CONTENT:

Sl. No.	Experiment Description
1	**Develop a Verilog code for 4 bit ALU using the following descriptions and analyze its RTL Design :** **Opcode** / **Operation** 0001 / A+B 0010 / A-B 0011 / A*B 0100 / A|B 0101 / A and B 0110 / A xor B 0111 / A xnor B 1000 / NOT A Default / A nand B ALU should use combinational logic to calculate an output based on the four bit op-code input code. ALU should pass the result to the out bus when enable line in high, and tri-state the out bus when the enable line is low. ALU should decode the 4 bit op-code as shown in the below table, simulate using Modelsim simulator, analyze its RTL Design and

	implement on FPGA kit.
2	Write a Verilog code for BCD- seven segment display, analyze its RTL Design and implement it on FPGA kit
3	Write a Verilog code to control speed, direction of Stepper motor and implement it on FPGA kit.
4	Realization of Code converter using Modelsim,analyze its RTL Design and implement on FPGA
5	Write a Verilog code for N bit- Ripple carry adder and CLA , analyze its RTL Design and implement on FPGA kit.
6	Write a Verilog code to generate Ramp waveforms using DAC and implement on FPGA.
7	Design of shift registers and sequence generators, analyze its RTL Design and implement on FPGA.
8	a) Design of synchronous mod N Counter, analyze its RTL Design and implement on FPGA. b) Design of Johnson and Ring counter, analyze its RTL Design and implement on FPGA.
9	Implement and demonstrate a project based on the concepts learnt in the experiments 1 to 8.

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Verilog HDL: A Guide to Digital Design and Synthesis	Samir Palnitkar	Pearson
2	FPGA Prototyping by Verilog Examples	Pong P. Chu	Wiley

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Verilog HDL: A Guide to Digital Design and Synthesis	Samir Palnitkar	Pearson Education,2nd Edition,2003

2	Circuit Design and Simulation with Multisim	Muhammad H. Rashid	Pearson/Elsevier,2nd Edition, 2012
3	Advanced Digital Design with Verilog HDL	Michael D. Ciletti	Pearson

Course Outcomes:

Course outcome	Descriptions
CO1	**Apply** Verilog HDL concepts to design digital systems.
CO2	**Demonstrate** designs using testbench.
CO3	**Design** sequential and combinational circuits.
CO4	**Implement** and **debug** designs on FPGA.
CO5	**Develop** system-level applications.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3				2								
CO2	3	2			2								
CO3	3	2	2		2								
CO4	2	2	3		2								
CO5		2	3		3								

Course Assessment and Evaluation: LAB (Ability Enhancement Course)

This course consists of experimental and project-based learning.

- Part A: 5 weeks of experimental learning with 5 experiments. Students shall conduct the experiments individually.

CIE for Part A shall be conducted in the 7th week.

- Part B: 5 weeks of project-based learning. A team of maximum 4 students shall carry out a project. The project shall be completed by the 13th week, CIE for Part B may be conducted in the 14th week.

	Continuous Internal Evaluation (CIE): 50 Marks

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Sl.No	Components	Marks Conducted for	Marks Reduced to	40% Min Marks in each component to write SEE
CIE for PART A(Experimental Learning)				
1	Periodic Lab Assessment	30	15	6
2	Lab CIE	20	10	4
	Total CIE for Part A	50	25	10
Rubrics for Periodic Lab Assessment: Attendance (5M), Lab record (10 M), Conduction of Experiments(10) and Viva(5M)-**Total 30M** **Lab CIE**: Write-up(5M), Conduction/Execution/Demonstration(10M) and Viva(5M**)- Total 20M**				
CIE for PART B (Project based Learning)				
1	Lab CIE Part B	50	25	10
	Total CIE(Part A and PartB)	**100**	**50**	**20**
Rubric for Lab CIE Part B: Write-up (10M), Presentation(10M) Demonstration(20M) Viva(10M)- **Total 50 Marks**				
Semester End Examination(SEE) : 50 Marks, Duration: 3 Hrs **PART A (25 Marks):** **Rubrics for Part A:** Write-up(5M), Conduction/Execution/Demonstration(15M) and Viva(5M)-**Total 25M.** **PART B (25 Marks):** **Rubrics for Part B:** Write-up(5M), Presentation/Demonstration(15M) and Viva(5M)-**Total 25M.** **Minimum passing Marks: 40% in Part A and Part B each**				

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Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Constitution of India				
Subject Code:	**25CI408**	**L – T – P - S:**	**14-0-0-16 (In Hrs)**	
			Credits:	**1**

Sl. No	Course Objectives
1	**Familiarize** with salient features and preamble of the constitution of India. Including fundamental rights of the citizen of India and types of Fundamental rights
2	**Understand** the relevance of directive principles under part-IV, and the responsibilities of the individuals towards society.
3	**Learn** the powers and functions of the Legislature, Executive, and judicial bodies.
4	**Awareness** about the fundamental duties, electoral process, emergencies and amending procedures.

COURSE TOPICS:

Module	Description	Hrs
I	Introduction, Meaning and definitions. Salient features, Sources, Constituent Assembly, Drafting Committee. Preamble to the constitution of India.	**2**
II	Fundamental rights under part III, scope, Limitations and important cases, Judicial and Excecutive	**2**
III	Relevance of directive principles of state policy, fundamental duties and its significance, different commissions of india, Finance Commission, five year plans, 73rd & 74th Constitutional Amendment	**3**
IV	Union Executives- President, Vice President, Prime minister, Speaker, Parliament, Supreme Court of India. State Executives – Governor, Chief Minister, (Upper and lower house) State legislature and High Court.	**3**
V	Constitutional Special Provisions for Scheduled Castes and	**4**

	Tribes, Women, Children and backward classes. Electoral process. Ethics : Introduction Scope of Ethics , History of Ethics, Methods of Ethics Different Approaches to the Study of Ethics, Division of Ethics	

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Introduction to the Constitution of India" (student edition)	DurgaDas Basu,	EEE, 19th/20th Edn.,2001
2	An Introduction to Constitution of India	MV Pylee.	Volume-1 Vikas Publishing, 2002

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	An Introduction to Constitution of India"	Brij kishore Sharma,	prentice-Hall of India, Volume-12002
2	Constitution of India and Professional Ethics	V. Rajaram	Second Edition New Age International Publication. 2011

Course Outcomes:

Course outcome	Descriptions
CO1	**Have** general knowledge and legal literacy and thereby to take up competitive examinations.
CO2	**Understand** the freedom, rights and restrictions including directives, and fundamental duties.
CO3	**Understand** the importance of the three main organs of the constitution, Viz-the legislature, the executive and the judiciary
CO4	**Remember** the various Amendments and Provisions
CO5	**Know** about various Union and state executives

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Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						2	1	3	3	2			
CO2		2			2				3	2	1		
CO3	1		1					3	2	2		1	
CO4				1				3	3	2			
CO5							1						

Course Assessment and Evaluation: Humanities and Social Science Courses (CIP, UHV, Environmental Science, Communicative English, Skill Development)

Sl.No	Components		Duration(min)	Marks Conducted for	Min Marks To pass the Course
1	Theory-Internal Assessment	IA-1	90	50	40
		IA-2	90	50	
	Total CIE			100	40
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module					

Department: Electronics & Communication Engineering			**Semester:**	**4**
Subject: Fundamentals of Aptitude and Employability Skills				
Subject Code:	**25SK409**	**L – T – P - S:**	**14-0-0-16 (In Hrs)**	
			Credits:	**1**

Sl. No	Course Objectives
1	**Improve** Communication Skills: Enhance students' ability to express ideas clearly, listen actively, and adapt communication style to different
2	**Foster** Effective Teamwork: Develop students' teamwork skills, including cooperation, active participation, conflict resolution, and leveraging diverse strengths for collaborative success.
3	**Enhance** Leadership Abilities: Cultivate leadership qualities by helping students develop self-awareness, problem-solving skills, and decision-making abilities
4	**Promote** Professional Etiquette: Instill a sense of professionalism in students, emphasizing appropriate workplace behavior, business

Module	Description	Hrs
I	**Communication Skills**: Basics, Method, Means, Process and Purpose, Basics of Business Communication, Written & Oral Communication, Listening. Communication with Confidence & Clarity- Interaction with people, the need the uses and the methods, Getting phonetically correct, using politically correct language, Debate & Extempore	3
II	**Assertive Communication-** Concept of Assertive communication, Importance and applicability of Assertive communication, Assertive Words, being assertive. **Presentation Skills**	2

	Discussing the basic concepts of presentation skills, Articulation Skills, IQ & GK, How to make effective presentations, body language & Dress code in presentation, media of presentation	
III	**Team Work**: Team Work and its important elements Clarifying the advantages and challenges of team work Understanding bargains in team building Defining behavior to sync with team work Stages of Team Building Features of successful teams. **Body Language & Proxemics**: Rapport Building - Gestures, postures, facial expression and body movements in different situations, Importance of Proxemics, Right personal space to maintain with different people.	3
IV	**Group discussion, Motivation and Stress Management** a. Theory & Evaluation : Understanding why and how is the group discussion conducted. b. Techniques of group discussion. c. Discussion on FAQs of group discussion d. Body language during group discussion. Self-motivation, group motivation, leadership abilities, Stress clauses and stress busters to handle stress and de-stress; Understanding stress - Concept of sound body and mind, Dealing with anxiety, tension, and relaxation techniques. Individual Counseling & Guidance, Career Orientation. Balancing Personal & Professional Life	3
V	**Interview Skills, Professional Practice** a. Personal and Group Interviews. b. Mock Interviews - Questions asked & how to handle them. c. Body language in interview. d. Etiquette, Dress code in interview e. Behavioral and technical interviews. f. Practice on stress interviews, technical interviews, General HR interviews **Professional Practice**: Professional Dress Code, Time Sense, Respecting People & their Space, Relevant Behavior at different Hierarchical Levels. Positive Attitude, Self Analysis and Self-Management. Professional Ethics values to be practiced, standards and codes to be adopted as professional engineers in the society for various projects. Balancing Personal & Professional Life.	3

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Technical Communication Principles and Practices,	Meenakshi Raman and Sangeeta Sharma,	Oxford Publishers, 2004
2	Tools for Talking When Stakes are High,	Kerry Patterson, Joseph Grenny, Ron McMillan, Crucial Conversation	McGraw-Hill Publication, ISBN: 9780071772204

Course Outcomes:

Course outcome	Descriptions
CO1	**Demonstrate** enhanced verbal and written communication abilities, effectively expressing ideas, actively listening, and adapting their communication style to different situations.
CO2	**Exhibit** improved teamwork skills, actively contributing to group projects, resolving conflicts constructively, and leveraging the strengths of team members to achieve shared
CO3	**Adhere** to professional behavior, workplace etiquette, demonstrating appropriate appearance, punctuality, and practicing ethical conduct in professional setting
CO4	**Illustrate** improved aptitude skills, including logical reasoning, analytical thinking, and problem-solving abilities, enabling them to excel in competitive exams, interviews, and real-life problem-solving scenarios (L2)
CO5	**Practise** professional ethics and standards of engineers to balance personal & professional life

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1					2		3	3	3			
CO2	1					2		3	3	3			
CO3	1					2	**3**	3	3	3			
CO4	1	**3**				2		3	3	3			
CO5						2	**3**	3	3	3			

Course Assessment and Evaluation: Humanities and Social Science Courses (CIP, UHV, Environmental Science, Communicative English, Skill Development)

Sl.No	Components		Duration(min)	Marks Conducted for	Min Marks To pass the Course
1	Theory-Internal Assessment	IA-1	90	50	40
		IA-2	90	50	
	Total CIE			100	40
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module					

Department: Electronics and Communication Engineering			**Semester:**	**4**
Subject: Environmental Studies				
Subject Code:	**25EN410**	**L – T – P - S:**	**14-0-0-16(In Hrs)**	
	For Lateral Entry		**Credits:**	**1**

Sl. No.	Course Objectives
1	**Outline** the fundamental concepts of environmental science, sustainability, ecosystems, natural resources, and biodiversity to
2	**Understand** the sources, impacts, and control measures of environmental pollution and waste management practices.
3	**Learn** environmental laws, ethics, and sustainable engineering practices to address environmental challenges responsibly.
4	**Develop** disaster management plans by integrating preparedness, mitigation, response, and recovery measures while evaluating global

Module	Description	Hrs
I	**Introduction**: Environment - Components of Environment, Atmosphere (Structure & Composition), Hydrological cycle, Ecosystem: Types & Function of Ecosystem, Effects of human activities on environment by Agriculture, Industry and urbanization, Environmental Impact Assessment (EIA), Refer text book 1: Ch-1,2: text book 2: Ch-1,2	**3**
II	**SDG:** Sustainable Development goals (SDG's), Introduction To Sustainable Development Definitions and principles of Sustainable Development – History, Millennium Development Goals: Status (global and Indian) – Sustainable Development Goals (SDGs) and their relevance to Engineering, Natural Resources- types of natural resources, Water resources – Surface and subsurface water, Quality aspects, Drinking water quality standards.	**3**

III	**Environmental Pollution** (Causes, effect and control) – Air pollution, Surface Water Pollution, Ground water pollution, Noise pollution, Soil Pollution, Environmental Acts & Regulations to control Pollution, Integrated Water Resources Management (IWRM) & IoT-Based Monitoring, smart waste management, AI, Machine Learning, Robotics, GIS and Remote Sensing application in Environmental studies.	**3**
IV	**Global Environmental Issues:** Global Warming, Acid rain & Ozone layer depletion (Causes, effect and control), Climate change, Carbon trading, Net zero emission **Energy:** Types, alternative sources of Energy, **Smart cities** and sustainable urban planning, Project Management in Smart Cities-Case studies on project management of smart cities Refer text book 1: Ch-6; text book 2: Ch-5	**3**
V	**Waste Management & Disposal:** E-Waste, Biomedical Waste, Hazardous waste (Management & Disposal), Plastic waste, National Environmental policy, **Disaster management Plan:** Types of disasters and its impacts, awareness and preparedness, Disaster Risk Management In India, NDMA, NDRF, SDRF. Develop plans to mitigate disasters Refer text book 1: Ch-6,7: text book 2: Ch-6 Reference book: Ch-10, 11 from book 1 & 2 and Ch-8 from book 3	**2**

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Environmental Studies for Undergraduate Courses	Erach Bharucha	Universities Press, 3rd Edition, 2023.
2	Environmental Science and Engineering	P. Anandan and R. Kumaravelan	Scitech Publications, 2026 Edition.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition

1	Environmental Studies	R Rajagopalan	From Crisis to Cure", 4th Edition, 2022, Oxford University Press
2	Environmental Studies	Benny Joseph	3rd Edition, 2023, McGraw Hill Education
3	Sustainable Construction and Green Infrastructure	Charles J. Kibert	5th Edition, 2024

Course Outcomes:

Course outcome	Descriptions
CO1	**Explain** the fundamental concepts of environmental science, ecosystems, natural resources, biodiversity, and their significance in sustainable development.
CO2	**Analyze** the causes, impacts, and control measures of environmental pollution, climate change, and waste management practices..
CO3	**Evaluate** environmental issues related to water resources, energy resources, and environmental conservation using scientific and engineering principles.
CO4	**Apply** environmental laws, sustainability principles, and ethical responsibilities to develop environmentally responsible engineering solutions and promote sustainable lifestyles.
CO5	**Develop** disaster management plans incorporating disaster preparedness, mitigation, response, and recovery measures to minimize the impacts of natural and human-induced disasters.

Course Articulation Matrix:

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1					1							
CO2						2	2				1		
CO3		2				1							

CO4			1			2					1		
CO5						1							

Course Assessment and Evaluation: Humanities and Social Science Courses (CIP, UHV, Environmental Science, Communicative English, Skill Development)

Sl.No	Components		Duration(min)	Marks Conducted for	Min Marks To pass the Course
1	Theory-Internal Assessment	IA-1	90	50	40
		IA-2	90	50	
	Total CIE			100	40
IA-1 Syllabus: 2 ½ Module , IA-2 Syllabus: 2 ½ Module					