VAAGDEVI COLLEGE OF ENGINEERING

Autonomous

Bollikunta, Khila Warangal (Mandal), Warangal Urban-506 005 (T.S), www.vaagdevi.edu.in

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Minutes of the meeting of the Board of Studies held on: 25/03/2023

The following members were present:

Sl. No	Members Present	Designation	Signature
1.	Dr. M. Shashidhar Assoc. Prof & HOD., ECE Dept., VCE Warangal. sasi47004@gmail.com	Chairman	
2.	Dr. Y. Raghavendra Rao, Head of the Department JNTU , Sulthanpur yraghavenderrao@gmail.com	JNTUH Nominee	
3.	Dr. S. Anuradha , Professor NIT, Warangal anuradha@nitw.ac.in	Subject Expert	
4.	Prof. P. Prasad Rao, Principal, VEC Warangal principal.vec@gmail.com	Subject Expert	
5.	Dr. V. Sudheer Raja, Assoc. Prof, ECE Dept, VCE, Warangal sudheerraja_v@vaagdevi.edu.in	Member	
6.	Dr. Hemant Kumar Gupta , Asst. Prof, ECE Dept, VCE, Warangal hk_gupta@vaagdevi.edu.in	Member	
7.	Mr. Bala Krishna Islavath, Scientist, R&D Laboratory center for Electromagnetic, Ministry of Electronics and Information Technology, Government of India islavath32@gmail.com	Alumni	
8.	Mr. P. Mahesh, Senior Silicon Design Engineer at AMD goud.mahesh058@live.com	Alumni	

The following decisions are taken:

1. Course Structure and Syllabi of B.Tech II Year under R22 regulation are finalized and approved.

2. Approved substitute subjects for the students who have re-admitted from:

   i) R-15 Regulation into R-18 Regulation.
   ii) R-15 Regulation into R-20 Regulation.
   iii) R-18 Regulation into R-20 Regulation.
   iv) R-18 Regulation into R-22 Regulation.
   v) R-20 Regulation into R-22 Regulation.

3. Approved syllabus of Digital Electronics for II year – I Semester B.Tech CSE & CSE (Data science)

4. Approved syllabus of Analog Electronics Circuits for II Year – I Semester B.Tech EEE

5. Approved Analog Electronics Circuits lab experiments list for II Year – I Semester B.Tech EEE

6. Approved syllabus of Digital Electronics for II year II Semester B.Tech EEE

7. Approved Digital Electronics Lab experiments list for II year II Semester B.Tech EEE

8. The Panel of Paper Setters for B.Tech and M.Tech courses have been approved.

9. The Panel of Examiners / Evaluators for B.Tech and M.Tech courses have been approved.

Dr. M. Shashidhar
Chairman
Board of Studies in-ECE

COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRONICS AND COMMUNICATION ENGINEERING

For
B.TECH FOUR YEAR DEGREE PROGRAMME
(Applicable for the batches admitted from 2022-2023)

VAAGDEVI COLLEGE OF ENGINEERING
(Autonomous)
Bollikunta, Warangal-506 005
Telangana State, India.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE
(R22 Regulations applicable for the batches admitted from Academic Year 2022-23)

I YEAR I SEMESTER

S.No.	Course Code	Title of the Course	L	T	P	Credits
1		Matrices and Calculus	3	1	0	4
2		Applied Physics	3	1	0	4
3		C Programming for Engineers	3	0	0	3
4		Engineering Workshop	0	1	3	2.5
5		English for Skill Enhancement	2	0	0	2
6		Elements of Electronics and Communication Engineering	0	0	2	1
7		Applied Physics Laboratory	0	0	3	1.5
8		English Language and Communication Skills Laboratory	0	0	2	1
9		C Programming for Engineers Laboratory	0	0	2	1
10		Environmental Science	3	0	0	0
11		Induction Programme				
		Total Credits	**14**	**3**	**12**	**20**

I YEAR II SEMESTER

S.No.	Course Code	Title of the Course	L	T	P	Credits
1		Ordinary Differential Equations and Vector Calculus	3	1	0	4
2		Engineering Chemistry	3	1	0	4
3		Computer Aided Engineering Graphics	1	0	4	3
4		Basic Electrical Engineering	2	0	0	2
5		Electronic Devices and Circuits	2	0	0	2
6		Applied Python Programming Laboratory	0	1	2	2
7		Engineering Chemistry Laboratory	0	0	2	1
8		Basic Electrical Engineering Laboratory	0	0	2	1
9		Electronic Devices and Circuits Laboratory	0	0	2	1
		Total Credits	**11**	**3**	**12**	**20**

1) (Dr. M. Shashidhar)
2) (Dr. Y. Raghavendra Rao)
3) (Dr. S. Anuradha)
4) (Dr. P. Prasad Rao)

(Dr. V. Sudheer Raja)
(Dr. Hanant Gupta)

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE
(R22 Regulations applicable for the batches admitted from Academic Year 2022-23)

II YEAR I SEMESTER

S.No.	Subject code	Subject	L	T	P	Credits
1		Analog Circuits	3	1	0	4
2		Network analysis and Synthesis	3	0	0	3
3		Digital Logic Design	3	0	0	3
4		Signals and Systems	3	1	0	4
5		Probability Theory and Stochastic Processes	3	0	0	3
6		Analog Circuits Laboratory	0	0	2	1
7		Digital logic Design Laboratory	0	0	2	1
8		Basic Simulation Laboratory	0	0	2	1
9		Logical Reasoning & Quantitative Aptitude	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

II YEAR II SEMESTER

S.No.	Subject code	Subject	L	T	P	Credits
1		Numerical Methods and Complex Variables	3	0	0	3
2		Electromagnetic Fields and Transmission Lines	3	0	0	3
3		Analog and Digital Communications	3	0	0	3
4		Linear and Digital IC Applications	3	0	0	3
5		Electronic Circuit Analysis	3	0	0	3
6		Analog and Digital Communications Laboratory	0	0	2	1
7		Linear and Digital IC Applications Laboratory	0	0	2	1
8		Electronic Circuit Analysis Laboratory	0	0	2	1
9		Real Time Project/ Field Based Project	0	0	4	2
10		Gender Sensitization Lab	0	0	2	0
		Total Credits	**15**	**0**	**12**	**20**

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(Dr. Hemant Gupta)

VAAGDEVI COLLEGE OF ENGINEERING
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B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE
(R22 Regulations applicable for the batches admitted from Academic Year 2022-23)

III YEAR I SEMESTER

S.No.	Subject code	Subject	L	T	P	Credits
1		Microcontrollers	3	1	0	4
2		IoT Architectures and Protocols	3	0	0	3
3		Control Systems	3	1	0	4
4		Business Economics & Financial Analysis	3	0	0	3
5		Professional Elective – I	3	0	0	3
6		Microcontrollers Laboratory	0	0	2	1
7		IoT Architectures and Protocols Laboratory	0	0	2	1
8		Advanced English Communication Skills Laboratory	0	0	2	1
9		Intellectual Property Rights	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

III YEAR II SEMESTER

S.No.	Subject code	Subject	L	T	P	Credits
1		Antennas and Wave Propagation	3	0	0	3
2		Digital Signal Processing	3	0	0	3
3		CMOS VLSI Design	3	0	0	3
4		Professional Elective - II	3	0	0	3
5		Open Elective – I	3	0	0	3
6		Digital Signal Processing Laboratory	0	0	2	1
7		CMOS VLSI Design Laboratory	0	0	2	1
8		Advanced Communication Laboratory	0	0	2	1
9		Industry Oriented Mini Project/ Internship	0	0	4	2
10		Environmental Science	3	0	0	0
		Total Credits	**18**	**0**	**10**	**20**

1) Dr. M. Shashidhar
2) (Dr. Y. Raghavendra Rao)
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5) (Dr. V. Sridhar Raja)
6) (Dr. Hemant Gupta)

VAAGDEVI COLLEGE OF ENGINEERING
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B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE
(R22 Regulations applicable for the batches admitted from Academic Year 2022-23)

IV YEAR I SEMESTER

S.No.	Subject code	Subject	L	T	P	Credits
1		Microwave and Optical Communications	3	1	0	4
2		Professional Elective – III	3	0	0	3
3		Professional Elective – IV	3	0	0	3
4		Open Elective – II	3	0	0	3
5		Professional Practice, Law & Ethics	3	0	0	2
6		Microwave and Optical Communications Laboratory	0	0	4	2
7		Project Stage – I	0	0	6	3
		Total Credits	**15**	**1**	**10**	**20**

IVYEAR II SEMESTER

S.No.	Subject code	Subject	L	T	P	Credits
1		Professional Elective – V	3	0	0	3
2		Professional Elective – VI	3	0	0	3
3		Open Elective – III	3	0	0	3
4		Project Stage – II including Seminar	0	0	22	9+2
		Total Credits	**9**	**0**	**22**	**20**

1) Dr. M. Shashidhar

2) (Dr. Y. Raghavendra Rao)

3) (Dr. S. Anuradha)

4) (Dr. P. Prasada Rao)

5) (Dr. V. Sridheer Raja)

16) (Dr. Hemant Gupta)

Professional Elective – I

	Computer Organization & Operating Systems
	Data Communications and Computer Networks
	Electronic Measurements and Instrumentation

Professional Elective – II

	Digital Image Processing
	Mobile Communications and Networks
	Embedded System Design

Professional Elective – III

	Radar Systems
	CMOS Analog IC Design
	Artificial Neural Networks

Professional Elective – IV

	Network Security and Cryptography
	Satellite Communications
	Biomedical Instrumentation

Professional Elective – V

	Artificial Intelligence
	5G and beyond Communication
	Machine learning

Professional Elective – VI

	Multimedia Database Management Systems
	System on Chip Architecture
	Wireless sensor Networks

Open Electives

Open Elective (OE – I)	Open Elective (OE – II)	Open Elective (OE – III)
1. Fundamentals of Internet of Things 2. Principles of Signal Processing 3. Digital Electronics for Engineering	1. Electronic Sensors 2. Electronics for Health Care 3. Telecommunications for Society	1. Measuring Instruments 2. Communication Technologies 3. Fundamentals of Social Networks

1) Dr M. Shahid
2) (Dr. Y. Raghavendra Rao)
3) (Dr. S. Anuradha)
4) Dr. P. Prasad Rao
5) (Dr. V. Shalini Rani)
6) (Dr. Hemant Kumar)

VAAGDEVI COLLEGE OF ENGINEERING (AUTONOMOUS)
ELECTRONICS & COMMUNICATION ENGINEERING
COURSE STRUCTURE, II YEAR SYLLABUS (R22 Regulations)
Applicable from AY 2022-23 Batch

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		Numerical Methods and Complex Variables	3	1	0	4
2	B22EC04	Analog Circuits	3	0	0	3
3		Network analysis and Synthesis	3	0	0	3
4	B22EC05	Digital Logic Design	3	0	0	3
5	B22EC06	Signals and Systems	3	1	0	4
6	B22EC07	Analog Circuits Laboratory	0	0	2	1
7	B22EC08	Digital logic Design Laboratory	0	0	2	1
8	B22EC09	Basic Simulation Laboratory	0	0	2	1
9	*MC	Logical Reasoning & Quantitative Aptitude	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

II YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22EC13	Probability Theory and Stochastic Processes	3	0	0	3
2	B22EC14	Electromagnetic Fields and Transmission Lines	3	0	0	3
3	B22EC15	Analog and Digital Communications	3	0	0	3
4	B22EC16	Linear and Digital IC Applications	3	0	0	3
5	B22EC17	Electronic Circuit Analysis	3	0	0	3
6	B22EC18	Analog and Digital Communications	0	0	2	1
7	B22EC19	Linear and Digital IC Applications Laboratory	0	0	2	1
8	B22EC20	Electronic Circuit Analysis Laboratory	0	0	2	1
9	B22EC21	Real Time Project/ Field Based Project	0	0	4	2
10	*MC	Gender Sensitization Lab	0	0	2	0
		Total Credits	**15**	**0**	**12**	**20**

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2) (Dr. Y. Raghavendra Rao) 6)
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(Dr. Hemant Gupta)

NUMERICAL METHODS AND COMPLEX VARIABLES

B.Tech. II Year I Semester.

L	T	P	C
3	1	0	4

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

- Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
- Various numerical methods to find roots of polynomial and transcendental equations.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations of first order using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

Course outcomes: After learning the contents of this paper the student must be able to

- Express any periodic function in terms of sine and cosine
- Find the root of a given polynomial and transcendental equations.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given first order ODE's
- Analyze the complex function with reference to their analyticity, integration using Cauchy'sintegral and residue theorems
- Taylor's and Laurent's series expansions in complex function

UNIT-I: Fourier Series & Fourier Transforms: **10 L**

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

UNIT-II: Numerical Methods-I **10 L**

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations.

Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-III: Numerical Methods-II **8 L**

Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE

UNIT-IV: Complex Differentiation **10 L**

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof),Milne-Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration: **10 L**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem and their properties. (All theorems without Proofs)

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-GrawHill, 2004.

ANALOG CIRCUITS

B.Tech. II Year I Semester.

L	T	P	C
3	0	0	3

Pre-requisite: Electronic Devices and Circuits

Course Objectives:

1. Learn the concepts of, load line analysis and biasing techniques
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of amplifier circuits
4. Learn the concepts of small signal analysis of BJT and FET
5. To familiarize the Concept of feedback in amplifiers so as to differentiate betweennegative and positive feedback.

Course Outcomes: Upon completing this course, the students will be able to

1. Design the amplifiers with various biasing techniques.
2. Design single stage amplifiers using BJT and FET
3. Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT.
4. Utilize the Concept of negative feedback to improve the characteristics of amplifiers.
5. Utilize the concept of Barkhausen criterion to design various oscillators

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	-	-	-	-	-	-	-	1
CO2	2	3	3	2	-	-	-	-	-	-	-	1
CO3	2	3	3	2	-	-	-	-	-	-	-	1
CO4	2	3	3	2	-	-	-	-	-	-	-	1
CO5	2	3	3	2	-	-	-	-	-	-	-	1

UNIT - I

BJT Biasing: Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diode

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT - II

FET- Biasing Techniques

FET Amplifiers: Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

UNIT - III

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency: Hybrid -πmodel of Common Emitter transistor model, f_α, f_β and unity gain bandwidth, Gain-bandwidth product.

UNIT - IV

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

UNIT - V

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

TEXT BOOKS:

1. Jacob Millman, Christos C Halkias -Integrated Electronics, McGraw Hill Education.
2. Robert L. Boylestead, Louis Nashelsky -Electronic Devices and Circuits theory, 11th Edition,2009, Pearson

REFERENCE BOOKS:

1. David A. Bell – Electronic Devices and Circuits, 5th Edition, Oxford.
2. Adel S. Sedra, Kenneth C. Smith- Microelectronic Circuits- Theory and Applications, Oxford.
3. Chinmoy Saha, Arindam Halder, Debaati Ganguly -Basic Electronics-Principles andApplications, 2018, Cambridge.

NETWORK ANALYSIS AND SYNTHESIS

B.Tech. II Year I Semester.

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady state and transient states in RLC circuits.
3. To understand the two port network parameters.
4. Learn the design concepts of various filters and attenuators

Course Outcomes: Upon successful completion of the course, students will be able to:

1. Gain the knowledge on basic RLC circuits behaviour.
2. Analyse the Steady state and transient analysis of RLC Circuits.
3. Characterization of two port network parameters.
4. Analyse the Design aspect of various filters and attenuators

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	1	-	-	-	-	1
CO2	2	3	2	-	-	-	1	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	2	3	3	-	-	-	1	-	-	-	-	1

UNIT - I

Network Topology: Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT - II

Transient and Steady state analysis: RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT - III

Two port network parameters: Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, □, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT-IV

Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

Attenuators: Types – T, π , L, Bridge T and lattice ,Asymmetrical Attenuators T, π , L Equalizers- Types-Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT – V

Network Synthesis: Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non ladder networks, Poles, Zeros analysis of network functions,

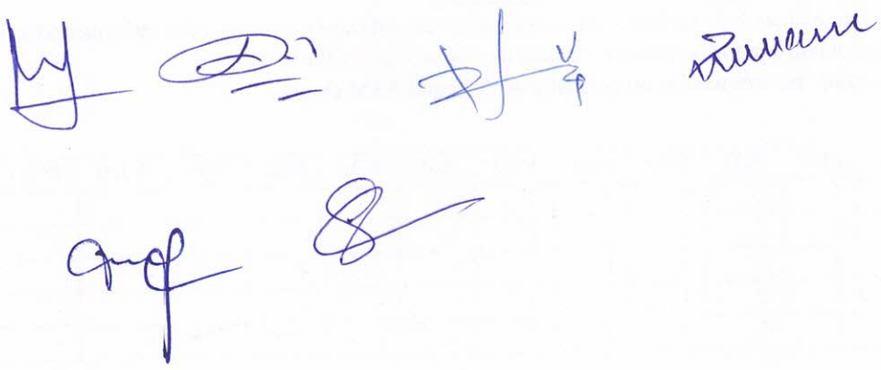
Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster andcauser methods.

TEXT BOOKS:

1. Van Valkenburg -Network Analysis, 3rd Ed., Pearson, 216.
2. JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.

REFERENCE BOOKS:

1. J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education,1999.
2. A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata McGraw- Hill Publications
3. William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt andJack E. Kimmerley, McGraw Hill Company



DIGITAL LOGIC DESIGN

B.Tech. II Year I Semester.

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used inthe design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes: Upon completing this course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems for Combinational function minimization
2. Design logic circuits by applying minimization techniques and also able to characterize the various logic families for their AC and DC parameter's
3. Design and analyze various combination logic circuits and understand the fundamental's of sequential circuits
4. Design and analyze sequential circuits for various cyclic functions
5. Acquire the knowledge on concepts of FSM and ASM charts .

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	-	-	-	-	-	2
CO2	2	3	3	2	2	1	-	-	-	-	-	1
CO3	3	2	2	1	2	1	-	-	-	-	-	2
CO4	3	2	1	1	1	-	-	-	-	-	-	-
CO5	2	3	3	2	2	1	-	-	-	-	-	1

UNIT - I

Number Systems: Number systems, Complements of Numbers, Codes- Weighted and Non-weightedcodes and its Properties, Parity check code and Hamming code.

Boolean algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT - II

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs,IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT – III

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

UNIT - IV

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N –Counters.

UNIT – V

Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs. Asynchronous design-modes of operation, Hazards, synthesis of SIC fundamental mode circuits, synthesis of burst mode circuits. Introduction to ASM Charts

TEXT BOOKS

1. Zvi Kohavi &Niraj K. Jha, - Switching and Finite Automata Theory, 3rd Ed., Cambridge, 2010.
2. R. P. Jain - Modern Digital Electronics, 3rd Edition, 2007- Tata McGraw-Hill

REFERENCE BOOKS

1. Morris Mano, Fredriac J. Hill, Gerald R. Peterson - Introduction to Switching Theory and LogicDesign –3rd Ed., John Wiley & Sons Inc.
2. Charles H. Roth - Fundamentals of Logic Design, 5th ED., Cengage Learning, 2004.

SIGNALS AND SYSTEMS

B.Tech. II Year I Semester.

L	T	P	C
3	1	0	4

Course Objectives: The objectives of this subject are to:

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3. Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4. Identify the need for sampling of CT signals, types and merits and demerits of each type.
5. Apply the knowledge of various signals and systems

Course Outcomes: Upon completing this course the students able to:

1. Characterize various signals, systems and their time and frequency domain analysis, usingtransform techniques.
2. Identify the conditions for transmission of signals through systems and conditions for physical realization of systems.
3. Use sampling theorem for baseband and band pass signals for various types of sampling andfor different duty cycles.
4. Apply the correlation and PSD functions for various applications.
5. Analysis transform techniques in time and frequency domain

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	1
CO2	3	3	2	-	-	-	-	-	-	-	-	1
CO3	3	3	2	2	-	-	-	-	-	-	-	1
CO4	3	3	2	2	-	-	-	-	-	-	-	1
CO5	3	3	2	2	1	-	-	-	-	-	-	1

UNIT - I

Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT – II

Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.
Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction toHilbert Transform.

UNIT - III

Signal Transmission through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT – IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Z–Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

UNIT - V

Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

TEXT BOOKS

1. B.P. Lathi -Signals, Systems & Communications, BSP, 2013.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawabi -Signals and Systems, 2nd Ed., Prentice Hall

REFERENCE BOOKS

1. Simon Haykin and Van Veen, A. Rama Krishna Rao, -Signals and Systems, TMH, 2008.
2. Michel J. Robert - Fundamentals of Signals and Systems, MGH International Edition, 2008.
3. C. L. Philips, J. M. Parr and Eve A. Riskin -Signals, Systems and Transforms, 3rd Ed., PE,2004.

ANALOG CIRCUITS LABORATORY

B.Tech. II Year I Semester.

L	T	P	C
0	0	2	1

Course Outcomes: Upon completing this course the students will be able to

1. Design amplifiers with required Q point and analyze amplifier characteristics
2. Examine the effect multistage amplification on frequency response
3. Investigate various feedback topologies and their frequency responses.
4. Design various oscillator circuits.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	2	-	3	-	-	3	3	-	-	1
CO2	1	-	2	-	3	-	-	3	3	-	-	1
CO3	1	-	2	-	3	-	-	3	3	-	-	1
CO4	1	-	2	-	3	-	-	3	3	-	-	1

List of Experiments):

Verify any twelve experiments in H/W Laboratory

1. Design a Self bias Circuit and determine the Q-point of the Transistor and its Stability factor.
2. Obtain the I/O Characteristics of CE, CB, CC amplifiers. Calculate h-parameters from theCharacteristics.
3. Obtain the Drain and Transfer characteristics of CD, CS amplifiers of JFET. Calculate gm, rdfrom the Characteristics.
4. By experiment prove that the voltage gain of Emitter Follower Circuit is one.
5. Design a Common Emitter Amplifier with a gain of 30db and Bandwidth of 10KHZ and plot the frequency response practically.
6. Design a two stage RC Coupled amplifier and prove that gain is increased and analyze theeffects of coupling capacitance.
7. Practically prove that the Darlington pair has high input impedance.
8. Draw the high frequency response of common emitter transistor amplifier and calculate $f\alpha$, $f\beta$ and gain bandwidth product.
9. Design a cascode amplifier for a given specifications
10. Design four topologies of feedback amplifiers and draw the frequency response of them with and without feedback.
11. Design an RC phase shift oscillator circuit and derive the gain condition for oscillationspractically for given frequency.
12. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.

Beyond syllabus

13 Determination of f_T of given transistor.

14 Design of wein Bridge oscillator

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic devices

DIGITAL LOGIC DESIGN LABORATORY

B.Tech. II Year I Semester.

L	T	P	C
0	0	2	1

Course Outcomes: Upon completing this course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
2. Define Postulates of Boolean algebra and to minimize combinational functions, and designthe combinational circuits.
3. Design and analyze sequential circuits for various cyclic functions.
4. Characterize logic families and analyze them for the purpose of AC and DC parameters.

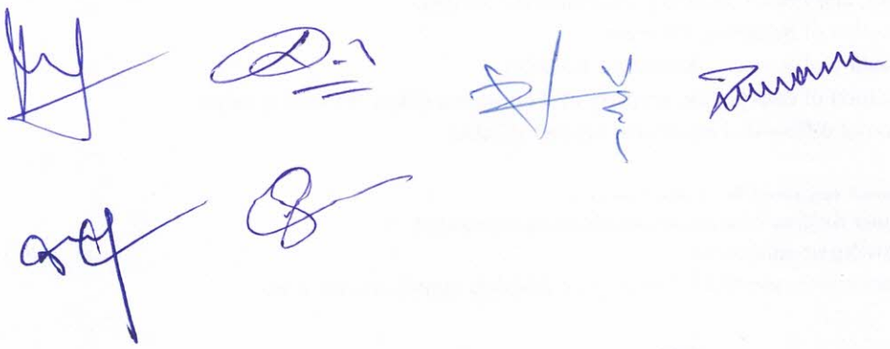
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	-	-	1	-	-	2
CO2	3	2	2	1	2	1	-	-	1	-	-	2
CO3	2	3	3	2	2	1	-	-	1	-	-	1
CO4	3	2	1	1	1	-	-	-	-	-	-	-

List of Experiments

1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. Realization of given Boolean function using universal gates and minimizing the same.Compare thegate count before and after minimization.
3. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor usingfull adder.
4. Designing a 2 – bit Comparator using AND, OR and NOT gates. Realize 4 – bit Comparator using 2 – bit Comparators.
5. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.
6. Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder.
7. Convert Demultiplexer to Decoder and vise versa.
8. Designing of Universal n-bit shift register using flipflops and Multiplexers. Draw the timing diagramof the Shift Register.
9. Design a Synchronous binary counter using D-flipflop/given flipflop.
10. Design a asynchronous counter for the given sequence using given flipflops.
11. Designing of MOD 8 Counter using JK flipflops.
12. Designing of sequence detecting State Machine with minimal states using the given flipflops.

Beyond Syllabus

1. Realize all logic gates with TTL logic.
2. Realize all logic gates with DTL logic.



BASIC SIMULATION LABORATORY

B.Tech. II Year I Semester.

L	T	P	C
0	0	2	1

Course Outcomes: Upon completing this course, the students will be able to

1. Generate, analyze and perform various operations on Signals/Sequences both in time andFrequency domain
2. Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling
3. Generate different Random Signals and capable to analyze their Characteristics
4. Apply the Concepts of Deterministic and Random Signals for Noise removal Applications andon other Real Time Signals

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	3	2	-	-	3	1	-	1
CO2	3	2	3	3	3	2	-	-	3	1	-	1
CO3	3	2	3	3	3	2	-	-	3	1	-	1
CO4	3	2	3	3	3	2	-	-	3	1	-	1

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UnitImpulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting,Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/DiscreteSystem.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system andverifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phasespectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for thegiven transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value andits Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Verification of Weiner – Khinchine Relations
16. Verification of convolution property of Fourier transform- beyond syllabus
17. Solution of differential equations- beyond syllabus

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window Xp or equivalent
3. Simulation software-MAT Lab or any equivalent simulation software

LOGICAL REASONING AND QUANTITATIVE APTITUDE

B.Tech. II Year I Semester.

L	T	P	C
3	0	0	0

Course Objectives: Upon completing this course, the students will be able to:

1. To improve logical thinking with general applications using mathematical concepts like sequences, series, number theory and probability.
2. It also features students to analyze data interpretation and able of improve their mathematical skills in various general aspects like coding and decoding, Time and Work puzzles solving blood relations etc.

Course Outcomes: Upon completion of this course, students will be able to:

1. Apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
2. Apply quantitative correctly arrive at meaningful conclusions regarding their answers and manipulate equations and formulas in order to solve for the desired variable
3. Interpret given information correctly, determine which mathematical model best describes the data, and apply the model correctly.
4. Correctly apply mathematical language and notation to explain the reasoning underlying their conclusions when solving problems using mathematical or statistical techniques.
5. Improve their mathematical skills in various general aspects to solve real time problems.

Unit – I: Logical Reasoning

1. Coding and Decoding
2. Distance and Directions
3. Classifications
4. Odd man out and series
5. Clocks and Calendars etc.

Unit – II: Logical ability

1. Blood relations
2. Seating Arrangements
3. Figure Analysis
4. Puzzles etc.

Unit – III: Number systems

1. LCM and HCF
2. Ratio and proportion
3. Simple interest and compound interest
4. Profit and Loss etc.

Unit – IV: Arithmetic ability

1. Time and work
2. Partnerships
3. Time speed and distance
4. Problems on Trains etc.

Unit – V: Mathematical ability

1. Sequence and series
2. Permutations and combination
3. General probability etc.

Reference Books:

1. A modern approach to verbal and non-verbal reasoning by Dr. R.S. Aggarwal.
2. Quantitative Aptitude by Abhijit Guha Tata McGraw-Hill Company Limited.
3. Quantitative Aptitude by P.A. Anand (Wiley)
4. Quantitative Aptitude by Dr. R.S. Agarwal.
5. Objective Arithmetic by S.L. Gulati.

PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech. II Year II Semester.

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. This gives basic understanding of random variables and operations that can be performed onthem.
2. To known the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

Course Outcomes: Upon completing this course, the students will be able to:

1. Perform operations on single and multiple Random variables.
2. Determine the Spectral and temporal characteristics of Random Signals.
3. Characterize LTI system
4. s driven by stationary random process by using ACFs and PSDs.
5. Understand the concepts of Noise and Information theory in Communication systems.
6. Understand the concepts of spectral characteristics of Random processes

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	3	-	2	-	-	-	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-

UNIT - I

Probability & Random Variable: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, *Random Variable*-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

UNIT - II

Operations on Single & Multiple Random Variables – Expectations: Expected Value of a RandomVariable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence.

Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT - III

Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelationFunction of Response, Cross-Correlation Functions of Input and Output.

UNIT - IV

Random Processes – Spectral Characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

UNIT - V

Noise Sources & Information Theory: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off betweenbandwidth and SNR.

TEXT BOOKS:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles, 4th Ed, TMH,2001.
2. Taub and Schilling - Principles of Communication systems, TMH, 2008

REFERENCE BOOKS:

1. Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002.
3. B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003.
4. S.P Eugene Xavier -Statistical Theory of Communication, New Age Publications, 2003

ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

B.Tech. II Year II Semester.

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives: Upon completing this course, the students will be able to

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions tocommunication engineering problems.
3. To study the propagation, reflection and transmission of planewaves inbounded and unbounded media.

Course Outcomes: Upon completing this course, the student able to

1. Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields andMagneto static Fields.
2. Characterize the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
3. Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPWCharacteristics for several practical media of interest.
4. Analyze the Design aspect of transmission line parameters and configurations.
5. Apply Maxwell's equations to solve the problems relating to the transmission uniform plane wave

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	1	-	-	-	1	-	-
CO2	3	3	2	1	-	1	-	-	-	1	-	-
CO3	3	3	2	1	-	1	-	-	-	1	-	-
CO4	3	3	2	1	-	1	-	-	-	1	-	-
CO5	3	3	2	1	-	1	-	-	-	1	-	-

UNIT – I

Electrostatics: Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Energy Density. Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

UNIT – II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT – III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Two Equations for Magnetostatic Fields, Maxwell's Two Equations for Electrostatic Fields Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

UNIT – IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in

Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization.
Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

UNIT – V

Transmission Lines: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.SC and OC Lines, $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Reflection Coefficient, VSWR Smith Chart – Configuration and Applications, Single Stub Matching.

TEXT BOOKS:

1. William H. Hayt Jr. and John A. Buck- Engineering Electromagnetics, 8th Ed., McGraw Hill,2014
2. Matthew N.O. sadiku and S.V. Kulkarni - Principles of Electromagnetics, 6th Ed., Oxford University Press, Aisan Edition, 2015.

REFERENCE BOOKS:

1. JD. Kraus -Electromagnetics with Applications ,5th Ed., TMH
2. Umesh Sinha, Satya Prakashan -Transmission Lines and Networks, (Tech. IndiaPublications), New Delhi, 2001.
3. JD Ryder -Networks, Lines and Fields, 2nd Ed., PHI, 1999

ANALOG AND DIGITAL COMMUNICATIONS

B.Tech. II Year II Semester.

L	T	P	C
3	0	0	3

Prerequisite: Probability theory and Stochastic Processes, Signal and system

Course Objectives:

1. To develop ability to analyze system requirements of Analog and digital communicationsystems.
2. To understand the generation, detection of various Analog and digital modulation techniques.
3. To acquire the vortical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

Course Outcomes: Upon completing this course, the student able to

1. Design and analyze various Analog and Digital Modulation and Demodulation techniques.
2. Model the noise present in continuous wave Modulation techniques.
3. Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques invarious applications
4. Analyze and design the base band Transmission

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	1	-	3	2	-	-	-	-	1	2	2
CO2	3	3	3	1	-	2	2	-	-	-	-	1	2	2
CO3	3	3	3	1	-	2	2	-	-	-	-	1	2	2
CO4	3	3	3	1	-	3	2	-	-	-	-	1	2	2

UNIT - I

Amplitude Modulation: Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.

UNIT - II

Angle Modulation: Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

UNIT - III

Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

UNIT - IV

Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT - V

Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.
Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

TEXT BOOKS

1. Simon Haykin -Analog and Digital Communications, John Wiley, 2005.
2. Wayne Tomasi - Electronics Communication Systems-Fundamentals through Advanced, 5th Ed., PHI, 2009.

REFERENCE BOOKS

1. Herbert Taub, Donald L Schilling, Goutam Saha, -Principles of Communication Systems, 3rd Ed., McGraw-Hill, 2008.
2. Dennis Roddy and John Coolean - Electronic Communications, 4th Ed., PEA, 2004
3. George Kennedy and Bernard Davis - Electronics & Communication System, TMH, 2004
4. K. Sam Shanmugam - Analog and Digital Communication, Willey, 2005

LINEAR AND DIGITAL IC APPLICATIONS

B.Tech. II Year II Semester.

L	T	P	C
3	0	0	3

Course Objectives: The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of Analog multipliers and PLL.
3. To introduce the concept sine waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

Course Outcomes: Upon completing this course, the students will be able to

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Attain the knowledge of functional diagrams and design applications of IC555 and IC565.
3. Acquire the knowledge and design the Data converters.
4. Choose the proper digital integrated circuits by knowing their characteristics.
5. Attain the knowledge about 74xx and CMOS 40xx series integrated circuits for sequential logic and memories.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	-	-	-	-	-
CO2	3	3	3	1	-	-	-	-	-	-	-	-
CO3	3	3	3	1	-	-	-	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-

UNIT - I

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation-Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger,Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

Op-Amp, IC-555 & IC565 Applications: Introduction to Active Filters, Characteristics of Bandpass, Bandreject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.

UNIT - III

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Combinational Logic ICs: Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT - V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS:

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003.
2. Floydand Jain- Digital Fundamentals, 8th Ed., PearsonEducation,2005.

REFERENCE BOOKS:

1. D. Roy Chowdhury – Linear Integrated Circuits, New Age International(p)Ltd,2nd Ed., 2003.
2. John. F. Wakerly – Digital Design Principles and Practices, 3rdEd., Pearson, ,2009.
3. Salivahana -Linear Integrated Circuits and Applications, TMH, 2008.
4. William D.Stanley- Operational Amplifiers with Linear Integrated Circuits, 4thEd., Pearson Education India, 2009.

ELECTRONIC CIRCUIT ANALYSIS

B.Tech. II Year II Semester.

L	T	P	C
3	0	0	3

Pre-requisite: Analog Circuits

Course Objectives: The student will be able to

1. Learn the concepts of Power Amplifiers.
2. To give understanding of tuned amplifier circuits
3. Understand various multivibrators using transistors and sweep circuits.

Course Outcomes: Upon completing this course, the student will be able to

1. Design the power amplifiers
2. Design the tuned amplifiers and analyze is frequency response
3. Design Multivibrators for various applications.
4. Analyze different sweep generator circuits.
5. Utilize the concepts of synchronization, frequency division and sampling gates

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	-	3	2	-	-	-	-	1
CO2	3	3	3	1	-	2	2	-	-	-	-	1
CO3	3	3	3	1	-	2	2	-	-	-	-	1
CO4	3	3	3	1	-	3	2	-	-	-	-	1
CO5	3	3	3	1	-	3	2	-	-	-	-	1

UNIT - I

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C and D Amplifiers.

UNIT- II

Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response, Double Tuned Amplifiers – Q-factor, frequency response, Concept of stagger tuning and synchronous tuning

UNIT - III

Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

UNIT - IV

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

UNIT - V

Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequencydivision in Sweep Circuits, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.

Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits

TEXT BOOKS:

1. Jacob Millman, Christos C Halkias - Integrated Electronics, , McGraw Hill Education.
2. J. Millman, H. Taub and Mothiki S. PrakashRao - Pulse, Digital and Switching Waveforms –2nd Ed., TMH, 2008,

REFERENCE BOOKS:

1. David A. Bell - Electronic Devices and Circuits, 5th Ed., Oxford.
2. Robert L. Boylestead, Louis Nashelsky - Electronic Devices and Circuits theory, 11th Ed., Pearson, 2009
3. Ronald J. Tocci - Fundamentals of Pulse and Digital Circuits, 3rd Ed., 2008.
4. David A. Bell - Pulse, Switching and Digital Circuits, 5th Ed., Oxford, 2015.

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ANALOG AND DIGITAL COMMUNICATIONS LABARATORY

B.Tech. II Year II Semester.

L	T	P	C
0	0	2	1

Note:

- Minimum 12 experiments should be conducted:
- All these experiments are to be simulated first either using MATLAB, COMSIM or any other simulation package and then to be realized in hardware

Course Outcomes: Upon completing this course, the student able to:

1. Design and implement various Analog modulation and demodulation Techniques and observethe time and frequency domain characteristics
2. Design and implement various Pulse modulation and demodulation Techniques and observethe time and frequency domain characteristics
3. Apply different types of Sampling with various Sampling rates and duty Cycles
4. Design and implement various Digital modulation and demodulation Techniques and observethe waveforms of these modulated Signals practically

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	3	1	2	2	-	2	3	2	-	1
CO2	1	-	3	1	2	2	-	2	3	2	-	1
CO3	1	-	3	1	2	2	-	2	3	2	-	1
CO4	1	-	3	1	2	2	-	2	3	2	-	1

List of Experiments:

1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. Frequency Division Multiplexing & De multiplexing
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. DPCM Generation and Detection
12. Frequency Shift Keying: Generation and Detection

Beyond Syllabus

1 Pre- emphasis & De-emphasis

2 Convolution encoder & Decoder

*Prove practically the Figure of Merit of DSB-SC is unity for single tone modulation

Major Equipment required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box

LINEAR AND DIGITAL IC APPLICATIONS LABORATORY

B.Tech. II Year II Semester.

L	T	P	C
0	0	2	1

Course Outcomes: Upon completing this course, the student able to

1. Design and implementation of various analog circuits using 741 ICs.
2. Design and implementation of various Multivibrators using 555 timer.
3. Design and implement various circuits using digital ICs.
4. Design and implement ADC, DAC and voltage regulators.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	0	3	3	3	-	-	-	3	3	-	1
CO2	1	0	3	3	3	-	-	-	3	3	-	1
CO3	1	0	3	3	3	-	-	-	3	3	-	1
CO4	1	0	3	3	3	-	-	-	3	3	-	1

Note:

- Minimum 12 experiments should be conducted.
- Verify the functionality of the IC in the given application.

Design and Implementation of:

1. Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3. Design a Integrator and Differentiator Circuits using IC741 and derive the required condition practically.
4. Design a Active LPF, HPF cutoff frequency of 2 KHZ and find the roll off of it.
5. Design a Circuit using IC741 to generate sine/square/triangular wave with period of 1KHZ anddraw the output waveform.
6. Construct Mono-stableMultivibratorusingIC555 and draw its output waveform.
7. Construct Astable Multivibrator using IC555 and draw its output waveform and also find its dutycycle.
8. Design a Schmitt Trigger Circuit and find its LTP and UTP.
9. Design VoltageRegulatorusingIC723, IC 7805/7809/7912 and find its load regulation factor.
10. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
11. Design Parallel comparator type/ counter type/ successive approximation ADC and find itsefficiency.
12. Design an even priority encoder using IC 74xx and verify its truth table.
13. Design a 8x1 multiplexer using digital ICs.
14. Design a 4-bit Adder/Subtractor using digital ICs and Add/Sub the following bits.
    (i)1010 (ii)0101 (iii)1011
    0100 0010 1001.
15. Design a Up/down counter usingIC74163 and draw read/write waveforms.
16. Design a Universal shift register using IC 74194/195 and verify its shifting operation.
17. Design a 16x4 RAM using 74189 and draw its read/write operation.
18. Design a 8x3 encoder/3x8 decoder and verify its truth table.

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply; Multimeter
2. 20 MHz Oscilloscope with Dual Channel; Bread board and components/Trainer Kit;

ELECTRONIC CIRCUIT ANALYSIS LABARATORY

B.Tech. II Year II Semester.

L	T	P	C
0	0	2	1

Note:

- Experiments marked with * has to be designed, simulated and verified in hardware.
- Minimum of 9 experiments to be done in hardware.

Course Outcomes: Upon completing this course, the students will be able to

1. Design power amplifiers and find its efficiency
2. Design tuned amplifiers and find its Q-factor
3. Design various multivibrators and sweep circuits. Understand the necessity of linearity
4. Design sampling gates.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	0	3	3	3	-	-	-	3	3	-	1
CO2	1	0	3	3	3	-	-	-	3	3	-	1
CO3	1	0	3	3	3	-	-	-	3	3	-	1
CO4	1	0	3	3	3	-	-	-	3	3	-	1

Hardware Testing in Laboratory:

1. Design transformer coupled class A power amplifier and draw the input and output waveformsfind its efficiency.*
2. Design class B power amplifier and draw the input and output waveforms, and showthat the crossover distortion occurs in class B amplifier.
3. Prove that the complementary symmetry pushpull amplifier eliminate cross over distortion.
4. Design class C power amplifier and draw the input and output waveforms.*
5. Design a single tuned amplifier and determine the Q of its tuned circuit practically.*
6. Design a Bistable Multivibrator and analyze the effect of commutating capacitors anddraw the wave forms at base and collector of transistors.
7. Design an Astable Multivibrator and draw the wave forms at base and collector of transistors.
8. Design a Monostable Multivibrator and draw the input and output waveforms
9. Design a Bootstrap sweep circuit using BJT and draw its output time base waveform
10. Design a constant current sweep generator and draw input and output waveforms
11. Design unidirectional and bidirectional sampling gates.*
12. Prove practically Schmitt Trigger generates square wave

Beyond Syllabus

1. Street light controller
2. UJT relaxation oscillator

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-Multisim or any equivalent simulation software
4. Regulated Power Suppliers, 0-30V
5. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
6. Functions Generators-Sine and Square wave signals
7. Multimeters
8. Electronic Components

GENDER SENSITIZATION LAB

B.Tech. II Year II Semester.

L	T	P	C
0	0	2	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.

-Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping withEveryday Harassment- Further Reading: *"Chupulu"*.

Domestic Violence: Speaking Outls Home a Safe Place? -When Women Unite [Film]. RebuildingLives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender andPopular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

- ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".***

- **ESSENTIAL READING**: The Textbook, *"Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

VAAGDEVI COLLEGE OF ENGINEERING

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Bollikunta, Khila Warangal (Mandal),p

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Department of Electronics and Communication Engineering

ANALOG ELECTRONIC CIRCUITS

(EEE)

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such assmall signal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will be able to

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Designs OP-AMP based circuits with linear integrated circuits.

UNIT-I:

Diode and Bipolar Transistor Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers;Small signal equivalent circuits,

UNIT-II:

FET Circuits: FET Structure and VI Characteristics, MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequencyequivalent circuit.

UNIT-III:

Multi-Stage and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C

UNIT-IV:

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators,LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V:

Operational Amplifiers: Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave andtriangular- wave generators.

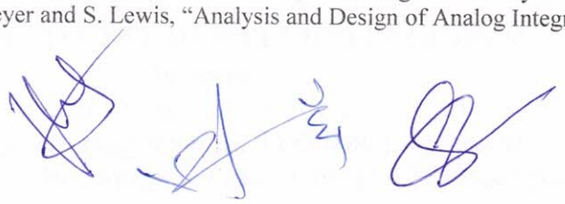
TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition2010
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

Dr. M. Sha...

REFERENCE BOOKS:

1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
2. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog IntegratedCircuits",John Wiley & Sons, 2001.



ANALOG ELECTRONIC CIRCUITS LABORATORY

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Analog Electronic Circuits

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such assmall signal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Design OP-AMP based circuits with linear integrated circuits.

List of Experiments: (Minimum of 10 Experiments to be performed)

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance of the Diode.
2. Determine the Ripple factor, %Regulation PIV and TUF of the given Rectifier with & withoutfilter.
3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from the Characteristics.
4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from the Characteristics.
5. Obtain the Drain and Transfer characteristics of CD,CS configuration of JFET. Calculategm, rd from the Characteristics Adder and Subtractor using Op Amp.
6. Inverting and Non-inverting Amplifiers using Op Amps
7. Adder and Subtractor using Op Amp
8. Integrator Circuit using IC 741.
9. Differentiator circuit using Op Amp.
10. Current Shunt Feedback amplifier
11. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency.
12. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
13. Design transformer coupled class A power amplifier and draw the input and output waveforms, find its efficiency

Beyond the syllabi

1. N-Channel MOSFET Output and Transfer Characteristics
2. Draw the VI Characteristics of Zener diode. Determine the Static and Dynamic resistance of diode
3. Linear Wave shaping

Dr. M. Sheshidhar

DIGITAL ELECTRONICS

B.Tech. II Year II Sem.

L	T	P	C
2	0	0	2

Prerequisites: Analog Electronics

Course Objectives:

- To learn fundamental concepts of digital system design and common forms of number representations and their conversions.
- To implement and design logical operations using combinational logic circuits and sequentiallogic circuits.
- To understand the semiconductor memories and programmable logic devices.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the working of logic families and logic gates.
- Design logic circuits by applying various minimization technique to combinational function
- Design and implement Combinational and Sequential logic circuits.
- Design and implementation various `sequential circuits
- Implement the given logical problems using programmable logic devices.

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	1	-	-	-	-	2
CO2	3	2	3	1	2	1	1	-	-	-	-	2
CO3	3	2	2	2	3	1	2	-	-	-	-	1
CO4	3	2	2	2	3	1	2	-	-	-	-	1
CO5	2	3	3	2	2	1	-	-	-	-	-	-

UNIT-I:

Fundamentals of Digital Systems and Logic Families: Digital signals, Digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, Examples of IC gates, Number systems-binary, Signed binary, Octal hexadecimal number, Binary arithmetic, One's and Two's complements arithmetic.

UNIT-II:

Combinational Circuits-I: Standard representation for logic functions, K-map representation and simplification of logic functions using K- map, Minimization of logical functions, Don't care conditions, Multiplexer, De-Multiplexer

UNIT-III:

Combinational Circuits-II: Adders, Subtractors, Carry look ahead adder, Digital comparator, Parity checker/generator, Code converters, Priority encoders, Decoders/Drivers for display devices, Q-M method of function realization.

UNIT-IV:

Sequential Circuits: Introduction to flip-flops, SR, JK, T and D type's flip-flops, Shift registers, Conversion of flip-flops, Ring counter, Ripple (Asynchronous) counters, Synchronous counters.

UNIT-V:

Semiconductor Memories and Programmable Logic Devices: Memory organization and operation,expanding memory size, classification and characteristics of memories, sequential memory, read-only memory (ROM), ROM types, Read and write memory (RAM) types, Programmable logic array, Programmable array logic, Field Programmable Gate Array (FPGA).

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, "A Textbook of Digital Electronics", S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

DIGITAL ELECTRONICS LAB

B.Tech. II Year II Sem.

L T P C
0 0 2 1

Prerequisites: Analog Electronics & Digital Electronics

Course Objectives:

- To learn basic techniques for the design of digital circuits and number conversion systems.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand the working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Analyze different types of semiconductor memories.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To learn basic techniques for the design of digital circuits and number conversion systems	3	2	3	1	1	1	3	1	2	1	2	3
To implement simple logical operations using combinational logic circuits	3	3	3	2	2	1	3	1	2	2	2	3
To design combinational logic circuits, sequential logic circuits	2	2	1	2	2	1	3	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the working of logic families and logic gates	2	2	2	3	3	2	1	1	3	3	3	3
Design and implement Combinational and Sequential logic circuits.	2	1	3	1	2	3	3	1	3	2	2	3
Analyse different types of semiconductor memories	1	1	2	1	1	3	3	1	3	3	3	3

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND/NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8. Design and realization Asynchronous and Synchronous counters using flip-flops
9. Design and realization 8x1 using 2x1 mux
10. Design and realization 2-bit comparator

11. Verification of truth tables and excitation tables
12. Realization of logic gates using DTL, TTL, ECL, etc.,

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, "A Textbook of Digital Electronics", S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

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Warangal-506 005 (T.S), www.vaagdevi.edu.in

Department of Electronics and Communication Engineering

DIGITAL ELECTRONICS (B22EC12)

(Common for CSE AND CSE (Data Science)

B.Tech. II Year I Sem. **L T P C**
3 0 0 3

Course Objectives:

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used inthe design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes: Upon completing this course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebratheorems for Combinational function minimization
2. Design logic circuits by applying minimization techniques and also able to characterize the various logic families for their AC and DC parameter's
3. Design and analyze various combination logic circuits and understand the fundamental's of sequential circuits
4. Design and analyze sequential circuits for various cyclic functions
5. Acquire the knowledge on concepts of Memories and PLA

UNIT - I:

BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.

Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT - II:

GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function.

UNIT - III:

COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

UNIT - IV:

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers, shift Registers, Ripple counters, synchronous counters, other counters.

UNIT - V

MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

TEXT BOOKS:

1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw Hill

Dr. M. Shesu Lida

Edition.
3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson.

REFERENCE BOOKS:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic and Microcomputer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

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The following substitute subjects are allotted for the students who have been re-admitted from R-15 Regulation to R-18 Regulation.

Semester	Subjects studied in R-15 and repeated subjects in R-18	Substitute subjects for R-18	Credits Deficiency
I	Nil	Nil	---
II	Environmental science (I Year- I Semester) (0 credits)	Personality development & soft skills (0 credits)	Nil (Condition Satisfied)
	English language &communication skills lab (I Year- I Semester) (1 credit)	Engineering workshop & IT workshop (1.5 credits)	Nil (Condition Satisfied)
III	Nil	Nil	Nil (Condition Satisfied)
IV	Nil	Nil	Nil (Condition Satisfied)
V	Nil	Nil	Nil (Condition Satisfied)
VI	Antennas & wave propagation (III Year- I Semester) (3 credits)	Computer Networks (3 credits)	Nil (Condition Satisfied)
VII	Satellite communication(III Year- II Semester) (3 credits)	Information theory & coding/speech processing (3 credits)	Nil (Condition Satisfied)
VIII	Nil	Nil	Nil (Condition Satisfied)

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Semester	Subjects studied in R-15 and repeated subjects in R-20	Substitute subjects for R-20	Credits Deficiency
I	Nil	Nil	---
II	English Language and Interactive Communication Skills Lab (I Year- I Semester) (1.5 credits)	Engineering Drawing (2 credits)	Nil (Condition Satisfied)
III	Nil	Nil	Nil (Condition Satisfied)
IV	Nil	Nil	Nil (Condition Satisfied)
V	Nil	Nil	Nil (Condition Satisfied)
VI	Antennas & Wave Propagation (III Year- I Semester) (3 credits)	Digital Signal Processing (3 credits)	Nil (Condition Satisfied)
VII	Satellite Communication (III Year- II Semester) (3 credits)	Sensor Networks/Robotics and Automation (3 credits)	Nil (Condition Satisfied)
VIII	Digital Signal Processor & Architecture (IV Year- I Semester) (3 credits)	FPGA Architecture & Applications / Internet of Things (3 credits)	Nil (Condition Satisfied)

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Semester	Subjects studied in R-18 and repeated subjects in R-20	Substitute subjects for R-20	Credits Deficiency	To fulfil the credit deficiency, additional subject(s) /Lab(s) added
I	Nil	Nil	---	----
II	Engineering & IT workshop (I-Semester) (1.5 credits)	Engineering Drawing (2credits)	0.5 credit	**Computational Mathematics (2 credits) (R 15)**
III	Nil	Nil	2 credits	Basic Python Programming (3 credits) (R-20)
IV	Nil	Nil	3 credits	Bio Medical Instrumentation (3 credits) (R-18)
V	Nil	Nil	2 credits	Telecommunication Switching Systems and Networks (3 Credits) (R-18)
VI	Nil	Nil	2 credits	Data Communication Networks (3 credits) (R-18)
VII	Nil	Nil	Nil (Condition Satisfied)	----
VIII	Digital Signal processor & Architecture (VI -Semester) (3 credits)	Internet of Things (3 credits) / FPGA Architecture & Applications (3 credits)	Nil (Condition Satisfied)	------
	FPGA Architecture & Applications (VII- Semester) (3 credits)	Internet of Things (3 credits) / Digital Signal processor & Architecture (3 credits)		
	Digital Signal processor & Architecture (VI -Semester) (3 credits)	Internet of Things (3 credits) / FPGA Architecture & Applications (3 credits)		
	Digital Signal processor & Architecture (VI -Semester) (3 credits) & FPGA Architecture & Applications(VII -Semester) (3 credits)	Internet of Things (3 credits)		

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Semester	Subjects studied in R-18 and repeated subjects in R-22	Substitute subjects for R-22	Credits Deficiency	To Fulfil the credit deficiency subject(s) /Lab(s) added
I	Nil	Nil	----	---
II	Nil	Nil	2 credits	English for Skill Enhancement (2 credits) (R-22)
III	Nil	Nil	3 credits	Computer Organization (3 credits) (R-18)
IV	Numerical Methods and Complex Variables (III - Semester) (3 credits)	OOPS Through Java (3 credits)	1 credit	Digital Logic Design Lab (1 credit) (R-22)
	Electronic circuit Analysis (III -Semester) (3 credits)	Pulse and Digital Circuits (4 credits)		
	Electronic circuit Analysis Laboratory (III -Semester) (1 credit)	Pulse and Digital Circuits Lab (1 credit)		
V	Nil	Nil	1 credit	Real Time Project / Field Based Project (2 credits) (R-22)
VI	Digital Signal Processing (V -Semester) (3 credits)	IoT Architecture and Protocols (3 credits)	1 credit	Real Time Project / Field Based Project (2 credits) (R-22)
	Digital Signal Processing Laboratory (V -Semester) (1 credit)	IoT Architecture and Protocols Laboratory (1 credit)		
VII	Radar Systems (VI - Semester) (3 credits)	CMOS Analog IC design / Artificial Neural Networks (3 credits)	1 credit	Real Time Project / Field Based Project (2 credits) (R-22)
	Biomedical Instrumentation (VI - Semester) (3 credits)	Satellite Communications / Network Security and Cryptography (3 credits)		
VIII	Artificial Intelligence (VII -Semester) (3 credits)	5G and beyond communication / Machine learning (3 credits)	Nil (Condition Satisfied)	-----

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Semester	Subjects studied in R-20 and repeated subjects in R-22	Substitute subjects for R-22	Credits Deficiency	To Fulfil the credit deficiency subject(s) / Lab(s) added
I	Nil	Nil	----	---
II	Computer Aided Engineering Graphics (I-Semester) (3 credits)	Engineering Workshop (2.5 credits)	1.5 credit	Basic Python Programming (3 credits) (R-20)
III	Nil	Nil	1 credit	Project Based Learning-1 (R-20)
IV	Numerical Methods and Complex Variables (III Semester) (3 credits)	Basic Java programming (3 credits)	Nil (Condition Satisfied)	---
	Electronic Circuits Analysis (III Semester) (3credits)	Pulse and Digital Circuits (3 credits)		
	Electronic Circuits Analysis Lab (III Semester) (1credit)	Pulse and Digital Circuits Laboratory (1.5 credits)		
V	Nil	Nil	Nil (Condition Satisfied)	---
VI	Digital Signal Processing (V Semester) (3 credits)	IoT Architecture and Protocols (3 credits)	Nil (Condition Satisfied)	---
	Digital Signal Processing Lab (III Semester) (1credit)	IoT Architecture and Protocols Laboratory (1 credit)		
VII	Radar Systems (VI Semester) (3credits)	CMOS Analog IC design / Artificial Neural Networks (3credits)	1 credit	Real Time Project / Field Based Project (2 credits) (R-22)
VIII	Artificial Intelligence (VII Semester) (3credits)	5G and beyond communication /Machine learning (3credits)	Nil (Condition Satisfied)	----
	Machine learning (VI Semester) (3credits)	5G and beyond communication / Artificial Intelligence (3credits)		
	Artificial Intelligence (VI Semester) (VII Semester) & Machine learning (3credits)	5G and beyond communication (3credits)		

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