Jawaharlal Nehru Technological University Anantapur

College of Engineering Pulivendula

(Accredited by NAAC with 'A' Grade)

Pulivendula –516 390 (A.P) India

B.Tech. in Electronics and Communication Engineering

Course Structure

Under R23 Regulations

Effective from AY 2023-24

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Semester –0			
S.No	**Course Name**	**Category**	**L-T-P-C**
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-0-0
5	Proficiency Modules & Productivity Tools	ES	2-0-0-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-0-3-0
8	Human Values & Professional Ethics	MC	3-0-3-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-0-2-0
10	Concepts of Programming	ES	2-0-0-0

B.Tech I Year I Semester

Semester –1					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	23ABS05	Linear Algebra & Calculus		3-0-0	3
2	23ABS01	Engineering Physics		3-0-0	3
3	23ACS01	Introduction to Programming		3-0-0	3
4	23ABEE01	Basic Electrical & Electronics Engineering		3-0-0	3
5	23AME01	Engineering Graphics		1-0-4	3
6	23ACS03	IT Workshop		0-0-2	1
7	23ABS02	Engineering Physics Lab		0-0-2	1
8	23ABEE02	Electrical & Electronics Engineering Workshop		0-0-3	1.5
9	23ACS02	Computer Programming Lab		0-0-3	1.5
10	23ABS07	NSS/NCC/Scouts &Guides/Community service		0-0-1	0.5
				Total	**20.5**

B.Tech I Year II Semester

Semester – 2					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	23ABS08	Differential Equations &Vector Calculus		3-0-0	3
2	23ABS03	Chemistry		3-0-0	3
3	23AHS01	Communicative English		2-0-0	2
4	23ACME01	Basic Civil & Mechanical Engineering		3-0-0	3
5	23AEC01	Network Analysis		3-0-0	3
6	23ABS04	Chemistry Lab		0-0-2	1
7	23AHS02	Communicative English Lab		0-0-2	1
8	20AME02	Engineering Workshop		0-0-3	1.5
9	23AEC02	Network Analysis and Simulation Lab		0-0-3	1.5
10	23ABS06	Health and wellness, Yoga and Sports		0-0-1	0.5
				Total	**19.5**

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B.Tech II Year I Semester

Semester – 3					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	23ABS34	Probability and Complex Variables		3-0-0	3
2	23AHS31	Universal Human Values–Understanding Harmony & Ethical human conduct		2-1-0	3
3	23AEC31	Signals, Systems and Stochastic Processes		3-0-0	3
4	23AEC32	Electronic Devices and Circuits		3-0-0	3
5	23AEC33	Digital Circuits Design		3-0-0	3
6	23AEC37	Electronic Devices and Circuits Lab		0-0-3	1.5
7	23AEC38	Digital Circuits & Signal Simulation Lab		0-0-3	1.5
8	23ACS49	Python Programming (Skill oriented course – I)		0-1-2	2
9	23AMC31	Environmental Science		2-0-0	0
				Total	**20**

B.Tech II Year II Semester

Semester – 4					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	23AEC41	Linear Control Systems		3-0-0	3
2	23AEC42	EM Waves and Transmission Lines		3-0-0	3
3	23AEC43	Electronic Circuits Analysis		3-0-0	3
4	23AEC44	Analog and Digital Communications		3-0-0	3
5		**Management Course-I**		2-0-0	2
	23AHS03A	Managerial Economics and Financial Analysis			
	23AHS03B	Organizational Behavior			
	23AHS03C	Business Environment			
6	23AEC47	Electronic Circuits Analysis Lab		0-0-3	1.5
7	23AEC48	Analog and Digital Communications Lab		0-0-3	1.5
8	23AEC49	PCB Design and Prototype Development (Skill Oriented Course -II)		0-1-2	2
9	23AMC41	Design Thinking and Innovation		1-0-2	2
				Total	**21**
Mandatory Community Service Project/ Internship during Summer Vacation					

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year I Semester

23ABS05 – LINEAR ALGEBRA & CALCULUS

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

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

- **CO1:** Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- **CO2:** Utilize mean value theorems to real life problems (L3)
- **CO3:** Familiarize with functions of several variables which is useful in optimization (L3)
- **CO4:** Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- **CO5:** Students will become familiar with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates (L5)

UNIT – I: Matrices

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT – II: Linear Transformation and Orthogonal Transformation

Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT – III: Calculus

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT – IV: Partial differentiation and Applications (Multi variable calculus)

Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

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UNIT – V: Multiple Integrals (Multi variable Calculus)
Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).
Text Books:
1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
Reference Books:
1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
3. H. K Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand,2021

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year I Semester

23ABS01 – ENGINEERING PHYSICS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses.
- To identifying the importance of the optical phenomenon like interference, diffraction etc.
- To enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics.
- To introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

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

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystals and their structures.

CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO4: Summarize various types of polarization of dielectrics and classify the magneticmaterials.

CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids. Identify the type of semiconductor using Hall effect.

UNIT – I: Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT – II: Quantum Mechanics and Free electron theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy.

UNIT – III: Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

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UNIT – IV: Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss, applications of dielectric materials.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials, applications of magnetic materials.

UNIT – V: Semiconductors and Superconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation –Hall effect and its applications.

Superconductors: Introduction – Properties of superconductors – Meissner effect – Type I and type II superconductors – BCS theory – Josephson effects (AC and DC) – High Tc superconductors – Applications of superconductors.

Text Books:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010

Online Learning Resources:

- https://www.loc.gov/rr/scitech/selected-internet/physics.html
- https://archive.nptel.ac.in/courses/122/107/122107035/
- https://archive.nptel.ac.in/courses/122/104/122104016/
- https://archive.nptel.ac.in/courses/122/101/122101002/

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year I Semester

23ABEE01 – BASIC ELECTRICAL & ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

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

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

CO4: Analyze different electrical circuits, performance of machines and measuring instruments.

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I:

DC & AC Circuits DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems. AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT – II:

Machines and Measuring Instruments Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines. Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT – III:

Energy Resources, Electricity Bill & Safety Measures Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation. Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

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Text books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition

Online Learning Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

Course objectives:

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

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

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.

CO2: Explain the characteristics of diodes and transistors.

CO3: Familiarize with the number systems, codes, Boolean algebra and logic gates.

CO4: . Understand the working mechanism of different combinational, sequential circuits and their role in the digital systems.

UNIT – I:

SEMICONDUCTOR DEVICES: Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT – II:

BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION: Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

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UNIT – III:
DIGITAL ELECTRONICS: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)
Text Books:
1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson 5 Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4 th Edition, Tata Mc Graw Hill, 2009
Reference Books:
1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, IntroductoryElectronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year I Semester

23ABEE02– ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

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

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.

CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.

CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, Multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar, Dhanpat Rai & Co, 2013

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3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives: The objectives of the course are to make the students learn about

- To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

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

CO1: Identify & testing of various electronic components.

CO2: Understand the usage of electronic measuring instruments.

CO3: Plot and discuss the characteristics of various electron devices.

CO4: Explain the operation of a digital circuit.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Reference Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, IntroductoryElectronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

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3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition
Note: Minimum Six Experiments to be performed.
PART B: ELECTRONICS ENGINEERING LAB
Course Objectives: The objectives of the course are to make the students learn about
• To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.
Course Outcomes: At the end of the course, the students will be able to
CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.
List of Experiments:
1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.
Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.
Reference Books:
1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, IntroductoryElectronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.
Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year I Semester

23ABS07 - NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

(Common to all branches)

L	T	P	C
0	0	1	0.5

Course Objectives:

- The objective of introducing this course is to impart discipline, character, fraternity, teamwork,social consciousness among the students and engaging them in selfless service.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

Course Outcomes: After completion of the course the students will be able to

CO1: Understand the importance of discipline, character and service motto. (L1)

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. (L2)

CO3: Explore human relationships by analyzing social problems. (L3)

CO4: Determine to extend their help for the fellow beings and downtrodden people. (L4)

CO5: Develop leadership skills and civic responsibilities. (L5)

UNIT – 1: Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

1. Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
2. Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
3. Displaying success stories-motivational biopics- award winning movies on societalissues etc.
4. Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II: *Nature & Care*

Activities:

1. Best out of waste competition.
2. Poster and signs making competition to spread environmental awareness.
3. Recycling and environmental pollution article writing competition.
4. Organising Zero-waste day.
5. Digital Environmental awareness activity via various social media platforms.
6. Virtual demonstration of different eco-friendly approaches for sustainable living.
7. Write a summary on any book related to environmental issues.

UNIT – III: Community Service

Activities:

1. Conducting One Day Special Camp in a village contacting village-area leaders- Surveyin the village, identification of problems- helping them to solve via media- authorities-experts-etc.

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2. Conducting awareness programs on Health-related issues such as General Health,Mental health, Spiritual Health, HIV/AIDS,
3. Conducting consumer Awareness. Explaining various legal provisions etc.
4. Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
5. Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
2. Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6).
3. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
4. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering",McGraw Hill, New York 4/e 2008
5. Masters G. M., Joseph K. and Nagendran R. "Introduction to EnvironmentalEngineering and Science", Pearson Education, New Delhi. 2/e 2007
6. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

- Institutes must assign slots in the Timetable for the activities.
- **Institutes are required to provide instructor to mentor the students.**

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23ABS08 – DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

(Common to All Branches)	L	T	P	C
	3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

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

CO1: Solve the linear differential equations related to various engineering fields.

CO2: Solve the linear differential equations of higher order and finds the relevant applications.

CO3: Identify solution methods for partial differential equations that model physical processes.

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO5: Estimate the work done against a field, circulation and flux using vector calculus and also to establish the relations between them using vector integral theorems.

UNIT – I: Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits

UNIT – II: Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT – III: Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT – IV: Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT – V: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.

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2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson

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B.Tech I Year II Semester

23ABS03 – CHEMISTRY

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, polymers, modern engineering materials.
- To introduce instrumental methods and to impart the concept of structure and bonding models.

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

CO.1: Compare the materials of construction for battery and electrochemical sensors.

CO.2: Explain the preparation, properties, and applications of thermoplastics & thermosetting plastics, elastomers & conducting polymers.

CO.3: Explain the principles of spectrometry, Chromatography in separation of solid and liquid mixtures.

CO.4: Apply the principle of Band diagrams in the application of conductors and semiconductors.

CO.5: Summarize and compare the concepts and applications of Instrumental methods

UNIT – I: Structure and Bonding Models

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo and heteronuclear diatomic molecules – energy level diagrams of O2, CO, and NO. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT – II: Modern Engineering Materials

Band theory of solids, Conductors, Semiconductors and Insulators, Semiconductor devices (p-n junction diode as rectifier and transistors)

Superconductors: Introduction, Basic concept and Applications.

Super capacitors: Introduction, Basic concept, Classification and Applications.

Nanomaterials: Introduction, classification, properties and applications of Fullerenes, carbon nanotubes and Graphenes.

UNIT – III: Electrochemistry

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems. Potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Na-Air Battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells, Polymer Electrolyte Membrane Fuel cells (PEMFC).

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UNIT – IV: Polymer Chemistry
Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation, Poly dispersity Index (PDI). Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6 and carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Biodegradable polymers - Polyglycolic Acid (PGA), Polylactic Acid (PLA).
UNIT – V:
Electromagnetic spectrum, Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy: electronic transition, Instrumentation. IR spectroscopy: fundamental modes, selection rules and applications. Raman Spectroscopy : Principle , Instrumentation and selection rules . Chromatography: Basic Principle, Classification, HPLC: Principle, Instrumentation and applications.
Text Books:
1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.
3. K. Sesha Maheswaramma, Mridula Chugh, "Engineering Chemistry", Pearson Publications Pvt., Ltd., 2019 (ISBN 978-93-895-8839-2).
Reference Books:
1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Text Book of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23AHS01 - COMMUNICATIVE ENGLISH

(Common to all Branches)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- The main objective of introducing this course, *Communicative English,* is to facilitate effectivelistening, Reading, Speaking and Writing skills among the students.
- It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.
- This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

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

1. **CO1**: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.. (L1)
2. **CO2:** Apply grammatical structures to formulate sentences and correct word forms. (L2)
3. **CO3:** Analyze discourse markers to speak clearly on a specific topic in informal discussions. (L3)
4. **CO4:** Evaluate reading / listening texts and to write summaries based on globalcomprehension of these texts. (L4)
5. **CO5:** Create a coherent paragraph, essay, and resume. (L5)

UNIT – 1

Lesson: HUMAN VALUES: Gift of Magi **(Short Story)**

Listening: Identifying the topic, the context and specific pieces of information by listeningto short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home,family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces ofinformation.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT – II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas afterlistening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structuretalks.

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Reading: Identifying sequence of ideas; recognizing verbal techniques that help to linkthe ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.**Vocabulary:** Homonyms, Homophones, Homographs.

UNIT – III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what isdiscussed.

Reading: Readinga text in detail by making basic inferences -recognizing and interpretingspecific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing.

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations.

Vocabulary: Compound words, Collocations.

UNIT – IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes.

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice.

Vocabulary: Words often confused, Jargons.

UNIT – V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series ofrelevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar andusage (articles, prepositions, tenses, subject verb agreement).

Vocabulary: Technical Jargons.

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Text Books:

- Pathfinder: Communicative English for Undergraduate Students, 1st Edition, OrientBlack Swan, 2023 (Units 1,2 & 3).
- Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge,2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge UniversityPress, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building aSuperior Vocabulary. Anchor, 2014.

Online Learning Resources:

GRAMMAR

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23AEC01- NETWORK ANALYSIS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits.
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

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

CO1: Understand basic electrical circuits with nodal and mesh analysis.

CO2: Analyse the circuit using network simplification theorems.

CO3: Find Transient response and Steady state response of a network.

CO4: Analyse electrical networks in the Laplace domain.

CO5: Compute the parameters of a two-port network.

UNIT – I:

Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also. Principal of Duality with examples.

Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens - problem solving using dependent sources also.

UNIT – II:

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots.

Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform.

UNIT – III:

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-LC circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving using Laplace transforms also.

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UNIT – IV:
Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies. Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.
UNIT – V:
Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also. Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice network and its parameters. Impedance matching networks.
Text Books:
1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9 th Edition 2020.
3. Network lines and Fields by John. D. Ryder 2 nd Edition, PHI
Reference Books:
1. D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7 th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23ABS04 – CHEMISTRY LAB

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

Verify the fundamental concepts with experiments

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

CO1: Determine the cell constant and conductance of solutions

CO2: Prepare advanced polymer Bakelite materials.

CO3: Verification of Lambert-Beer's law.

CO4: Analyze the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method.
2. Conductometric titration of strong acid vs. strong base.
3. Conductometric titration of weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emf.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Estimation of Ferrous Iron by Dichrometry.
8. Verification of Lambert-Beer's law.
9. Simultaneous estimation of Mn and Cr ions by spectrophotometry in water samples.
10. Identification of functional groups in organic compounds by IR Spectroscopy.
11. Preparation of nanomaterials by precipitation method.
12. Preparation of a polymer (Bakelite).

Reference Books:

1. "Vogel's Quantitative Chemical Analysis 6th Edition, Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23AHS02 - COMMUNICATIVE ENGLISH LAB

(Common to all Branches)

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

- The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning.
- Thestudents will get trained in basic communication skills and also make them ready to face job interviews.

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

- CO1: Understand the different aspects of the English language proficiency with emphasison LSRW skills. (L1)
- CO2: Apply communication skills through various language learning activities. (L2)
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable divisionfor better listening and speaking comprehension. (L3)
- CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. (L4)
- CO5: Create effective Course Objectives: (L5)

UNIT – 1 **09 Hrs**

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Text Books:

- Pathfinder: Communicative English for Undergraduate Students, 1st Edition, OrientBlack Swan, 2023 (Units 1,2 & 3).
- Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed),Kindle, 2013.

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3. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India,2016.

4. Hewing's, Martin. Cambridge *Academic English* (B2). CUP, 2012.

Online Learning Resources:

Suggested Software

- Walden Infotech
- Young India Films

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

7. https://www.youtube.com/user/letstalkaccent/videos
8. https://www.youtube.com/c/EngLanguageClub/featured
9. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc

https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23AEC02 – NETWORK ANALYSIS AND SIMULATION LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- To gain hands on experience in verifying Kirchoff's laws and network theorems.
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters

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

CO1: Verify Kirchoff's laws and network theorems.

CO2: Measure time constants of RL & RC circuits.

CO3: Analyze behavior of RLC circuit for different cases.

CO4: Design resonant circuit for given specifications.

CO5: Characterize and model the network in terms of all network parameters.

The following experiments need to be performed using both Hardware and simulation Software.

The experiments need to be simulated using software and the same need to be verified using the hardware.

1. Study of components of a circuit and Verification of KCL and KVL.
2. Verification of mesh and nodal analysis for AC circuits
3. Verification of Superposition, Thevenin's & Norton theorems for AC circuits
4. Verification of maximum power transfer theorem for AC circuits
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Study of DC transients in RL, RC and RLC circuits
7. To study frequency response of various 1 st order RL & RC networks
8. To study the transient and steady state response of a 2 nd order circuit by varying its various parameters and studying their effects on responses.
9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters
11. Determination of hybrid (H) and transmission (ABCD) parameters
12. To measure two port parameters of a twin-T network and study its frequency response.

Hardware Requirements:

Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components

Software requirements:

Multisim/ Pspice/Equivalent simulation software tool, Computer Systems with required specifications

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References:
1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9 th Edition 2020

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech I Year II Semester

23ABS06 - HEALTH AND WELLNESS, YOGA AND SPORTS

(Common to all branches)

L	T	P	C
0	0	1	0.5

Course Objectives:

1. The main objective of introducing this course is to make the students maintain their mental andphysical wellness by balancing emotions in their life.
2. It mainly enhances the essential traits required for the development of the personality.

Course Outcomes: After completion of the course the students will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.(L1)

CO2: Demonstrate an understanding of health-related fitness components. (L2)

CO3: Compare and contrast various activities that help enhance their health. (L3)

CO4: Assess current personal fitness levels. (L4)

CO5: Develop Positive Personality. (L5)

UNIT – 1:

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community.
ii) Preparation of health profile.
iii) Preparation of chart for balance diet for all age groups.

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar.

UNIT – III

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning,2022.
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice.

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3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993.
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to SurvivingAnywhere Third Edition, William Morrow Paperbacks, 2014.
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, Inc.2014.

General Guidelines:

1) Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2) Institutes must provide field/facility and offer the minimum of five choices of as manyas Games/Sports.
3) Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23ABS34 – PROBABILITY & COMPLEX VARIABLES

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- The ideas of probability and random variables, operations on single & multiple random variables and various discrete and continuous probability distributions and their properties.
- Differentiation and integration of complex valued functions.

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

- **CO1:** Understand the concepts of Probability, Random Variables and their characteristics (L2,L3)
- **CO2:** Learn how to deal with multiple random variables, conditional probability, joint distribution and statistical independence. (L3,L5)
- **CO3:** Formulate and solve engineering problems involving random variables. (L3)
- **CO4:** Analyze limit, continuity and differentiation of functions of complex variables and Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions. (L2, L3)
- **CO5:** Understand Cauchy theorem,Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem (L3, L5)

UNIT – I: Probability & Random Variable

Probability 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, Bayes' Theorem, Independent Events.

Random variables: Definition of a random variable - conditions for a function to be a random variable- discrete and continuous random variables - Mixed Random Variable. Distribution and Density functions and their properties. Gaussian random variable - Other distributions and density functions (Binomial, Poisson, Uniform, Exponential and Rayleigh).(Refer Text Book-1)

UNIT – II: Operations on Random variable

One Random Variable - Expectation: Expected value of a Random variable - Expected value of a function of a Random variable. Moments: Moments about the origin, Central moments, Variance and Skew. Functions that Give Moments: characteristic function - Moment generating functions.

Multiple Random Variables: Vector Random Variables, Joint Distribution and its properties: Joint distribution function - properties of joint distribution - Marginal Distribution Functions. -Joint density and its properties: joint density function-properties of Joint density-Marginal density functions. Conditional distribution and density-point conditioning. Statistical Independence.(Refer Text Book-1)

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UNIT – III: Operations on Multiple Random variables
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 of Gaussian random variables. (Refer Text Book-1)
UNIT – IV: Complex Variables - Differentiation
Introduction to functions of complex variables and elementary functions (exponential, trigonometric, hyperbolic and logarithmic functions)- Concept of Limit & continuity- Differentiation, analytic functions, Cauchy-Riemann equations (Cartesian & Polar), harmonic functions, finding harmonic conjugate - construction of analytic function by Milne Thomson method. (Refer Text Book-2&3)
UNIT – V: Complex Variable – Integration
Line integral-Contour integration, Cauchy's integral theorem (Simple Case), Cauchy Integral formula & generalized Cauchy's integral formula. Power series expansions: Taylor's and Laurent's series, zeros and singularities of analytic functions - Residues and evaluation of residues, Cauchy Residue theorem (without proof) and related problems (Refer Text Book-2&3).
Text Books:
1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH, 2002.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition.
Reference Books:
1. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI, 2002
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India
3. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education, 2002.
Online Learning Resources:
• https://onlinecourses.nptel.ac.in/noc20_ma50/preview
• https://onlinecourses.nptel.ac.in/noc21_ma66/preview#:~:text=This%20course%20provides%2 0random%20variable,and%20simple%20Markovian%20queueing%20models.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23AHS31 - UNIVERSAL HUMAN VALUES

(Common to all branches)

L	T	P	C
2	1	0	3

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes: At the end of this Course the student will be able to

CO1: Define the terms like Natural Acceptance, Happiness and Prosperity L1

CO2: Identify one's self, and one's surroundings (family, society nature) L2

CO3: Apply what they have learnt to their own self in different day-to-day settings in real life L3

CO4: Relate human values with human relationship and human society. L4

CO5: Justify the need for universal human values and harmonious existence L5

UNIT I: Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT – II: Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

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Lecture 9: The body as an Instrument of the self Lecture 10: Understanding Harmony in the self Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self Lecture 11: Harmony of the self with the body Lecture 12: Programme to ensure self-regulation and Health Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body
UNIT – III : Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction Lecture 14: 'Trust' – the Foundational Value in Relationship. Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust. Lecture 15: 'Respect' – as the Right Evaluation. Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect. Lecture 16: Other Feelings, Justice in Human-to-Human Relationship. Lecture 17: Understanding Harmony in the Society. Lecture 18: Vision for the Universal Human Order. Tutorial 9: Practice Session PS9 Exploring Systems to fulfill Human Goal.
UNIT – IV : Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature. Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature. Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature. Lecture 21: Realizing Existence as Co-existence at All Levels. Lecture 22: The Holistic Perception of Harmony in Existence. Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.
UNIT – V : Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values. Lecture 24: Definitiveness of (Ethical) Human Conduct. Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct. Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order. Lecture 26: Competence in Professional Ethics. Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education. Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies. Lecture 28: Strategies for Transition towards Value-based Life and Profession. Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order.
Practice Sessions

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Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself.

PS2 Exploring Human Consciousness.

PS3 Exploring Natural Acceptance.

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body.

PS5 Exploring Sources of Imagination in the self.

PS6 Exploring Harmony of self with the body.

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust.

PS8 Exploring the Feeling of Respect.

PS9 Exploring Systems to fulfill Human Goal.

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature.

PS11 Exploring Co-existence in Existence.

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct.

PS13 Exploring Humanistic Models in Education.

PS14 Exploring Steps of Transition towards Universal Human Order.

Text Books:

- R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
- R R Gaur, R Asthana, G P Bagaria,*Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books

- *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
- *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- *The Story of Stuff* (Book).
- *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
- *Small is Beautiful* - E. F Schumacher.
- *Slow is Beautiful* - Cecile Andrews
- *Economy of Permanence* - J C Kumarappa
- *Bharat Mein Angreji Raj* – PanditSunderlal
- *Rediscovering India* - by Dharampal
- *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
- *India Wins Freedom* - Maulana Abdul Kalam Azad
- *Vivekananda* - Romain Rolland (English)
- *Gandhi* - Romain Rolland (English)

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23A04301– SIGNALS, SYSTEMS AND STOCHASTIC PROCESSES

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To teach concepts of signals and systems and its analysis using different transform techniques.
- To provide basic understanding of random processes which is essential for the random signal and systems encountered in communications and signal Processing areas.

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

CO1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems, Also, understand the concepts of various transform techniques and Random Processes (L2)

CO2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L3)

CO3: Formulate and solve engineering problems involving random processes. (L3)

CO4: Analyze the frequency spectra of various continuous-time signals using different transform methods. (L4)

CO5: Classify the systems based on their properties and determine the response of them. (L4)

UNIT – I:

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error, Fourier series: Trigonometric & Exponential forms of Fourier series, Properties, Concept of discrete spectrum, Illustrative Problems.

UNIT – II:

Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing. Illustrative Problems.

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the s-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions, Illustrative Problems.

UNIT – III:

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. 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, Energy and Power spectral densities, Illustrative Problems.

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UNIT – IV:
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, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.
UNIT – V:
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.
Text Books:
1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH, 2002
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009
Reference Books:
1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI, 2002.
3. Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.
4. Matthew Sadiku and Warsame H. Ali, "Signals and Systems A primer with MATLAB", CRC Press, 2016.
5. Hwei Hsu, "Schaum's Outline of Signals and Systems", 4thEdition, TMH, 2019.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23AEC32– ELECTRONIC DEVICES AND CIRCUITS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Students will be able understand the basic principles of all semiconductor devices.
- Able to analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers, compare the performance of BJTs and MOSFETs
- Able to design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

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

CO1: Understand principle of operation, characteristics and applications of semiconductor diodes, special diodes, BJTs, JFET and MOSFETs. (L2)

CO2: Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs. (L3)

CO3: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs. (L4)

CO4: Design of diode circuits and amplifiers using BJTs, and MOSFETs. (L4)

CO5: Compare the performance of various semiconductor devices. (L4)

UNIT – I:

PN junction diode: Review, diode current equation, Diode resistance, Transition and Diffusion Capacitance, effect of temperature on PN junction diode, Quantitative analysis of Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics, Clipping and Clamping circuits, Illustrative problems. Special Diodes: Construction, operation and VI characteristics of Tunnel Diode, Varactor Diode, LED, LCD, Photo Diode, SCR and UJT.

UNIT – II:

Review of Bipolar Junction Transistors, Characteristics, Transistor as an Amplifier and as a Switch, BJT Configurations, Limits of Operation, BJT Specifications.

Biasing and Stabilization: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self-Bias, Bias Stability, Thermal Runaway, Thermal Stability, Illustrative problems.

UNIT – III:

BJT Small Signal Operation and Models- the transconductance, input resistance at the base, input resistance at the emitter, Voltage gain, separating the Signal and the DC Quantities, The Hybrid π Model, the T Model. Single Stage BJT Amplifiers - Common-Emitter (CE) amplifier without and with emitter resistance, Common-Base (CB) amplifier, CommonCollector (CC) amplifier or Emitter Follower, Problem solving.

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UNIT – IV:
Junction Field Effect Transistor (FET): Construction, Principle of Operation, V–I Characteristics, Comparison of BJT and FET, FET as Voltage Variable Resistor. FET biasing. **MOS Field Effect Transistors:** Introduction, Device Structure and Physical Operation, CMOS, V–I Characteristics , MOSFET Circuits at DC, MOSFET as an Amplifier and as a Switch. Biasing in MOS Amplifier circuits - biasing by fixing VGS with and without source resistance, biasing using drain to gate feedback resistor, biasing using constant current source, body effect, Problem solving.
UNIT – V:
MOSFET Small Signal Operation Models– the dc bias, separating the DC analysis and the signal analysis, Small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Single stage MOS Amplifiers – common source (CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, Problem Solving.
Text Books:
1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits – Theory and Applications", 6 th Edition, Oxford Press, 2013.
2. J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.
Reference Books:
1. Donald A Neamen, "Electronic Circuits – analysis and design", 3rd Edition, McGraw Hill (India), 2019.
2. Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.
4. Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series, 3 rd edition, McGraw-Hill (India), 2010.
5. Solid State Electronic Devices - Solid State Electronic Devices by Ben G. Streetman and Sanjay Kumar Banerjee 7 Edition.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23AEC33 – DIGITAL CIRCUITS DESIGN

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Understand the properties of Boolean algebra, logic operations, and minimization of Boolean functions.
- Analyze combinational and analyze sequential logic circuits.
- Understand the concepts of FSM and compare various Programmable logic devices.
- Model combinational and sequential circuits using HDLs.

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

CO1: Understand the properties of Boolean algebra, logic operations, concepts of FSM (L2)

CO2: Apply techniques for minimization of Boolean functions (L3)

CO3: Analyze combinational and Sequential logic circuits. (L4)

CO4: Compare various Programmable logic devices. (L4)

CO5: Design and Model combinational and sequential circuits using HDLs. (L5, L6)

UNIT – I:

Boolean algebra, logic operations, and minimization of Boolean functions Review of Number Systems and Codes, Representation of unsigned and signed integers, Floating Point representation of real numbers, Laws of Boolean Algebra, Theorems of Boolean Algebra, Realization of functions using logic gates, Canonical forms of Boolean Functions, Minimization of Functions using Karnaugh Maps.

UNIT – II:

Combinational Logic Circuits Combinational circuits, Design with basic logic gates, design procedure, adders, subtractors, 4-bit binary adder/ subtractor circuit, BCD adder, carry look- a-head adder, binary multiplier, magnitude comparator, data selectors, priority encoders, decoders, multiplexers, demultiplexers.

UNIT – III:

Hardware Description Language Introduction to Verilog - structural specification of logic circuits, behavioral specification of logic circuits, hierarchical Verilog Code, Verilog for combinational circuits - conditional operator, if-else statement, case statement, for loop using sequential circuits with CAD tools.

UNIT – IV:

Sequential Logic Circuits Basic architectural distinction between combinational and sequential circuits, Design procedure, latches, flip-flops, truth tables and excitation tables, timing and triggering consideration, conversion of flip- flops, design of counters, ripple counters, synchronous counters, ring counter, Johnson counter, registers, shift registers, universal shift register. Verilog constructs for sequential circuits, flip-flop with clear capability, using Verilog constructs for registers and counters.

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UNIT – V:
Finite State Machines and Programmable Logic Devices Types of FSM, capabilities and limitations of FSM, state assignment, realization of FSM using flip-flops, Mealy to Moore conversion and vice-versa, reduction of state tables partition technique, Design of sequence detector. Types of PLD's: PROM, PAL, PLA, basic structure of CPLD and FPGA, advantages of FPGAs.
Text Books:
1. M. Morris Mano, "Digital Design", 3rd Edition, PHI. (Unit I to IV)
2. Stephen Brown and ZvonkoVranesic, "Fundamentals of Digital Logic with Verilog Design", 3rd Edition, McGraw-Hill (Unit V)
Reference Books:
1. Charles H. Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishers.
2. ZviKohavi and NirajK.Jha, "Switching and Finite Automata Theory, 3rd Edition, Cambridge University Press, 2010.
3. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", 2 ndEdition, Prentice Hall PTR.
4. D.P. Leach, A.P. Malvino, "Digital Principles and Applications", TMH, 7th Edition.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23AEC37– ELECTRONIC DEVICES AND CIRCUITS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- Verify the theoretical concepts practically from all the experiments.
- Analyse the characteristics of Diodes, BJT, MOSFET, UJT.
- Design the amplifier circuits from the given specifications.
- Model the electronic circuits using tools such as PSPICE/Multisim.

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

CO1: Understand the characteristics and applications of basic electronic devices. (L2)

CO2: Plot the characteristics of electronic devices. (L3)

CO3: Analyze various biasing circuits and electronic circuits as amplifiers (L4).

CO4: Design MOSFET / BJT based amplifiers for the given specifications. (L5)

CO5: Simulate all circuits in PSPICE /Multisim. (L5).

LIST OF EXPERIMENTS: (Implement / execute any 12 experiments).

1. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
2. Study and draw the Volt Ampere characteristics of UJT and determine η, IP, Iv, VP, &Vv from the experiment.
3. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required parameters from the graphs.
4. Study and draw the input and output characteristics of BJT in Common Base configuration experimentally and determine required parameters from the graphs.
5. Verification of the input and output characteristics of BJT in Common Collector configuration experimentally and find required parameters from the graphs.
6. Study and draw the V- I characteristics of JFET experimentally.
7. Study and draw the output and transfer characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find Threshold voltage (VT), gm, & K from the graphs.
8. Study and draw the output and transfer characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find IDSS, gm, & VP from the graphs.
9. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
10. Design and analysis of self-bias circuit using MOSFET.
11. Design a suitable circuit for switch using BJT.
12. Design a suitable circuit for switch using MOSFET.
13. Design a small signal amplifier using MOSFET (common source) for the given specifications. Draw the frequency response and find the bandwidth.
14. Design a small signal amplifier using BJT(common emitter) for the given specifications. Draw the frequency response and find the bandwidth.

Tools / Equipment Required: Software Toollike Multisim/ Pspice or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23AEC38– DIGITAL CIRCUITS & SIGNAL SIMULATION LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- Verify the truth tables of various logic circuits.
- Design sequential/combinational circuit using Hardware Description Language and verify their functionality.
- Simulate various Signals and Systems through MATLAB
- Analyze the output of a system when it is excited by different types of deterministic and random signals.

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

CO1: Verify the truth tables of various logic circuits. (L2)

CO2: Understand how to simulate different types of signals and system response. (L2)

CO3: Design sequential and combinational logic circuits and verify their functionality. (L3, L4)

CO4: Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals. (L4)

CO5: Generate different random signals for the given specifications. (L5)

List of Experiments: (Implement/Simulate any 6 experiments from Part A and 6 experiments from Part B)

PART-A

1. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
2. Verification of functional table of 3 to 8-line Decoder /De-multiplexer
3. Four variable logic function verification using 8 to1 multiplexer.
4. Design full adder circuit and verify its functional table.
5. a) Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output.
   b) Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output
6. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
7. a) Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T Flip-Flops and Test It with a low frequency clock and sketch the output waveforms.
   b) Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
8. (a) Draw the circuit diagram of a single bit comparator and test the output
   (b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.

Note: Design and verify combinational and sequential circuits using Hardware Description Language

References:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI

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PART-B
List of Experiments:
1. a) Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function. b) Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
2. a) Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal. b) Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
3. a) Write a program to convolve two discrete time sequences. Plot all the sequences. b) Write a program to find autocorrelation and cross correlation of given sequences.
4. a) Write a program to verify Linearity and Time Invariance properties of a given Continuous System. b) Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
5. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
6. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
7. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
8. To plot pole-zero diagram in S-plane of given signal/sequence and verify its stability.
Note: All the experiments are to be simulated using MATLAB or equivalent software.
References: Stephen J. Chapman, "MATLAB Programming for Engineers", Cengage, November 2012.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year I Semester

23AMC31-ENVIRONMENTAL SCIENCE

L	T	P	C
2	0	0	0

Course Objectives: The objectives of the course are to make the students learn about

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life.
- Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21 st century.
- To save earth from the inventions by the engineer.
- Influence their society in proper utilization of goods and services.

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

CO1: Solve the environmental problems based fundamental concepts of Environmental Science.

CO2: Describe the structure and function of significant environmental systems

CO3: Differentiate Natural and Polluted environment and asses its impact different on the environmental components.

CO4: Apply the Pyramid of number, mass and Energy, Demonstrate about Renewable energy resources.

CO5: Differentiate between Forest and desert Ecosystems, critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity

UNIT – I: Multidisciplinary Nature of Environmental Studies

Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Introduction to Natural resources and associated problems; Energy resources: Renewable and non-renewable resources : Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

UNIT – II: Ecosystems

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation– Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity; In-situ and Ex-situ conservation of biodiversity.

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UNIT – III: Environmental Pollution
Environmental Pollution: Definition, Cause, effects and control measures of: Air Pollution Water pollution- Soil pollution-Marine pollution-Noise pollution-Thermal pollution-Nuclear hazards; Role of an individual in prevention of pollution. Pollution case studies. **Solid Waste Management** Causes, effects and control measures of urban and industrial wastes (Reduce, Reuse, Recycle, and Recover); **Disaster management**: floods, earthquake, cyclone and landslides.
UNIT – IV: Social Issues and the Environment
From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns; Environmental ethics: Issues and possible solutions – Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. Environment Protection Act: Air (Prevention and Control of Pollution)Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act– Issues involved in enforcement of environmental legislation – Public awareness.
UNIT – V: Human Population and the Environment
Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies. **Field Work:** Visit to a local area to document environmental assets such as River/forest grassland/hill/mountain - Visit to a local polluted site like -Urban/Rural/Industrial/Agricultural ; Study of common plants, insects, and birds – river, hill slopes.
Text Books:
1. Erach Barouche ,(2013). Textbook of Environmental Studies for Undergraduate Courses for University Grants Commission (2 nd edition). Universities Press
2. Palaniswamy, (2014). "Environmental Studies"(2 nd edition) Pearson education.
3. S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar,(2008) "Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus", (2 nd edtion) Scitech Publications (India), Pvt. Ltd.
5. Anubha kaushik ,C.P Kaushik (2016) " Text book of Environmental Science "(5 th edition) 2016 . New Age International Publishers.
Reference Books:
1. Deeksha DaveandE.SaiBabaReddy," Text book of Environmental Science ", Cengage Publications
2. M.AnjiReddy,"Textbook of Environmental Science sand Technology",B S Publication.
3. P.Sharma,Comprehensive Environmental studies, Laxmipublications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciencesand Engineering", Prenticehall of India Private limited
5. G.R.Chatwal," A Text Book of Environmental Studies "Himalaya Publishing House.
6. GilbertM.MastersandWendellP.Ela,"IntroductiontoEnvironmentalEngineeringand Science, Prentice hall of India Private limited.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC41 – LINEAR CONTROL SYSTEMS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the basic principles and applications of control systems.
- Learn the time response and steady state response of the systems.
- Know the time domain analysis and solutions to time invariant systems.
- Understand different aspects of stability analysis of systems in frequency domain.
- Understand the concept of state space, controllability and observability.

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

CO1: Summarize the basic principles and applications of control systems. (L2)

CO2: Understand the time response and steady state response of the systems. (L2)

CO3: Understand the concept of state space, controllability and observability. (L2)

CO4: Apply time domain analysis to find solutions to time invariant systems. (L3)

CO5: Analyze different aspects of stability analysis of systems in frequency domain. (L4)

UNIT – I:

Control Systems Concepts: Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Controller components, DC Servomotor and AC Servomotortheir transfer functions, Synchros.

UNIT – II:

Time Response Analysis: Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Study of effects and Design of P, PI, PD and PID Controllers on second order system.

UNIT – III:

Stability Analysis in Time Domain: The concept of stability – Routh's stability criterion – Stability and conditional stability - limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT – IV:

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram - Stability Analysis from Bode Plots. Polar Plots- Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Compensation techniques – Study of Effects and Design of Lag, Lead, Lag-Lead Compensator design in frequency Domain on a second order system.

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UNIT – V:
State Space Analysis of Continuous Systems: Concepts of state, state variables and state model - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, solving the Time invariant state Equations- State Transition Matrix and its Properties. System response through State Space models. The concepts of controllability and observability.
Text Books:
1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5 thedition, 2010.
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5th edition, 2007.
Reference Books:
1. Control Systems Principles & Design by M.Gopal, 4 th Edition, McGraw Hill Education,2012.
2. Automatic Control Systems by B. C. Kuo and Farid Golnaraghi, John wiley and sons, 8th edition,2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, 2 nd Edition, Schaum's outlines, McGraw Hill Education,2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami- Naeini, 6 th Edition, Pearson,2010.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC42– EM WAVES AND TRANSMISSION LINES

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand and analyze different laws and theorems of electrostatic fields .
- To study and analyze different laws and theorems of magnetostatic fields.
- Analyzing Maxwell's equations in different forms.
- To learn the concepts of wave theory and its propagation through various mediums.
- To get exposure to the properties of transmission lines.

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

CO1: Learn the concepts of wave theory and its propagation through various mediums. (L2)

CO2: Understand the properties of transmission lines and their applications. (L2)

CO3: Apply the laws & theorems of electrostatic fields to solve the related problems (L3)

CO4: Gain proficiency in the analysis and application of magnetostatic laws and theorems (L4).

CO5: Analyze Maxwell's equations in different forms. (L4)

UNIT – I:

Review of Co-ordinate Systems, Electrostatics: Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

UNIT – II:

Magnetostatics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems

UNIT – III:

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems. 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, Illustrative Problems.

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UNIT – IV:
Transmission Lines - I : Types, Parameters, T & π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.
UNIT – V:
Transmission Lines – II: Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.
Text Books:
1. Elements of Electromagnetics, Matthew N.O. Sadiku, 4 th Edition, Oxford University Press, 2008.
2. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, 2 nd Edition, PHI, 2000.
Reference Books:
1. Electromagnetic Field Theory and Transmission Lines, G. S. N. Raju, 2 nd Edition, Pearson Education, 2013.
2. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck, 7 th Edition, Tata McGraw Hill, 2006.
3. Electromagnetics, John D. Krauss, 3 rd Edition, McGraw Hill, 1988. 4. Networks, Lines, and Fields, John D. Ryder,2nd Edition, PHI publications, 2012.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC43– ELECTRONIC CIRCUITS ANALYSIS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Understand the characteristics of Differential amplifiers, feedback and power amplifier.
- Analyze the response of tuned amplifiers Analyze the response of tuned amplifiers
- Categorize different oscillator circuits based on the application c Design the electronic circuits for the given specifications and for a given application.

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

CO1: Understand the characteristics of differential amplifiers, feedback and power amplifiers. (L2)

CO2: Examine the frequency response of multistage and differential amplifier circuits using BJT & MOSFETs at low and high frequencies. (L3)

CO3: Investigate different feedback and power amplifier circuits based on the application. (L4)

CO4: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits. (L4)

CO5: Evaluate the performance of different tuned amplifiers (L5)

UNIT – I:

Multistage & Differential Amplifiers: Introduction, Classification of Amplifiers, Distortion in amplifiers, Coupling Schemes, RC Coupled Amplifier using BJT, Cascaded RC Coupled BJT Amplifiers, Cascode amplifier, Darlington pair, the MOS Differential Pair, Small-Signal Operation of the MOS Differential Pair, The BJT Differential Pair, and other Nonideal Characteristics of the Differential Amplifier.

UNIT – II:

Frequency Response: Low-Frequency Response of the CS and CE Amplifiers, Internal Capacitive Effects and the High-Frequency Model of the MOSFET and the BJT, HighFrequency Response of the CE, Emitter follower, CS, CD, fβ,fΓ and gain bandwidth product.

UNIT – III:

Feedback Amplifiers: Introduction, Thc Gcneral Feedback Structure, Some Properties of Negative Feedback, The Four Basic Feedback Topologies, Series—Shunt, Scries—Series, Shunt—Shunt, Shunt—Series. Oscillators: General Considerations, Phase Shift Oscillator, Wien-Bridge Oscillator, LC Oscillators, Relaxation Oscillator, Crystal Oscillators, Illustrative Problems.

UNIT – IV:

Power Amplifiers: Introduction, Class A amplifiers (Series fed, Transformer coupled, Push pull), Second Harmonic distortion, Class B amplifiers (Push pull, Complementary symmetry), Crossover distortion and Class AB operation, Class C amplifiers, Power BJTs, MOS power transistors.

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UNIT – V:
Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response, Double Tuned Amplifiers – Q-factor, frequency response, Concept of stagger tuning and synchronous tuning. Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.
Text Books:
1. Adel. S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits," 6th Edition, Oxford University Press, 2011.
2. J. Millman, H. Taub and Mothiki S. PrakashRao - Pulse, Digital and Switching Waveforms –2nd Ed., TMH, 2008.
3. Millman, C Chalkias, "Integrated Electronics", 4thEdition, McGraw Hill Education (India) Private Ltd., 2015.
Reference Books:
1. Behzad Razavi, "Fundamentals of Micro Electronics", Wiley, 2010.
2. Donald A Neamen, "Electronic Circuits – Analysis and Design," 3rdEdition, McGraw Hill (India), 2019.
3. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", 9th Edition, Pearson/Prentice Hall, 2006.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC44– ANALOG AND DIGITAL COMMUNICATIONS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce various modulation and demodulation techniques of analog and digital communication systems.
- Analyze different parameters of analog and digital communication techniques.
- Understand function of various stages of AM, FM transmitters and Know characteristics of AM &FM receivers.
- Analyze the performance of various digital modulation techniques in the presence of AWGN.
-

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

CO1: Recognize the basic terminology used in analog and digital communication technique for transmission of information/data. (L1)

CO2: Explain the basic operation of different analog and digital communication systems at baseband and passband level. (L2)

CO3: Compute various parameters of baseband and passband transmission schemes by applying basic engineering knowledge. (L3)

CO4: Analyze the performance of different modulation & demodulation techniques to solve complex problems in the presence of noise. (L4)

CO5: Evaluate the performance of all analog and digital modulation techniques to know the merits and demerits of each one of them in terms of bandwidth and power efficiency. (L5)

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:

FM and 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.

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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:
Introduction to Noise: Types of Noise, Receiver Model, Noise in AM, DSB, SSB, and FM Receivers. 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 , Delta Modulation, DPCM, Noise in PCM and DM.
UNIT – V:
Digital Modulation Techniques: Coherent Digital Modulation Schemes – ASK, BPSK, BFSK, QPSK, Non-coherent BFSK, DPSK. M-ary Modulation Techniques, Power Spectra, Bandwidth Efficiency. 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, "Communication Systems", JohnWiley& Sons, 4 th Edition, 2004.
2. Wayne Tomasi - Electronics Communication Systems-Fundamentals through Advanced, 5 thEd., PHI, 2009
3. B. P. Lathi, Zhi Ding " Modern Digital and Analog Communication Systems", Oxford press, 2011.
Reference Books:
1.Sam Shanmugam, "Digital and Analog Communication Systems",JohnWiley& Sons, 1999.
2. Bernard Sklar, F. J. harris"Digial Communications: Fundamentals andApplications", Pearson Publications, 2020.
3. Taub and Schilling, " Principles of Communication Systems", Tata McGraw Hill, 2007.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AHS03A - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to all Branches)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To inculcate the basic knowledge of microeconomics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

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

1. Define the concepts related to Managerial Economics, financial accounting and management. (L1)
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets. (L2)
3. Apply the Concept of Production cost and revenues for effective Business decision. (L3)
4. Analyze how to invest their capital and maximize returns. (L4)
5. Develop the accounting statements and evaluate the financial performance of business entity.(L5)

UNIT – II Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT – III Business Organizations and Markets

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT – IV Capital Budgeting

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay BackMethod, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

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UNIT – V Financial Accounting and Analysis
Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.
Text Books:
• Varshney & Maheswari: Managerial Economics, Sultan Chand.
• Aryasri: Business Economics and Financial Analysis, 4/e, MGH.
Reference Books:
1. A R Aryasri - Managerial Economics and Financial Analysis, TMH 2011.Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
2. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
3. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. N. Appa Rao. & P. Vijaya Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.
5. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.
Online Learning Resources:
https://www.slideshare.net/123ps/managerial-economics-ppt https://www.slideshare.net/rossanz/production-and-cost-45827016 https://www.slideshare.net/darkyla/business-organizations-19917607 https://www.slideshare.net/balarajbl/market-and-classification-of-market https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396 https://www.slideshare.net/ashu1983/financial-accounting

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AHS03B - ORGANIZATIONAL BEHAVIOR

(Common to all branches)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To enable student's comprehension of organizational behavior.
- To offer knowledge to students on self-motivation, leadership and management.
- To facilitate them to become powerful leaders.
- To impart knowledge about group dynamics.
- To make them understand the importance of change and development

Course Outcomes: At the end of this Course the student will be able to

1. Understand the nature and concept of Organizational behaviour. (L1)
2. Analyze the different theories of leadership. (L2)
3. Apply theories of motivation to analyze the performance problems. (L3)
4. Evaluate group dynamics. (L4)
5. Develop as powerful leader. (L5)

UNIT –I : Introduction to Organizational Behavior

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behaviour –Attitude -Perception - Learning – Personality.

UNIT – II: Motivation and Leading

Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory.

UNIT – III Organizational Culture

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

UNIT – IV Group Dynamics

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution.

UNIT – V Organizational Change and Development

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development.

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Text Books:
• Luthans, Fred, OrganisationalBehaviour, McGraw-Hill, 12 Th edition.
• P Subba Ran, OrganisationalBehaviour, Himalya Publishing House.
Reference Books:
1. McShane, Organizational Behaviour, TMH.
2. Nelson, OrganisationalBehaviour, Thomson.
3. Robbins, P. Stephen, Timothy A. Judge, OrganisationalBehaviour, Pearson.
4. Aswathappa, OrganisationalBehaviour, Himalaya.
Online Learning Resources:
https://www.slideshare.net/Knight1040/organizational-culture 9608857 https://www.slideshare.net/AbhayRajpoot3/motivation-165556714 https://www.slideshare.net/harshrastogi1/group-dynamics-159412405 https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AHS03C - BUSINESS ENVIRONMENT

(Common to all Branches)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

Course Outcomes: At the end of this Course the student will be able to

- Apply the knowledge of Money markets in future investment. (L1)
- Analyze India's Trade Policy. (L2)
- Evaluate fiscal and monitory policy. (L3)
- Develop a personal synthesis and approach for identifying business opportunities. (L4)
- Understand various types of business environment. (L5)

UNIT – I: Overview of Business Environment

Introduction – meaning Nature, Scope, significance, functions and advantages. Types- Internal &External, Micro and Macro. Competitive structure of industries - Environmental analysis- advantages & limitations of environmental analysis.

UNIT – II: FISCAL & MONETARY POLICY

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

UNIT – III: TRADE POLICY

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

UNIT – IV: WORLD TRADE ORGANIZATION

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

UNIT – V: MARKETS

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

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Text Books:
• Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
• K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.
Reference Books:
• K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
• Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
• Chari. S. N (2009), International Business, Wiley India.
• E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC47-ELECTRONIC CIRCUITS ANALYSIS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- Plot the characteristics of Differential amplifiers, feedback and power amplifiers.
- Analyze the response of tuned amplifiers and multivibrators.
- Categorize different oscillator circuits based on the application.
- Design the electronic circuits for the given specifications and for a given application.

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

CO1: Know about the usage of equipment/components/software tools used to conduct experiments in analog circuits. (L2)

CO2: Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit experimentally. (L3)

CO3: Analyze the given analog circuit to find required important metrics of it theoretically. (L4)

CO4: Compare the experimental results with that of theoretical ones and infer the conclusions. (L4)

CO5: Design the circuit for the given specifications. (L6)

List of Experiments: (Implement / execute any 12 experiments).

1. Design and Analysis of Darlington pair.
2. Frequency response of CE – CC multistage Amplifier.
3. Design and Analysis of Cascode Amplifier.
4. Frequency Response of Differential Amplifier
5. Design and Analysis of any two topologies of feedback amplifies and find the frequency response of it.
6. Design and Analysis of Class A power amplifier.
7. Design and Analysis of Class AB amplifier.
8. Design and Analysis of RC phase shift oscillator.
9. Design and Analysis of LC Oscillator.
10. Frequency Response of Single Tuned amplifier
11. Design a Bistable Multivibrator and analyze the effect of commutating capacitors and draw the wave forms at base and collector of transistors.
12. Design an Astable Multivibrator and draw the wave forms at base and collector of transistors.
13. Design a Monostable Multivibrator and draw the input and output waveforms.
14. Draw the response of Schmitt trigger for gain of greater than and less than one.

Note: Use Multisim Software for simulation. Faculty members who are handling the laboratory shall see that students are given design specifications for a given circuit appropriately and monitor the design and analysis aspects of the circuit.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC48 - ANALOG AND DIGITAL COMMUNICATIONS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- Understand the basics of analog and digital modulation techniques.
- Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- Design and implement different modulation and demodulation techniques and their applications.
- Develop cognitive and behavioral skills for performance analysis of various modulation techniques.

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

CO1: Know about the usage of equipment/components/software tools used to conduct experiments in analog and digital modulation techniques. (L2)

CO2: Conduct the experiment based on the knowledge acquired in the theory about modulation and demodulation schemes to find the important metrics of the communication system experimentally. (L3)

CO3: Analyze the performance of a given modulation scheme to find the important metrics of the system theoretically. (L4)

CO4: Compare the experimental results with that of theoretical ones and infer the conclusions. (L4)

List of Experiments:

Design the circuits and verify the following experiments taking minimum of six from each section shown below.

Section-A

1. AM Modulation and Demodulation
2. DSB-SC Modulation and Demodulation
3. Frequency Division Multiplexing
4. FM Modulation and Demodulation
5. Radio receiver measurements
6. PAM Modulation and Demodulation
7. PWM Modulation and Demodulation
8. PPM Modulation and Demodulation

Section-B

1. Sampling Theorem.
2. Time Division Multiplexing
3. Delta Modulation and Demodulation
4. PCM Modulation and Demodulation

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5. BPSK Modulation and Demodulation
6. BFSK Modulation and Demodulation
7. QPSK Modulation and Demodulation
8. DPSK Modulation and Demodulation
Note: Faculty members (who are handling the laboratory) are requested to instruct the students not to use readymade kits for conducting the experiments. They are advised to make the students work in the laboratory by constructing the circuits and analyzing them during the lab sessions.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AEC49- PCB DESIGN AND PROTOTYPE DEVELOPMENT (SKILL ORIENTED COURSE -II)

L	T	P	C
0	1	2	2

Fundamental of basic electronics : Component identification, Component symbols & their footprints, Understand schematic, Creating new PCB, Browsing footprints libraries, Setting up the PCB layers, Design rule checking, Track width selection, Component selection, Routing and completion of the design.

Introduction to PCB: Definition and Need/Relevance of PCB, Background and History of PCB, Types of PCB, Classes of PCB Design, Terminology in PCB Design, Different Electronic design automation (EDA) tools and comparison.

PCB Design Process: PCB Design Flow, Placement and routing, Steps involved in layout design, Artwork generation Methods - manual and CAD, General design factors for digital and analogue circuits, Layout and Artwork making for Single-side, double-side and Multilayer Boards, Design for manufacturability, Design-specification standards .

Practice Exercises: Any twelve experiments are to be done

1.Practice following PCB Design steps
- Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, Netlist generation.
- Layout Design: Familiarization of Footprint Editor, Mapping of components, Creation of PCB layout Schematic.
- Create new schematic components.
- Create new component footprints.

2. Regulator circuit using 7805

3. Inverting Amplifier or Summing Amplifier using op-amp

4. Full-wave Rectifier

5. Astable multivibrator using IC555

6. Monostable multivibrator using IC555

7. RC Phase-shift or Wein-bridge Oscillator using transistor

8. Full-Adder using half-adders.

9. 4-bit binary /MOD N counter using D-Flip flops.

10. Design a Development board for an open ended experiment of Analog applications.

11. Design a Development board for an open ended experiment of Digital applications.

12. One open-ended (analog/ digital/mixed circuit) experiments of similar nature and magnitude to the above are to be assigned by the teacher (Student is expected to solve and execute/simulate independently).

13. Design a Development board for Power section of a system consisting of IC7805, capacitor, resistor, headers, LED.

14. Fabricate a single-sided PCB, mount the components and assemble them in a cabinet for any one of the circuits mentioned in the above exercises.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech II Year II Semester

23AMC41 - DESIGN THINKING & INNOVATION

(Common to all Branches)

L	T	P	C
1	0	2	2

Course Objectives: The objectives of the course are to make the students learn about

1. The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation.
2. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas.
3. To develop solutions for real-time problems.

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

1. Define the concepts related to design thinking. (L1)
2. Explain the fundamentals of Design Thinking and innovation (L2)
3. Apply the design thinking techniques for solving problems in various sectors. (L3)
4. Analyse to work in a multidisciplinary environment (L4)
5. Evaluate the value of creativity (L5)
6. Formulate specific problem statements of real time issues (L6)

UNIT – 1 Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, historyof Design Thinking, New materials in Industry.

UNIT – II Design Thinking Process

Design thinking process (empathize, analyse, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development.

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT – III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies.

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Activity: Importance of modelling, how to set specifications, Explaining their own product design.
UNIT – V Design Thinking in Business Processes
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes. **Activity:** How to market our own product, About maintenance, Reliability and plan for startup.
Text Books:
• Tim Brown,Change by design, Harper Bollins (2009).
• Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.
Reference Books:
• David Lee, Design Thinking in the Classroom, Ulysses press.
• Shrutin N Shetty, Design the Future, Norton Press.
• William Lidwell,Universal Principles of Design- Kritinaholden, Jill Butter.
• Chesbrough.H, The Era of Open Innovation – 2013.
Online Learning Resources:
https://nptel.ac.in/courses/110/106/110106124/ https://nptel.ac.in/courses/109/104/109104109/ https://swayam.gov.in/nd1_noc19_mg60/preview .

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