SRI VENKATESWARA UNIVERSITY - TIRUPATI

B.Sc., (Honours) in **ELECTRONICS(MAJOR)**

FIRST YEAR – II SEMESTER

(w.e.f. Academic Year 2023 - 24)

COURSE 3: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Theory **Credits: 3** **3 hours/week**

Objectives

The students will learn:

1. Basics of electrostatics, Gauss theorem and its applications, concept of a capacitor, various types of capacitors and dielectric constant, magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter,
2. Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits.
3. Transistor and its three modes of operation, h-parameter model of a transistor and the frequency response of an amplifier.

UNIT-I Electrostatics: Electric charges - Coulomb' s law - Electric field - Electric intensity and electric potential - Relation between electric potential and intensity - Electric intensity and potential due to a uniform charged conducting sphere at a point outside, on, and inside the conductor. Electric dipole - Dipole moment - Intensity and potential due to a dipole – Statement and proof of Gauss law - Application of Gauss law to uniformly charged solid sphere.

UNIT-II Capacitors: Definition and unit of capacity - Capacitance of a parallel plate capacitor - Effect of dielectric on capacity - Capacitors in series and parallel - Energy stored in a charged capacitors - Force of attraction between plates of charged parallel plate capacitor - Kelvin' s attracted disc electrometer - Measurement of potential and dielectric constant. Type of capacitors - Mica capacitor, Electrolytic capacitors, Variable air capacitor - Uses of capacitors.

UNIT-III Electrical Measurements: Carey-Foster bridge - Determination of specific resistance - Potentiometer - Calibration of low and high range voltmeters - Calibration of Low range ammeter. **Magnetic Effect of Current:** Biot-Savart' s law [Force on a conductor carrying current placed in a magnetic field] - Principle, construction and theory of a moving coil ballistic galvanometer - Measurement of figure of merit of B.G.

UNIT-IV Diode Circuits and power Supplies: Junction diode - construction and working - characteristics - Zener Diode – construction and working- Characteristics - Half and full wave rectifiers - Expression for efficiency and ripple factor -Bridge rectifier - Filter circuits - Regulated power supply using Zener diode - Clipper and Clamper using diodes. Differentiator and integrator using resistor and capacitor.

UNIT-V Transistor circuits: Construction, working of PNP, and NPN transistors -

Characteristics of a transistor in CB, CE modes - h parameters. - Transistor as a amplifier - RC coupled Single stage amplifier - Frequency response - Basic logic gates AND, OR, and NOT - Construction of basic logic gates using diodes and transistors.

Text Books

1. Electricity and Magnetism - M. Narayanamoorthi and Others, National PublishingCo., Chennai. Electricity and Magnetism - R. Murugeshan, S. Chand & Co. Ltd., New Delhi,Revised Edition, 2006.
2. Principles of Electronics - V.K. Mehta, S. Chand & Co., 4/e, 2001. Basic Electronics - B.L. Theraja, S. Chand & Co., 4/e, 2001.

Reference Books

1. Electricity and Magnetism - Brijlal & Subrahmanyam, Ratan Prakashan Mandir,Agra.
2. Fundamentals of Electricity and Magnetism - B.D. Duggal & C.L. Chhabra, ShobanLal Nagin Chand & Co., Jallundur.
3. Physics, Vol. II - Resnick, Halliday & Krane, 5/e, John Wiley & Sons, Inc.,. Basic Electronics - B. Grob, McGraw - hill, 6/e, NY, 1989.
4. Elements of Electronics - Bagde & Singh, S. Chand

SEMESTER-II

COURSE 3: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Practical **Credits: 1** **2 hrs/week**

List of Experiments:

1. Determination of dielectric constant of dielectric material
2. Determination of specific resistance of a conductor using Carey Foster Bridge
3. Determination of low resistance using potentiometer
4. Conversation of Galvanometer into ammeter
5. Conversation of Galvanometer to Voltmeter
6. Junction Diode Characteristics
7. Zener Diode Characteristics
8. Transistor Characteristics
9. Verification of Basic Logic gates

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

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SEMESTER-II

COURSE 4: CIRCUIT THEORY AND ELECTRONIC DEVICES

Theory **Credits: 3** **3 hrs/week**

Objectives:

1. To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
2. To analyze circuits in time and frequency domain.
3. To synthesize the networks using passive elements.
4. To understand the construction, working and VI characteristics of electronic devices.
5. To understand the concept of power supply.

UNIT- I: SINUSOIDAL ALTERNATING WAVEFORMS: Definition of current and voltage. Differences between A.C and D.C. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Phase relation of R,L and C

UNIT-II: **PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C):** Branch current method, Nodal Analysis, star to delta & delta to star conversions. Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Milliman and Reciprocity theorems.

UNIT-III: RC, RL AND RLC CIRCUITS for D.C:
Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits. LCR Series resonance and parallel resonance circuits, Q – Factor.

UNIT-IV: BJT, FET and UJT:

BJT: Construction, working, and characteristics of CE Configurations. Hybrid parameters and hybrid equivalent circuit of CE Transistor,

FET: Construction, working and characteristics of JFET and MOSFET. Advantages of FET over BJT.

UJT: Construction, working and characteristics of UJT. UJT as a Relaxation oscillator.

UNIT-V: POWER SUPPLIES & PHOTO ELECTRIC DEVICES:

Rectifiers: Half wave and full wave rectifiers-Efficiency-ripple factor- Filters- L- section & π-section filters. Three terminal fixed voltage I.C. regulators (78XX and &79XX). Light Emitting Diode – Photo diode and LDR.

TEXT BOOKS:

1. Introductory circuit Analysis (UBS Publications) ----- Robert L. Boylestad.
2. Electronic Devices and Circuit Theory --- Robert L. Boylestad & Louisashel sky.
3. Circuit Analysis by P.Gnanasivam- Pearson Education
4. Electronic Devices and Circuit Theory ---- Robert L. Boylestad &
5. Louis Nashelsky.
6. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition

REFERENCE BOOKS:

1. Engineering Circuit Analysis By: Hayt & Kemmerly - MG.
2. Networks and Systems – D.Roy Chowdary.
3. Unified Electronics (Circuit Analysis and Electronic Devices) by Agarwal- Arora
4. Electric Circuit Analysis- S.R. Paranjothi- New Age International.
5. Integrated Electronics – Millmam & Halkias.
6. Electronic Devices & Circuits – Bogart.
7. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

Outcomes:-

1. Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation.
2. Apply time and frequency concepts of analysis.
3. Synthesize the network using passive elements.
4. Know about amplifier circuits, switching circuits and oscillator circuits their design and use in electronics.

5. Design and construction of a power supply.

SEMESTER-II

COURSE 4: CIRCUIT THEORY AND ELECTRONIC DEVICES

Practical **Credits: 1** **2 hrs/week**

List of Experiments:

1. Thevenin’ s Theorem-verification
2. Norton's Theorem-verification
3. Maximum Power Transfer Theorem-verification
4. LCR series resonance circuit.
5. BJT input and output characteristics
6. FET Output and transfer characteristics
7. UJT VI characteristics
8. LDR characteristics
9. IC regulated power supply(IC-7805)

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

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