



# Telangana University

## Syllabus of Bachelor of Science (B.Sc) Electronics – 1st year

### PAPER-I Circuit Analysis and Electronic Devices (120 hours)

#### UNIT-I (30 hours)

AC Fundamentals: The Sine wave –Average and RMS values–The J operator – Polar and rectangular forms of complex numbers – Phasor diagram – Complex impedance and admittance.

Passive networks: Concept of voltage and current sources – KVL and KCL- Application to simple circuits (AC and DC) consisting of resistors and sources (one or two) - Node voltage analysis and method of mesh currents.

Network theorems (DC and AC): Superposition Theorem–Thevenin's Theorem– Norton's Theorem– Maximum power transfer Theorem–Millman Theorem- Reciprocity Theorem – Application to simple networks.

#### UNIT- II (30 hours)

RC and RL Circuits: Transient response of RL and RC circuits with step input– time constants. Frequency response of RC and RL circuits – Types of Filters: Low pass filter – High pass filter – frequency response - Passive differentiating and integrating circuits.

Resonance: Series resonance and parallel resonance RLC circuits – Resonant frequency – Q factor – Band width – Selectivity.

#### UNIT-III (30 hours)

PN Junction: Depletion region – Junction capacitance – Diode equation (no derivation) – Effect of temperature on reverse saturation current. Construction, working, V-I characteristics and simple applications of

i) Junction diode ii) Zener diode iii) Tunnel diode and iv) Varactor diode.

Bipolar Junction Transistor (BJT): PNP and NPN transistors–current components in BJT – BJT static characteristics (Input and Output) – Early effect- CB, CC,CE configurations (cut off, active, and saturation regions) CE configuration as two port network – h-parameters – h-parameter equivalent circuit. Experimental arrangement to study input and output characteristics of BJT in CE configuration. Determination of h-parameters from the characteristics. Biasing and load line analysis – Fixed bias and self bias arrangement.

## **UNIT-IV (30 hours)**

Field Effect Transistor (FET): Structure and working of JFET and MOSFET – output and transfer characteristics – Experimental arrangement for studying the characteristics and to determine FET parameters. Application of FET as voltage variable resistor and MOSFET as a switch – Advantages of FET over transistor.

Uni Junction Transistor (UJT): Structure and working of UJT- Characteristics. Application of UJT as a relaxation oscillator.

Silicon Controlled Rectifier (SCR): Structure and working of SCR. Two transistor representation, Characteristics of SCR. Experimental set up to study the SCR characteristics. Application of SCR for power control.

Photo Electric Devices: Structure and operation of LDR, Photo voltaic cell, Photo diode, Photo transistors and LED.

(NOTE: Solving related problems in all the Units)

### **Text Books:**

1. Grob's Basic Electronics , Mitchel E.Schultz 10th Edn. Tata McGraw Hill
2. Network lines and fields, Ryder- Prentice Hall of India Circuit analysis, P.Gnanasivam- Pearson Education
3. Electronic Devices and Circuits, Millman and Halkias - Tata McGraw Hill TMH
4. Electronic Devices and Circuits, Allen Mottershead - Prentice Hall of India
5. Electronic Devices and Circuit Theory, R.L.Boylestad and L.Nashelsky- Pearson Education.
6. Pulse digital switching waveforms , Millman &Taub - Tata McGraw Hill .
7. A First course in Electronics, AA Khan & KK Day - Prentice Hall of India

### **Reference Books**

1. Circuits and Networks, A.Sudhakar & Shyammohan S. Palli - Tata McGraw Hill
2. Network Theory, Smarajit Ghosh - - Prentice Hall of India
3. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand &Co
4. Applied Electronics- R.S.Sedha - S Chand &Co
5. Principles of Electronic circuits- Stanely G.Burns and Paul R. Bond- Galgotia.
6. Electronic Principles and Applications – A.B. Bhattacharya- New Central Book Agency

**PRACTICALS PAPER-I (90 hours-30 Sessions)**

**Circuit Analysis and Electronic devices Lab**

1. Measurement of peak voltage, frequency and phase using CRO.
2. Thevenin's theorem – verification.
3. Norton's theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR and LR circuits- Frequency response- (Low pass and High pass).
6. CR and LR circuits - Differentiation and integration - tracing of waveforms.
7. LCR–Series resonance circuit–Frequency response–Determination of  $f_0$ , Q and band width.
8. To draw volt-ampere characteristics of Junction diode and determine the cut-in voltage, forward and reverse resistances.
9. Zener diode V-I Characteristics– Determination of Zener breakdown voltage.
10. Voltage regulator using Zener diode
11. BJT input and output characteristics (CE configuration) and determination of 'h' parameters.
12. FET –Characteristics and determination of FET parameters.
13. UJT –(i) V-I Characteristics, (ii) relaxation oscillator
14. LDR- characteristics.
15. SCR Volt-ampere characteristics.

**Reference Books**

1. Lab Manual for Electronic Devices and Circuits - 4th Edition By David A Bell - PHI

**Note for other University students:** Student has to perform any 12 experiments.