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GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

(Affiliated to Andhra University, Visakhapatnam)

B.Tech. - I Semester Regular / Supplementary Examinations, January – 2026

ELEMENTS OF ELECTRONICS ENGINEERING

(CSE-AI&ML)

1. All questions carry equal marks
2. Must answer all parts of the question at one place

Time: 3Hrs.

Max Marks: 70

UNIT-I

1. a. Explain the energy band theory of solids and classify materials into conductors, semiconductors, and insulators with neat diagrams. [7M]
b. Discuss the role of doping in modifying carrier concentration of semiconductors. [7M]
- OR
2. a. Derive the expression for diffusion current density in semiconductors. [7M]
b Explain why mobility of electrons is higher than that of holes in semiconductors. [7M]

UNIT-II

3. a. With neat diagrams, explain the working of a Schottky diode and highlight its advantages over PN diode. [7M]
b. A half-wave rectifier supplies a DC output of 5 V to a 500 Ω load. Calculate the DC current and rectifier efficiency. [7M]
- OR
4. a. With a neat circuit diagram and explain half-wave rectifier with capacitor filter. [7M]
b. Define ripple factor and efficiency of rectifiers. Compare half-wave and full-wave rectifiers. [7M]

UNIT-III

- 5 a. Explain the construction and working principle of PNP and NPN transistors with neat diagrams. [7M]
b. Draw the input and output characteristics of a CE configuration and explain the different regions of operation (active, saturation, cutoff). [7M]
- OR
- 6 a. With neat diagrams, explain the voltage divider bias circuit and show how it improves thermal stability compared to fixed bias. [7M]
b. Define thermal runaway in BJTs. Explain the causes and methods used to prevent it in practical biasing circuits. [7M]

UNIT-IV

- 7 a. Draw the small-signal equivalent circuit of a CE amplifier and derive expressions for voltage gain and input resistance. [7M]
- b. Sketch the frequency response curve of a transistor amplifier and explain the significance of bandwidth in communication systems. [7M]

OR

- 8 a. Compare CE, CB and CC amplifiers. [7M]
- b. What is the need for multi-stage amplifier and explain the circuit of Two-stage RC coupled amplifier. [7M]

UNIT-V

- 9 a. A JFET has $I_{DSS} = 8 \text{ mA}$ and $V_P = -5 \text{ V}$. Calculate I_D when $V_{GS} = -2 \text{ V}$. [7M]
- b. Explain the construction and transfer characteristics of depletion-mode MOSFET [7M]

OR

- 10 a. Explain the advantages of FETs over BJTs in terms of input impedance and noise performance [7M]
- b. Compare the drain characteristics of enhancement-mode and depletion-mode MOSFETs. Discuss their applications in digital and analog circuits. [7M]