


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 $500\ \Omega$ 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 $Id_{SS} = 8$ mA and $V_p = -5$ V. Calculate I_d when $V_{GS} = -2$ 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]