Subject Code:24EC11RC01 **R-24**

Reg No:

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

(Affiliated to Andhra University, Visakhapatnam)

I B.Tech. - I Semester Regular Examinations, December / January – 2025

ELECTRONIC DEVICES AND CIRCUITS

(Common to <<ECE>>)

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 in detail the temperature dependence of PN junction diode.
   b. In the step graded junction diode, how does the transition capacitance CT vary with (I) depletion layer width W and (ii)with reverse bias.

OR

2. a. Sketch the energy band diagram of PN junction diode under open circuited condition. Indicate Fermi level E_F and the contact difference of potential Eo.
   b. Derive an expression to prove that diffusion capacitance of a p-n diode is proportional to current I.

UNIT-II

3. a. Explain the working of a Zener voltage regulator (against variations in load and supply) with relevant mathematical equations.
   b. Analyze the circuit of a Full Wave Rectifier with Capacitor filter with neat diagrams and explain its operation. Derive the expression for its ripple factor.

OR

4. a. Draw the block diagram of Half wave rectifier and derive the expressions for I_{dc}, I_{rms} and ripple factor.
   b. What is the working principle of a varactor diode and also list the key applications.

UNIT-III

5. a. Explain the output characteristics of BJT in CE configuration. Mark the three regions of operation and explain their significance.
   b. Draw the circuit diagram of a Collector to Base Bias BJT CE amplifier. Carry out the D.C Analysis to obtain expressions for Q point ($\mathbf{I_C}$ and $\mathbf{V_{CE}}$).

OR

6. a. Evaluate the expressions for Q Point and Stability factor for BJT Voltage divider bias circuit.
   b. Explain the various current components of PNP transistor and define α, β* and γ.

UNIT-IV

7. a. Explain how transistor works as an amplifier.
   b. Derive expressions for A_v,A_I,R_i and R_o of a CE amplifier using h-parameter model.

OR

8. a. Explain the working of a two stage RC coupled amplifier with circuit diagram.

b. Derive general expressions for A_v,A_I,R_i and R_o of a transistor amplifier using h- parameter.

UNIT-V

9. a. Analyze the operation of an n-channel JFET and explain the Drain characteristics.
   b. With a neat circuit diagram explain the fixed-bias method of biasing the n-channel JFET. Analyze the circuit for D.C conditions and derive expressions for $\mathbf{V_{GS}}$, $\mathbf{I_D}$ and $\mathbf{V_{DS}}$.

OR

10. a. Explain why I_D in a JFET remains constant with V_{DS} in the region beyond pinch-off.
    b. For the P channel enhancement MOSFET, draw and discuss the nature of
    (i) drain characteristics
    (ii)transfer characteristics.