

II B. Tech I Semester Supplementary Examinations, July - 2022
ELECTRONIC DEVICES AND CIRCUITS
 (Electrical and Electronics Engineering)

Time: 3 hours

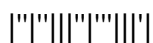
Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
 All Questions carry **Equal** Marks

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- 1 a) Explain about Fermi Dirac function and Fermi level in intrinsic and extrinsic semiconductors. [8M]  
 b) The voltage across a silicon diode at room temperature of 300°K is 0.62V when 3mA current flows through it. If the voltage increases to 0.80V, calculate the new diode current. [6M]
- Or
- 2 a) At room temperature of 300K, the Fermi level is 0.35 eV above the valence bond in a P-type semiconductor. When the temperature is increased to (i) 370K, and (ii) 410K, calculate the position of Fermi level. [6M]  
 b) Explain the volt-ampere characteristics of PN junction diode. [8M]
- 3 a) With a neat sketch explain the V-I characteristics of Photodiode. [7M]  
 b) Explain the different operating regions of SCR. [7M]
- Or
- 4 a) A sinusoidal voltage whose  $V_m = 25V$  is applied to a half-wave rectifier. The diode may be considered to be ideal and  $R_L = 1.6 K\Omega$  is connected as load. Determine the following: [8M]  
 Peak value of current  
 RMS value of current  
 DC value of current  
 Ripple factor  
 b) Draw the circuit diagram of a full-wave rectifier using center-tap transformer. Explain its working principle. [6M]
- 5 a) Explain how transistor can be used as an amplifier with a neat diagram. [8M]  
 b) Explain about Ebers-Moll model of a transistor. [6M]
- Or
- 6 a) Derive the relationship among transconductance, drain resistance and amplification factor of a JFET. [6M]  
 b) Explain the construction and operation of JFET and draw its characteristics. [8M]
- 7 a) Draw the fixed bias circuit of a BJT? Derive the equation for stability factor. [7M]  
 b) Draw a circuit which uses a diode to compensate for changes in  $I_{CO}$ . Explain how stabilization is achieved in the circuit. [7M]

Or



- 8 a) Define Q-point and give its significance. [3M]  
b) Give the comparison between fixed bias, collector to base bias and self-bias circuits. [5M]  
c) Explain diode compensation against variation in base-emitter voltage  $V_{BE}$ . [6M]
- 9 Derive the expressions for voltage gain, current gain, input impedance and output impedance of CE amplifier using exact and approximate analysis. [14M]
- Or
- 10 a) A CE amplifier is drawn by a voltage source of internal resistance  $r_s = 800 \Omega$ , and the load impedance is a resistance  $R_L = 1000\Omega$ . The h-parameters are  $h_{ie}=1K\Omega$ ,  $h_{re}=2 \times 10^{-4}$ ,  $h_{fe}=50$  and  $h_{oe}=25\mu A/V$ . Compute the current gain, input resistance, voltage gain and output resistance. [8M]  
b) Explain the principle of CS amplifier with the help of circuit diagram. [6M]

