ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

Course Title: Electronics Devices and Circuits

Course Code: 25EC303

Regulation : NR25

Course Outcomes (CO's)

CO1: Analyze the electronic characteristics and models of semiconductor diode and apply them in rectifier and clipping circuits

CO2: Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and Analyze their input and output characteristics

CO3: Design appropriate biasing networks for BJTs and determine the operating point for Amplifier applications

CO4: Analyze transistor amplifier circuits using h-parameter models and assess Performance for various configurations.

CO5: Analyze the structure, working, and characteristics of JFETs, MOSFETs, and Advanced Devices like Fin FETs and CNTFETs, and compare modern device Technologies

UNIT–I
DIODE CHARACTERISTIC AND APPLICATIONS

S.No	Questions	BT	CO	PO
	Part –A(Short Answer Questions)			
1	Define Static and Dynamic resistance of PN Diode?	L2	1	2
2	What is meant by depletion region?	L2	1	1
3	Determine the forward resistance of PN junction diode. When the forward current is 5mA at T=300K assume is diode.	L2	1	1
4	Write the effect of temperature on diode characteristics?	L4	1	2
5	A silicon diode has a saturation current of 7.5μ A at room temperature 300K.calculate the saturation current at 400K.	L3	1	2
6	Draw the Diode Equivalent Circuit. Mention the applications of PN-junction diode.	L3	1	1
7	Define ripple factor and PIV	L4	1	1
8	Define diffusion capacitance and its formulae.	L2	1	1
9	Define transition capacitance and its formulae.	L2	1	1
10	Define PN junction diode and draw its symbol.	L2	1	1
11	Define drift and diffusion currents?	L2	1	1
12	What is meant by avalanche breakdown in PN junction diode?	L2	1	1
13	What is a rectifier and its types?	L2	1	1
14	What do you mean by positive and negative clamping?	L2	1	1

Part– B(Long Answer Questions)					
15	a)	The reverse saturation current of a silicon p-n junction diode at an operating temperature of 27°C is 50 nA. Compute the dynamic forward and reverse resistances of the diode for applied voltages of 0.8 V and -0.4 V respectively.	L3	1	1, 2
	b)	Obtain the transition capacitance (C_T) of a junction diode at a reverse bias voltage of 12 V if (C_T) is 15 pF at a reverse bias of 8 V. Differentiate between transition and diffusion capacitances.	L3, L4	1	1, 2
16	a)	Define the following terms of a rectifier: (i) Ripple Factor (ii) Regulation (iii) Rectification Efficiency (iv) Form Factor	L1	1	1
	b)	What is the ripple factor if a power supply of 220 V, 50 Hz is to be Full Wave rectified and filtered with a 220 μF capacitor before delivering to a resistive load of 120 Ω? Compute the value of the capacitor for the ripple factor to be less than 15%.	L3	1	1, 2
17	a)	Derive expressions for ripple factor of a Full Wave Rectifier with and without a capacitive filter.	L4	1	1, 2
	b)	Define the following terms and derive the equations with respect to half-wave rectifier: (i) Ripple factor (ii) Peak inverse voltage (iii) Rectification efficiency (iv) % Regulation	L4	1	1, 2
18	a)	The reverse saturation current of a silicon p-n junction diode at an operating temperature of 27°C is 50 nA. Compute the dynamic forward and reverse resistances of the diode for applied voltages of 0.8 V and -0.4 V respectively.	L3	1	1, 2
	b)	Explain the V-I characteristics of a PN junction diode.	L3	1	3
19	a)	Derive the expression for dynamic resistance of a diode.	L3	1	2
	b)	Explain transition capacitance and diffusion capacitance with suitable expressions.	L4	1	2
20	a)	Explain Ideal, Simplified and Piecewise Linear diode models.	L3	1	1
	b)	Explain the operation of a Half-Wave Rectifier with circuit diagram and waveforms.	L3	1	3
21	a)	Derive the ripple factor, rectification efficiency and PIV of a Half-Wave Rectifier.	L4	1	3
	b)	Explain the operation of a Centre-Tapped Full-Wave Rectifier with circuit diagram and waveforms.	L3	1	3
22	a)	Explain the operation of a Bridge Rectifier with circuit diagram and waveforms.	L3	1	3

	b)	Compare Half-Wave, Centre-Tapped Full-Wave and Bridge Rectifiers.	L4	1	2
23	a)	Derive the ripple factor and rectification efficiency of a Full-Wave Rectifier.	L4	1	3
	b)	Explain the working of a capacitor filter with circuit diagram and waveforms.	L3	1	3
24	a)	Explain diode conducting and non-conducting intervals in a capacitor filter.	L4	1	2
	b)	Derive the ripple factor of a Full-Wave Rectifier with capacitor filter.	L4	1	3
25	a)	Explain the operation of positive and negative clipper circuits with waveforms.	L3	1	3
	b)	Explain the operation of positive and negative clamper circuits with waveforms.	L3	1	3
26	a)	Explain the V-I characteristics of a Zener diode.	L3	1	2
	b)	Explain Zener and Avalanche breakdown mechanisms in detail.	L4	1	2
27	a)	Explain the operation of a Zener diode as a voltage regulator.	L3	1	3
	b)	Compare PN junction diode and Zener diode.	L4	1	2
28		Explain the V-I characteristics of a PN junction diode.	L3	1	3