JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY
Electronics and Communication Engineering
Electrical Science-2 (15B11EC211)
Tutorial Sheet: 9

Q1[CO3]. The current flowing in a PN-junction diode at room temperature is 200 nA, when a large reverse bias is applied. Calculate the current through the diode when 0.1 V forward bias is applied. [**Ans.** 9.1625 μA**]**

Q2[CO3]. In the circuit given in Fig. 1, a silicon diode with knee voltage 0.7 V is used. The dynamic resistance of the diode in forward bias may assumed to be zero.

(a) If V_{DD} = 5 V, what should be the value of R to establish a current of 5 mA in the circuit?

(b) Determine the power dissipated in the resistance R and in the diode D, when a current of 5 mA flows in the circuit at V_{DD} = 6 V. [**Ans**. (a) 860 Ω; (b) 26.5 mW, 3.5 mW]

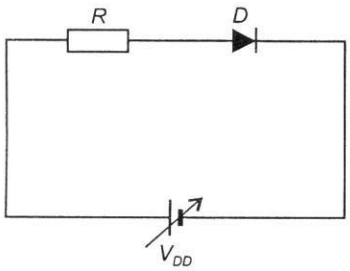

Fig. 1

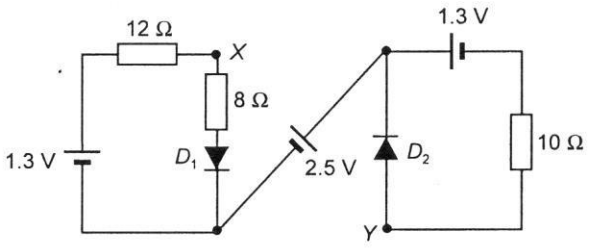

Fig. 2

Q3[CO3]. Germanium diodes D_1 and D_2 with knee voltage 0.3 V are used in the circuit given in Fig. 2. Determine the potential of point X with respect to point Y. [**Ans**. -0.5 V]

Q4[CO3]. The diodes used in the circuit Fig. 3 are identical with V_T = 0.6 V and R_F = 10 Ω. Determine V_D, I_D and V_o as marked in the figure. [**Ans**. 1.833 V, 31.667 mA, 3.167 V]

Q5[CO3]. Determine the current through the 3-Ω resistor in the circuit of Fig. 4. Assume the diode to be ideal. [**Ans**. 1 A]

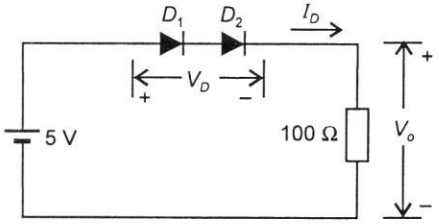

Fig. 3

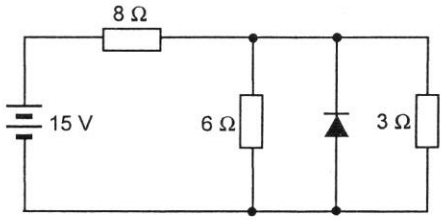

Fig. 4

Q6[CO3]. If the terminals of the diode are reversed in the circuit of Fig. 4, what would be the current in the 3-Ω resistor? [**Ans**. zero]

Q7[CO3]. Determine the current through the circuit of Fig. 5, assuming the diode to be a piecewise linear model with V_T = 0.3 V and r_f= 8 Ω. [**Ans**. 25 mA]

Q8[CO3]. Determine the value of current through the 300-Ω resistor in the circuit of Fig. 6. Assume that the diodes D_1 and D_2 are ideal. [**Ans**. 16.66 mA]

Q9[CO3]. In the circuit given in Fig. 7, all diodes are identical and have a cut-in voltage (V_T) = 0.6 V. (*a*) Find the voltage V_0 and current I, for (*i*) V_i = 0 V, and (*ii*) V_i = +2 V. (*b*) Plot the output voltage v_o, if the input voltage is $v_i = 2\sin 2\pi f t$ V, where f = 50 Hz.

[**Ans**. (*a*) (*i*) 0.6 V, 4.7 mA; (*ii*) 1.8 V, 4.1 mA]

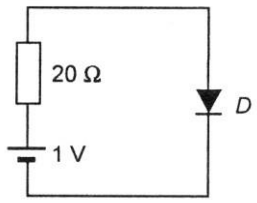

Fig. 5

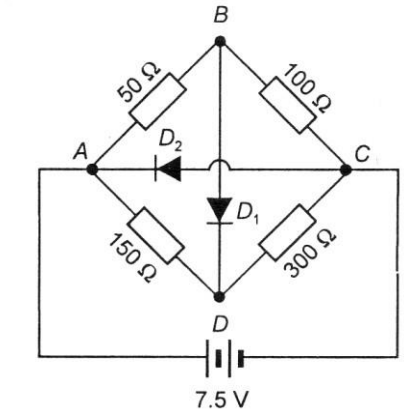

Fig. 6

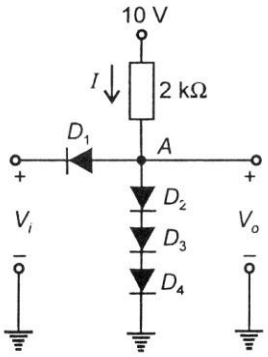

Fig. 7