Roll No. ..160100116.....

EE-101, S4: Quiz # 1

Date: 7th Sep, 2017
Time: 10:10am to 10:30am

4
Max. Marks: 15

Instructions: (a) Answer all questions
(b) Answer only in the space provided next to the question
(c) You can use back side of the 2nd sheet for rough work

Q1. Determine the Thevenin equivalent of the circuit shown in Fig. 1 as seen from terminals A-B. (5)

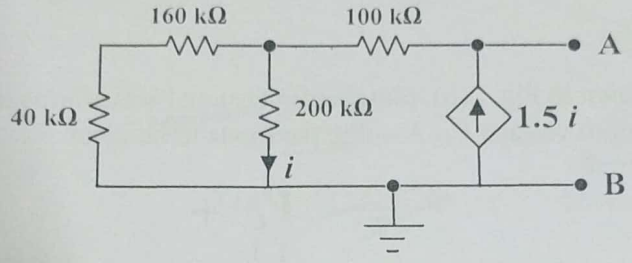


Fig. 1

Soln.: ~~200~~ ~~200~~

$R_{th} = \frac{200 \times 200}{400} = 100\,\Omega + 100\,\Omega = 200\,\Omega$

$1.5i(100) + i(200) = 0$

$i = i_{th} = 0$

$V_{th} = 0$

2

Q2. (a) In the circuit shown in Fig. 2(a), the cut-in voltage of the diode is 1.5 V and the diode on state dynamic resistance is 0 Ω.
Determine the values of 'V_B' when:

(i) 'V_A' = 3.5 V and 'V_C' = 2.5 V
(ii) 'V_A' = 10 V and 'V_C' = 2.5 V (2)

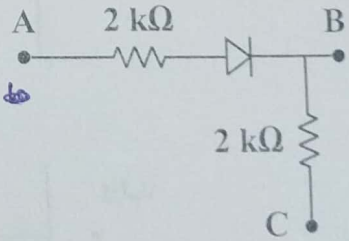


Fig. 2(a)

(i) $V_A = 3.5\,V \quad V_C = 2.5\,V$

$V_B = V_C = 2.5\,V$

2

(ii) $i = \frac{10 - 2.5 - 1.5}{4} = \frac{6}{4} = 1.5\,mA$

$V_B = 10 - 2 \times 1.5 - 1.5$
$= 5.5\,V$

Soln:

Q2 (b). In the circuit shown in Fig. 2(b), plot the dimensional waveforms of the voltages 'V_O' and 'V_C' for the given input voltage V_I. Assume the diode to be ideal. **(3)**

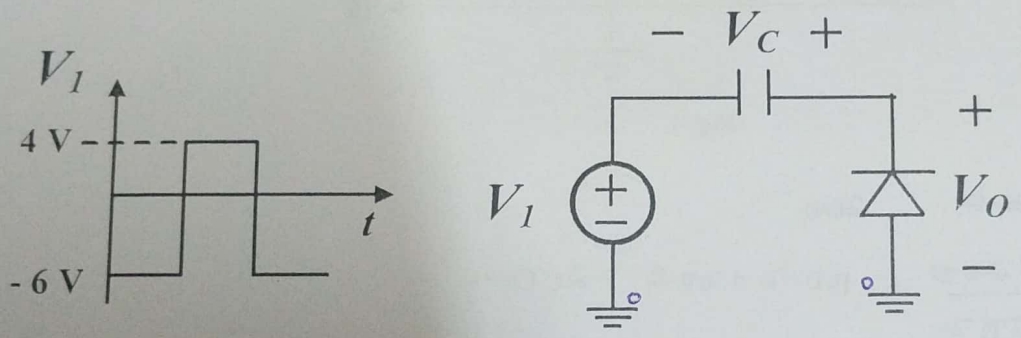
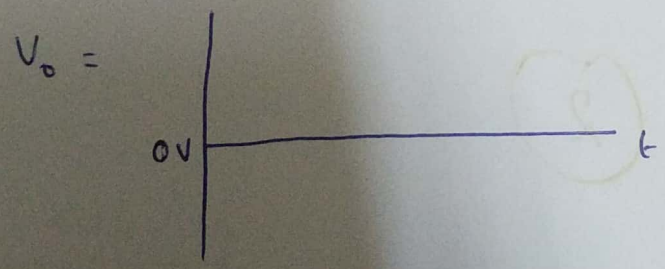
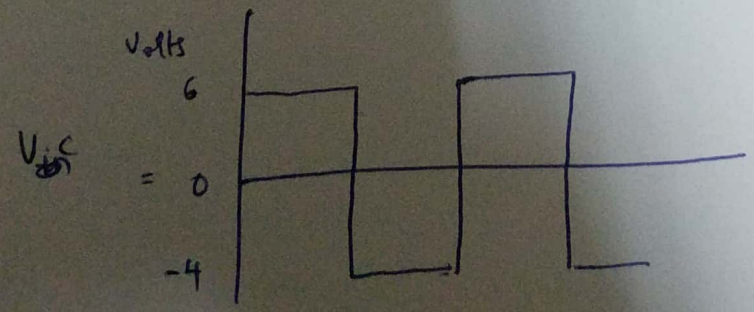


Fig. 2(b)

Soln.:



(No drop across diode)



Q3. In the circuit shown in Fig. 3, β = 100. Determine the values of 'I_C' and 'V_{CE}'. Comment on the mode of operation of the BJT in the circuit. **(5)**

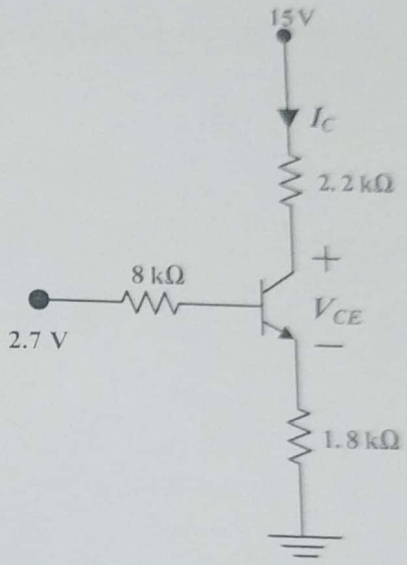


Fig. 3

Soln.:

$\beta = \frac{I_C}{I_B} = 100$

$\frac{I_C}{I_E} = \alpha$

$I_{CE} = 5.4 \text{ mA}$

$V_C = 15 - 5.4 \times 2.2$

$= 3.54 \text{ V}$

$V_C - V_E = -0.665$

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