Somaiya Vidyavihar University

Answer Sheet: Online Examination

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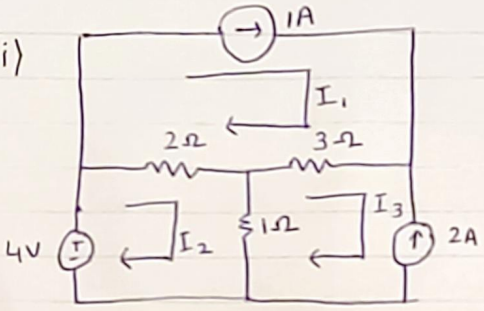
Pargat Singh Dhanjal	Pargat

Q1)

1) D) 100 Ohms
2) A) low, high & moderate respectively
3) A) Forward bias & Forward bias
4) C) 0.7V and 0.3V
5) D) Saturation, Cut-off and active regions.
6) B) 12.5 Watts
7) C) Both Electron and Holes
8) D) 25 V and 50 V
9) C) out of phase with input voltage and has positive DC shift
10) D) 10 V

Q2) i)



Using Mesh analysis,
There are three mesh

$\therefore I_1 = 1A \rightarrow (1)$

$I_3 = -2A \rightarrow (2)$

For mesh (2), using KVL

$+4 - 2(I_2 - I_1) - 1(I_2 - I_3) = 0$

$4 - 2I_2 + 2I_1 - I_2 + I_3 = 0$

$4 - 2I_2 + 2 - I_2 - 2 = 0$ (From 1 & 2)

$-3I_2 = -4$

$I_2 = 4/3 \ A \Rightarrow 1.33A$

$\therefore$ Current through 1Ω resistor $= I_2 - I_3 \Rightarrow 3.33A$

Power $= I^2R = (3.33)^2 \times 1 =$ **11.09 W**

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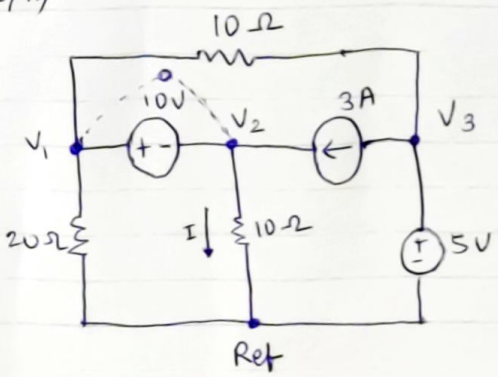
Q2) ii)



To find current I using Nodal Analysis

We have 4 Nodes, one of them being Reference node

For Node 1,

∵ There is no resistance between node 1 & 2. Its a supernode using KVL

$V_1 - 10 - V_2 = 0$

$V_1 - V_2 = 10 \rightarrow (1)$

For supernode, using KCL

$\therefore \frac{V_1 - V_3}{10} + \frac{V_1}{20} + \frac{V_2}{10} - 3 = 0 \rightarrow (2)$

$2V_1 - 2V_3 + V_1 + 2V_2 - 60 = 0$

$3V_1 + 2V_2 - 2V_3 - 60 = 0 \rightarrow (2)$

For node (3), using KCL

$\frac{V_3 - V_1}{10}$ ∵ There is no load btw V_3 & Ref

$\therefore V_3 = 5V \rightarrow (3)$

From (1), (2) & (3)

$V_1 = 18$, $V_2 = 8$, $V_3 = 5$

$\therefore I = \frac{V_2}{R} = \frac{8}{10} = \boxed{0.8A}$

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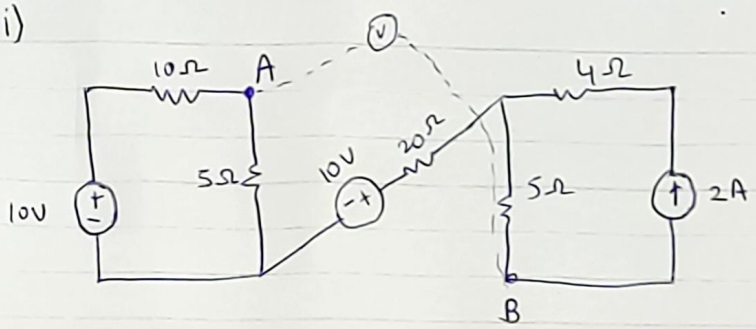
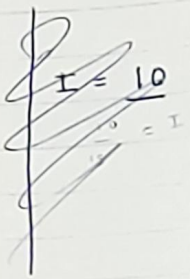
Q3) i)





Applying Kirchoff's Voltage Law,

$$V_{AB} - V_{5\Omega} + 10 - V_{20} - V_{5\Omega} = 0$$

$$V_{AB} - 10 + 10 - (2 \times 5) = 0$$

$$\boxed{V_{AB} = 10\ V}$$

$\because V_{5\Omega} = 10V$

$I_{5\Omega} = 2A$ (Given)

Q3) ii)

P-N junction diode	Zener diode
• It is uni-directional, i.e current flows only in one direction through it.	• It is bi-directional, i.e current flows in both directions
• Used for rectification	• used for voltage regulation
• On reverse biasing, the deplition region is permanently damaged.	• The reverse bias enables it to flow current bi-directionaly.

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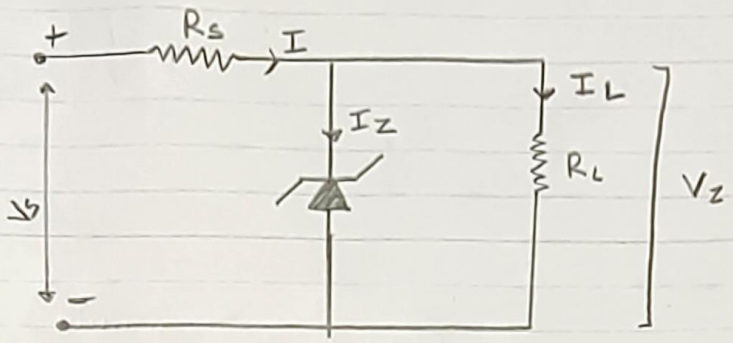
Q3) 3.2)

Zener-diode as voltage regulator.



A voltage regulator is an electronic device which regulates or provides a stable, safe DC voltage independent of current (load) and temperature. There is a series resistor connected to the circuit in order to limit the current into the diode. It is connected to the higher potential side of the dc circuit. It works in such a way that reversed biased can also work in breakdown conditions.

Line Regulation: Here, series & load resistances are fixed, & only the input voltage is changing. output voltage remains the same as the input voltage is maintained above a minimum value.

Load Regulation: In this type of regulation, the input voltage is fixed & load resistance is variable and the output voltage remains constant as long as the load resistance is maintained above minimum value.