Assignment 2

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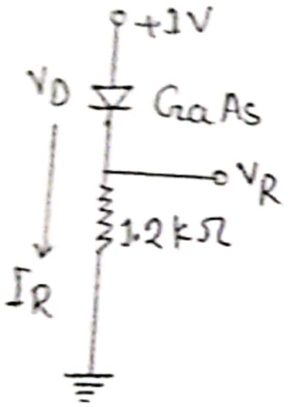
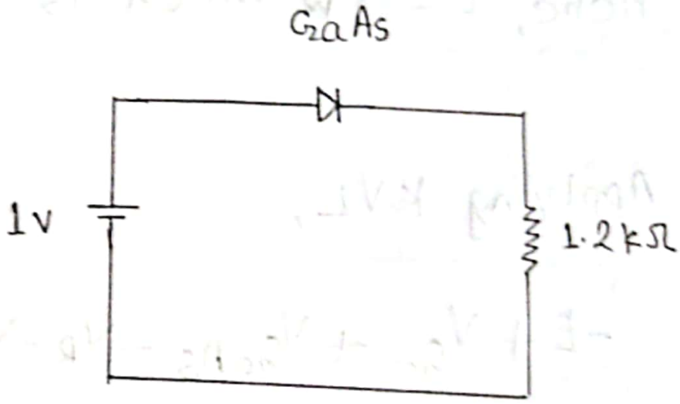
Subject Name: Electronic Devices

Section: J.

1. The voltage of GaAs is 1.2V





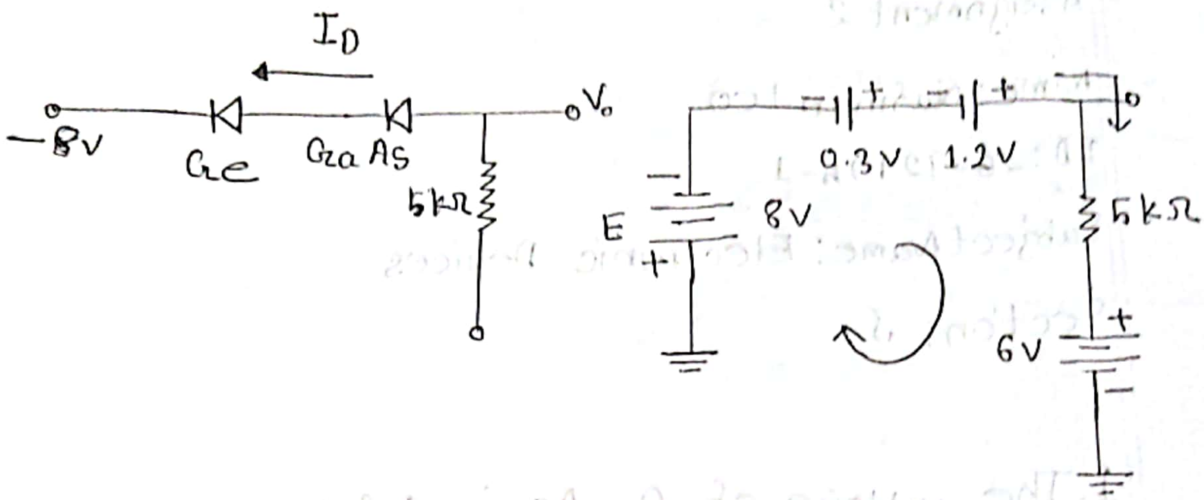
Here, we give less voltage than the knee voltage of GaAs. So, the circuit will close.

Given that, $V_D = 1V$

$I_R = I_D = 0$

$\therefore V_R = 0$ (Ans:)

2.



Here, $E = 8V$ which is greater than $(0.3+1.2)V = 1.5V$

Applying KVL,

$$-E + V_{Ge} + V_{GaAs} - V_R - V_o = 0$$

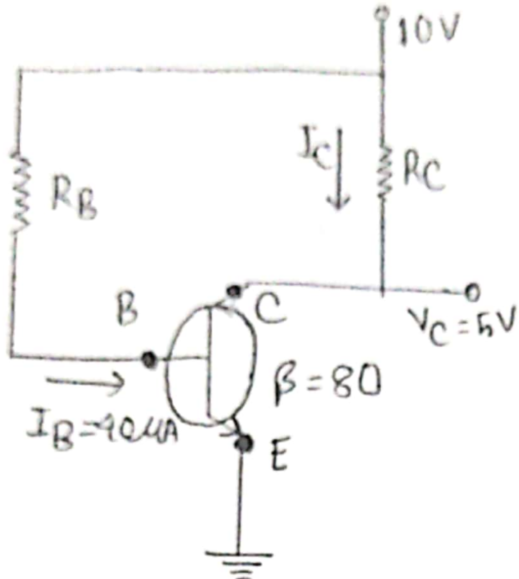
$$\Rightarrow -8 + 0.3 + 1.2 - 6 - V_o = 0$$

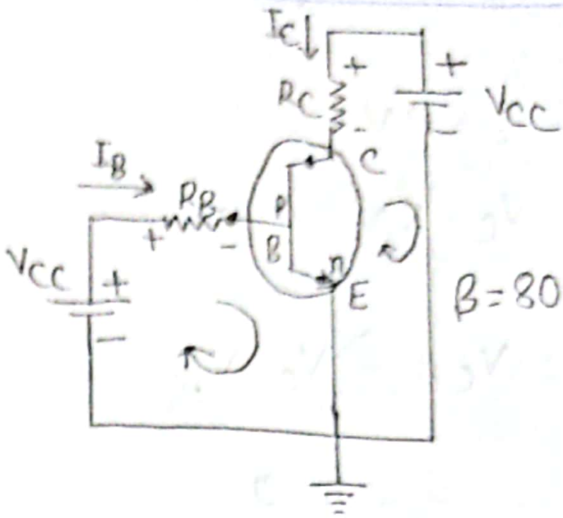
$$\Rightarrow V_o = -12.5\ V$$

$$\therefore I_D = \frac{V_o}{R} = \frac{-12.5}{5}$$

$$= -2.5\ A \quad \text{(Ans:)}$$

3.





Here, $I_C = \beta I_B$

$= 80 \times 40 \times 10^{-6}$

$= 3.2 \times 10^{-3} A$

$= 3.2 mA$

Applying KVL,

$+V_{CC} - I_B \times R_B - V_{BE} = 0$

$\Rightarrow R_B = \dfrac{V_{CC} - V_{BE}}{I_B}$

$= \dfrac{10 - 0.7}{40 \times 10^{-6}}$

$= 232.5 \, k\Omega$

Sub :

$V_E = 0V$

$V_C = 5V$

$\therefore V_{CE} = V_C - V_E$

$= 5 - 0$

$= 5V$

Applying KVL,

$+V_{CE} + I_C \times R_C - V_{CC} = 0$

$\Rightarrow R_C = \dfrac{V_{CC} - V_{CE}}{I_C}$

$= \dfrac{10 - 5}{3.2 \times 10^{-3}}$

$= 1.5625 k\Omega$

(Ans:)

4. i)

→ Negative Half cycle

→ Positive Half Cycle

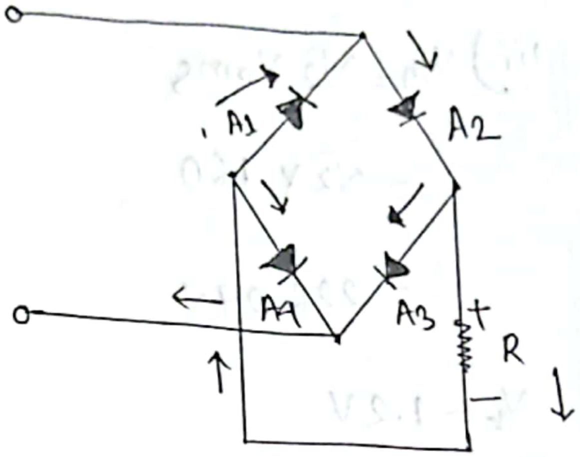


Figure: Full Wave Bridge Rectifier Circuit

ii) $V_m = \sqrt{2}\, V_{rms}$

$= \sqrt{2} \times 160$

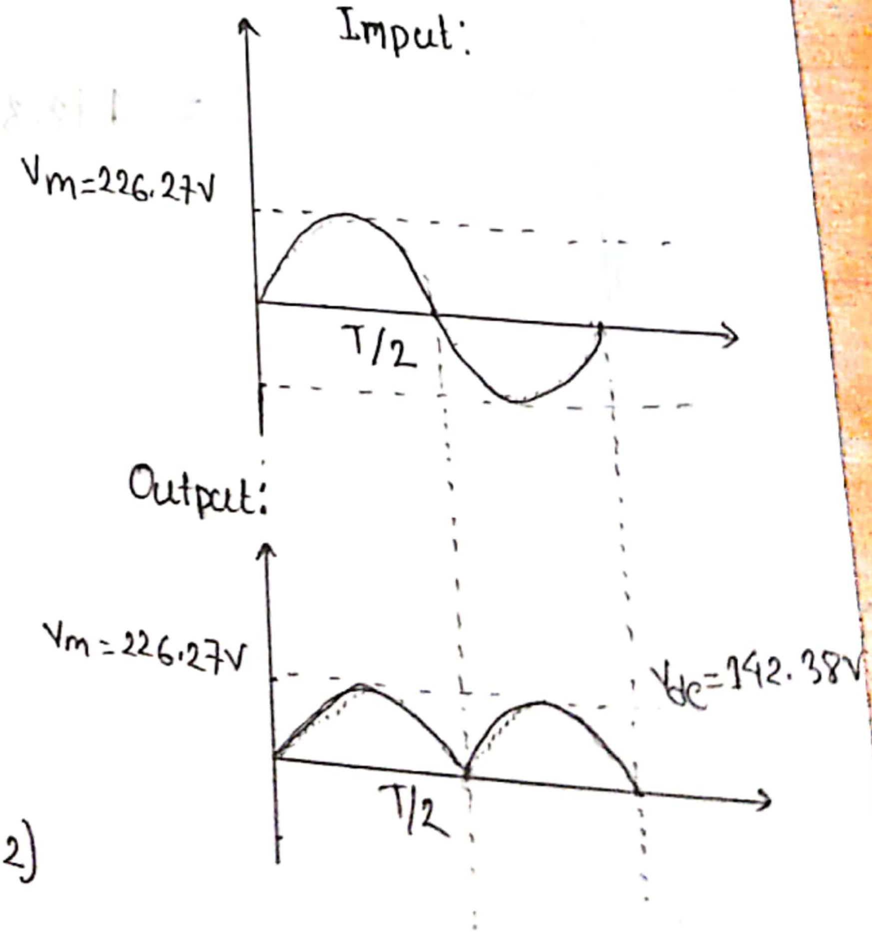
$= 226.27\,V$

Here,

$V_{dc} = 0.636 \times (V_m - 2V_K)$

$= 0.636 \times (226.27 - 2 \times 1.2)$

$= 142.38\,V$

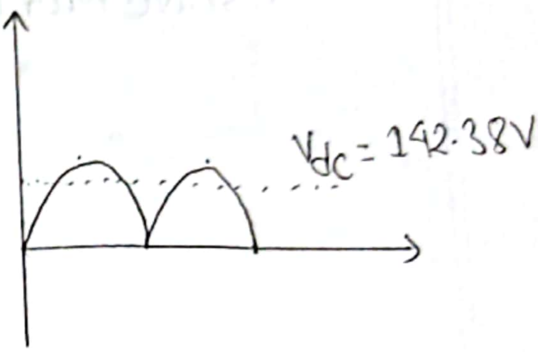


iii) $V_m = \sqrt{2}\, V_{rms}$

$= \sqrt{2} \times 160$

$= 226.27V$

$V_k = 1.2V$



Output Voltage $V_{dc} = 0.636 \times (V_m - 2V_k)$

$= 0.636 \times (226.27 - 2 \times 1.2)$

$= 142.38V$

(Ans:)