Tut-1

31 January 2022 11:04 PM

JMEERAJ, 202019

01) During +ve half cycle all diodes are in reverse bias position so $V_{out} = 0$

02) Now during -ve half cycle all diodes are short circuit so a rectifier bridge will form so and $V_{out} = 0$ [so option d is correct]

02) Given: $n_i = 1.5 \times 10^{16}\ m^{-3}$, $s = 2 \times 10^{5}\ \Omega m$

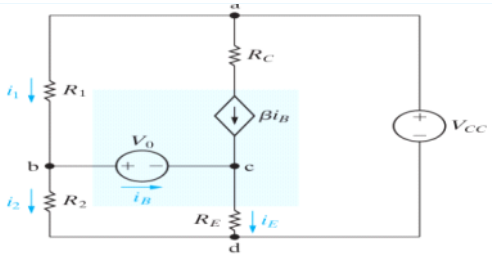
$N_0 = 10^{20}\ m^{-3}$

a) $n \times N_0 = (n_i)^2 \Rightarrow n = \dfrac{(1.5 \times 10^{16})^2}{10^{20}} = \boxed{2.25 \times 10^{12}\ /m^3}$

b) s intrinsic $= 2 \times 10^{5} = \dfrac{1}{n_i \times q(\mu_n \times \mu_p)} = \dfrac{1}{n_i \times q \times 2\mu_n}$ $\Rightarrow \mu_n = 1.64 \times 10^{-3}\ m^2/V\text{-}s$ (1)

$$\boxed{s_i = \frac{1}{\rho_i} = \frac{1}{n_i q(\mu_p) + N_0 q \mu_n}}$$

04) (a)

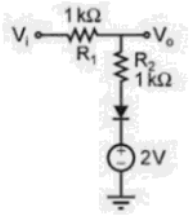


$V_c = V_D - V_0$

$V_a = V_{cc}$

$\dfrac{V_b}{R_2} + \dfrac{V_b - V_{cc}}{R_1} + i_B = 0 \Rightarrow i_{cc} =$

05)



According to question

→ during -ve half cycle minimum value of $V_i = -5V$ [because diode is reverse bias]

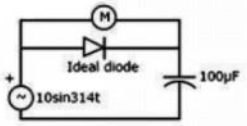
→ during +ve half cycle forward bias $5 - 2i_K - 0.7 - 2 = 0 \Rightarrow \boxed{i_{KC} = 1.15A}$

$V_0 = 5 - i_K = 5 - 1.15 \Rightarrow \boxed{3.85V}$

$\boxed{\text{Hence option C is correct}}$

Q6(HW)

In the figure, the ideal moving iron voltmeter M will read



(a) 7.07 V

(b) 12.24 V

(c) 14.14 V

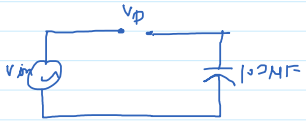
(d) 20.0 V

According To Given question

during $0 \le \omega t \le \frac{\pi}{2}$ here $V_{in} = +ve$ [forward bias] so capacitor will charged to 10V max

Now, diode to be forward bias the voltage V_{in} should be > 10 not possible

So after first quarter cycle the diode is always in reverse bias



$V_{in} = V_D + V_c \Rightarrow V_D = V_{in} - V_c \Rightarrow V_D = 10\sin(314t) - 10$

$V_{D\,rms} = \sqrt{\left(\frac{10}{\sqrt{2}}\right)^2 + (10)^2} \Rightarrow \boxed{V_D = 12.24V}$