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Mid-term Paper
Electronic Circuit

Name: ASH.FAQ AHMAD

Reg NO: 19PWCST 1795

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Section : B

Answer No: 01

Given:

$E = 7$ Volt

$R = 1.54\ K\Omega$

Required:

$I_D = ?$

$V_D = ?$

$V_R = ?$

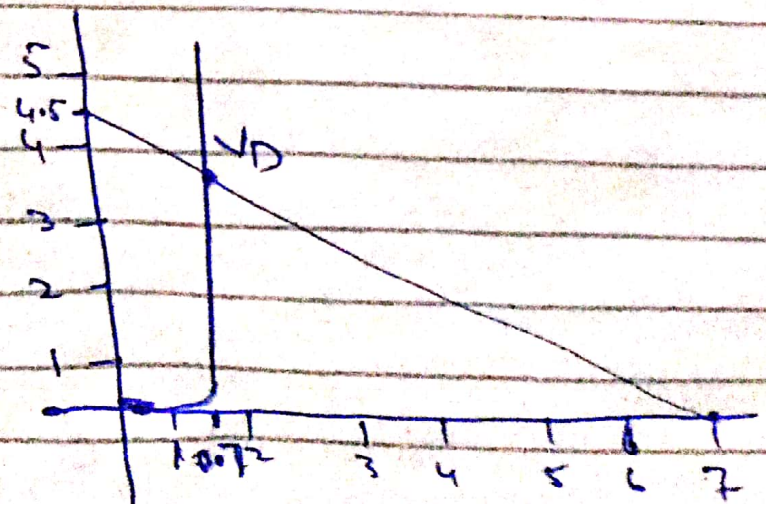
Sol

$$I_D = E/R$$

$$I_D = 7/1.54 \times 10^3\ A$$

$$I_D = 4.55 \times 10^{-3}\ A$$

$$\boxed{I_D = 4.55\ mA}$$



$V_D = .2V$ Approximately,

$V_R = ?$

$V_R = E - V_d$

$V_R = 7 - 2$

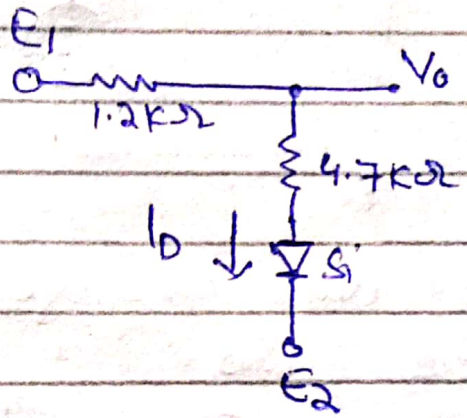
$V_R = 5$ Volt

Answer No: 02

Given:

$E_1 = 15$

$E_2 = -9$



Required.

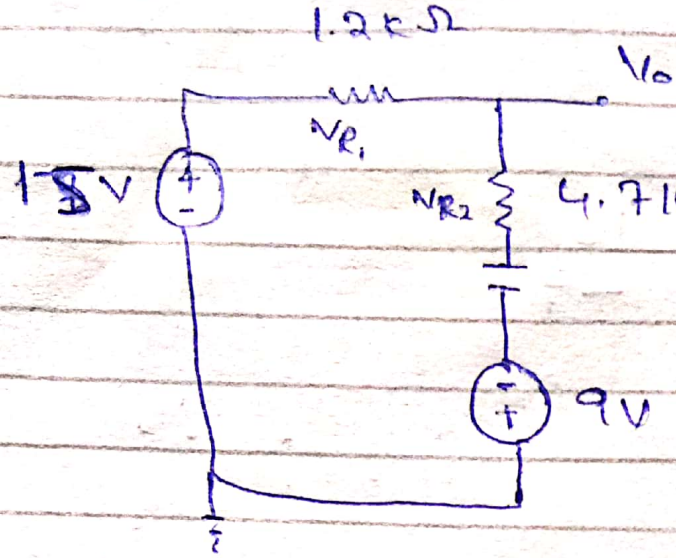
$V_o = ?$

$I_o = ?$

Sol

Now Redesign the circuit we will Include 0.7V battery because of Silicon diode

P e T f o



As we changed polarity of E_2 So

$$E_2 = +9V$$

Now apply KVL

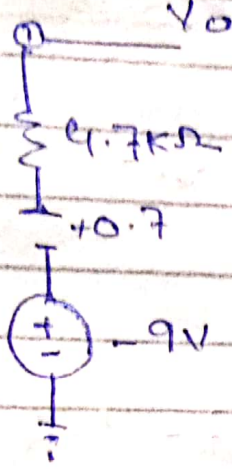
$$15V - (1.2k\Omega) \times I_D - 4.7k\Omega \times I_D - 0.7V + 9V = 0$$

$$-[1.2k\Omega + 4.7k\Omega] I_D + 23.3V = 0$$

$$I_D = \left(\frac{23.3}{5.9k}\right) mA$$

$$\boxed{I_D = 3.95\,mA}$$

Now V_o is the sum of E_2, the voltage across 4.7KΩ resistor and V_d of Diode, So



here I again changed the polarity of E_2.

$$V_o = V_R + 0.7V + (-9V) = 0$$

$$V_R = I_D R = (3.95mA) \times (4.7k\Omega)$$

$$V_R = 18.57\,V$$

$$V_o = 18.57 + 0.7 - 9$$

$$\boxed{V_o = 10.27\,V}$$ Ans

— XX — XX — XX V

Answer No: 03

Given.

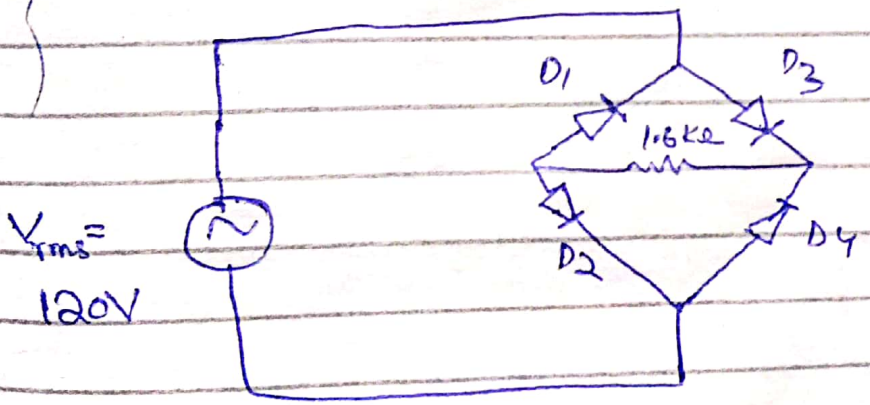
$V_i = 111$

$R = 1.6 \times 10^3 \Omega$

(a) $V_{dc} = ?$

Sol

Full-wave bridge Rectifier.



Now Peak voltage of Input voltage is

$$V_{rms} = \frac{V_m}{\sqrt{2}}$$

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

$V_m = \sqrt{2}\,(111)$

$V_m = 157\ V$

Now formula for finding V_{dc} is.

$V_{dc} = 0.636\,(V_m - 1.4V)$

Put values

$V_{dc} = 0.636(157 - 1.4)$

$\boxed{V_{dc} = 98.9V}$

(b) $PIV_{min} = ?$

Sol

formula for finding

$PIV_{min} = V_m - V_K$

V_K = Knee voltage of Diode

Here Diode is Silicon

So for Silicon

$V_K = 0.7\ V$

$P_{IV_{min}} = 157 - 0.7$:

$P_{IV_{min}} = 156.3$ A

Now in miliAmpere,

$$P_{IV_{min}} = 156300 \text{ mA}$$

—— xx —— xx —— xx

(c) $I_m = ?$

Sol

Now formula for finding I_m is,

$$I_{max} = \frac{N_m - 1.4}{R}$$

put values

$$I_m = \frac{157 - 1.4}{1.6 \times 10^3}$$

$$I_m = 97.25 \times 10^{-3} \text{ A}$$

$$I_m = 97.25 \text{ mA}$$ Ans

—— xx —— xx —— xx

Answer No: 04

Given:

$V_m = 143$

$E = 6$

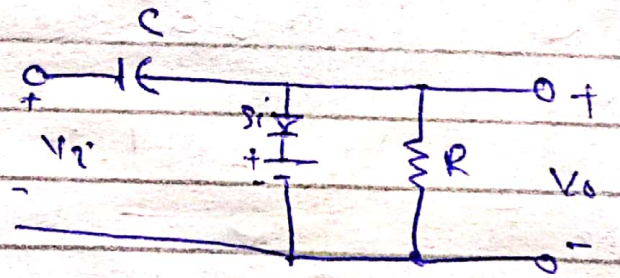
Required:

$V_c = ?$

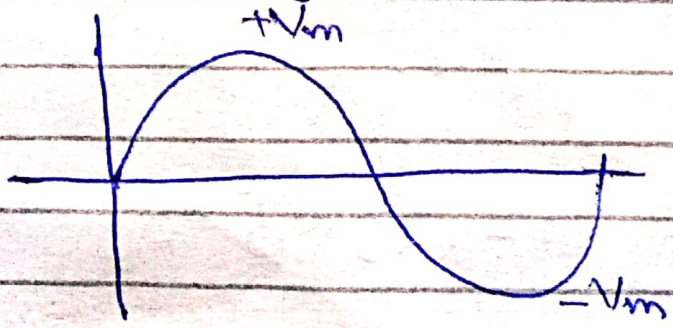
$V_{o+} = ?$

$V_{o-} = ?$

Sol



Input Signals are



formula for V_c is,

$$V_c = V_m - (E + 0.7)$$

$$V_c = 143 - (6 + 0.7)$$

$$\boxed{V_c = 136.3 \text{ Volt}}$$

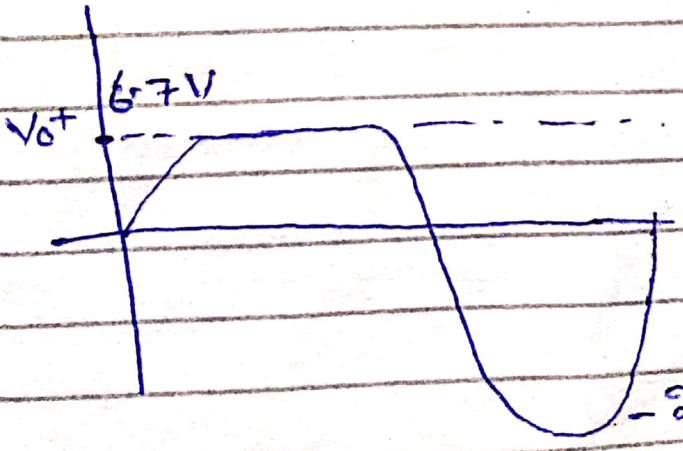
Now V_o^+ is given by,

$$V_o^+ = E + 0.7V$$

$$V_o^+ = 6 + 0.7V$$

$$\boxed{V_o^+ = 6.7V}$$

Output Signal



V_o^- will reached to $-2V_m$

so

$$\boxed{V_o^- = -2V_m}$$

Answer No = 5

Given

$R_S = 99\,\Omega$

$V_Z = 14\ V$

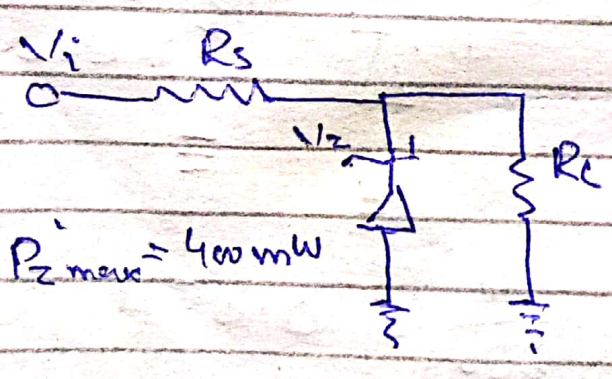
$R_L = 280\,\Omega$

Required:

$V_{i\,max} = ?$

$V_{i\,mini} = ?$

Sol



Now Voltage across diode should be 14V.

Now we Consider V_Z as open circuit and Apply KVL.

$$V_i = \frac{14(99)}{280} + 14V =$$

$$V_i = 4.9 + 14$$

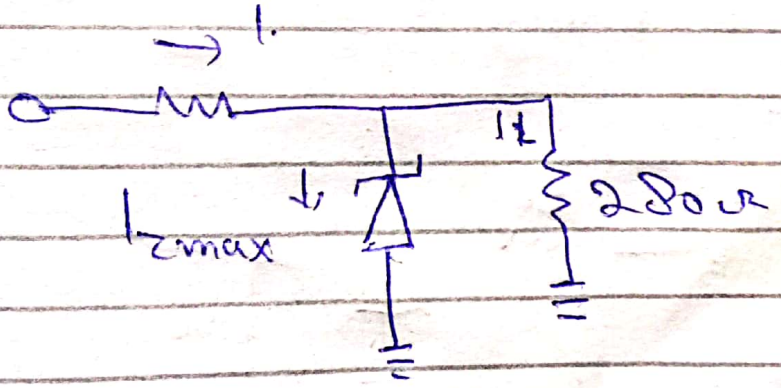
$$V_{i_{min}} = 18.9V$$

Since $P_{Z\,max} = 400mW$

and $V_Z = 14V$

$$I_{Z\,max} = \frac{400mW}{14V} =$$

$$I_{Z\,max} = 28.57\,mA$$



$$I_L = \frac{14}{280} = 0.05A$$

$$I_L = 50\,mA$$

$$I_{Z\,max} = 28.57mA$$

P φ T + O

Now $I_{max} = I_{zmax} + I_L$

$$I_{max} = 78.57\,mA$$

This is the current that should flow across R

$$I_{R_s} = \frac{V_i - 14V}{99}$$

$$I_{max} = \frac{V_{imax} - 14V}{99\,\Omega}$$

PVT $I_{max} = 78.57\,mA$

$$78.57(99) + 14V = V_{imax}$$

$$V_{imax} = 7792.43\,mV$$

$$V_{imax} = 7.8V$$

$$V_{imini} = 18.9V$$

$$7.8 \leq V_i \leq 18.9V$$

The END