American International University- Bangladesh (AIUB)
Faculty of Engineering

Course Name :	Electronic Devices	**Course Code:**	EEE 2103
Semester :	Spring 2020-21	**Section:**	J
Faculty :	Dr. Md. Rifat Hazari		

Assignment No :	1
Assignment Name :	CO2 (POI: P.a.3.C3)

Student Name:	**NAFINUR LEO**	**Student ID:**	**20-42195-1**

Submission Date:	**20-02-2021**	**Due Date :**	**20-02-2021**

Marking Rubrics (to be filled by Faculty):

Problems	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Problem 01	Detailed unique response explaining the concept properly and answer is correct with all works clearly shown.	Response with no apparent errors and the answer is correct, but explanation is not adequate/unique.	Response shows understanding of the problem, but the final answer may not be correct.	Partial problem is solved; response indicates part of the problem was not understood clearly.	Unable to clarify the understanding of the problem and method of the problem solving was not correct.	No Response	
Problem 02	Detailed unique response explaining the concept properly and answer is correct with all works clearly shown.	Response with no apparent errors and the answer is correct, but explanation is not adequate/unique.	Response shows understanding of the problem, but the final answer may not be correct	Partial problem is solved; response indicates part of the problem was not understood clearly.	Unable to clarify the understanding of the problem and method of the problem solving was not correct	No Response	
Comments						Total marks (10)	

INSTRUCTIONS: ***When a question mentions "ID" as a value, you have to use the last two digits of your ID before the hyphen. For example, for 12-34567-8 it would be 67. If the last 2 digits of your ID form a number less than 10, then add 10 with the number before using it to solve the problems. If the last 2 digits of your ID form a number greater than or equal to 10, you can use it as it is.***

Note: Copied/identical submissions will be graded as 0 for all parties concerned.

Problem 1

Consider that the input shown in the below figure (here V_x = **ID** V). **[5]**

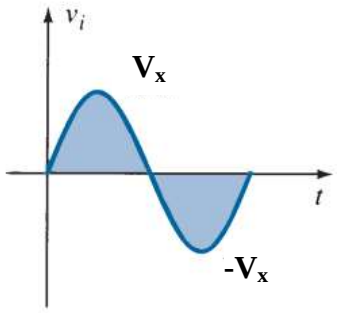


Fig. 1

Apply the knowledge gained from diode theories to **construct a circuit** which satisfies the following conditions and **sketch the output voltage** of the constructed circuit. Please explain how your circuit works and state your reasoning for your choice of circuit.

Design Criteria:
1) Only regular diodes (choose between Ge, Si, GaAs) and resistors can be used to construct the network.
2) During positive half cycle, output $V_O = (V_i - 1.2\ V)$
3) During negative half cycle, output $V_O = 0\ V$
4) Diode Peak inverse voltage = V_x

Problem 2

Consider that the input shown in the below figure (here V_x = **ID** V). **[5]**

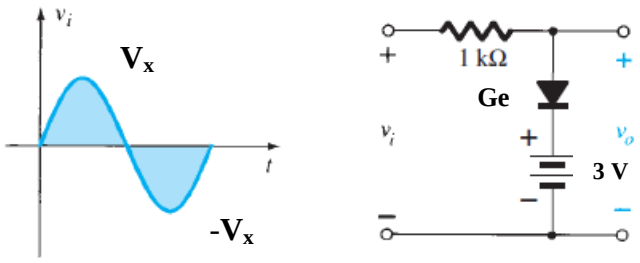


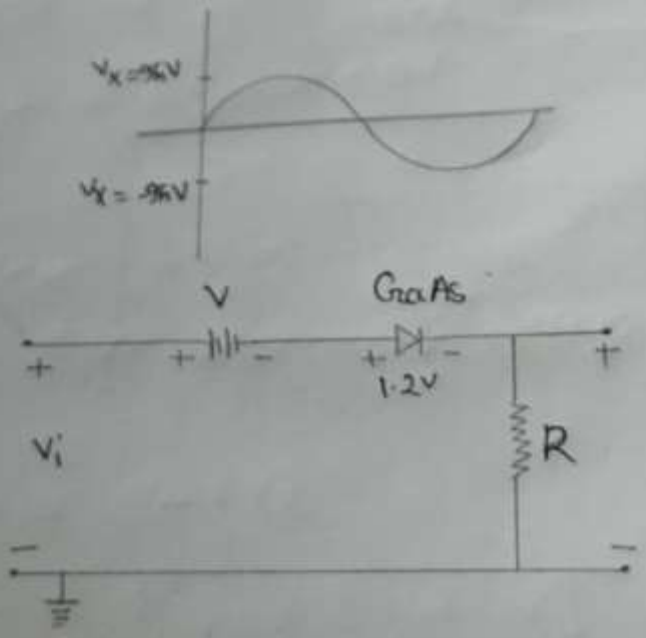
Fig. 2

Apply the knowledge gained from diode theories, **determine V_o curve** and explain the operating principle of the circuit shown in Fig. 2.

Problem 1:-

Here, $V_x = 9.5\ V$

1)



2. Here, for positive half cycle,

output $V = V_i - 1.2\ V$

In this figure, we see that diode is 'on'. For this reason, this diode is replaced

by a short circuit equivalent voltage.

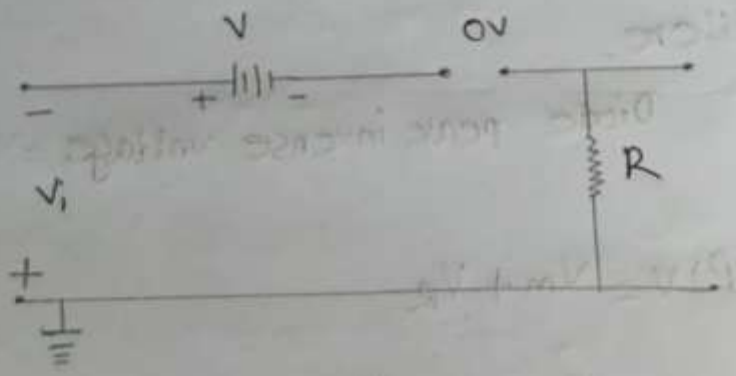
So, the output voltage.

$$V = V_i - 1.2V$$

$$= (95 - 1.2)V$$

$$= 93.8V$$

3.



In thi figure, for negative half cycle, we see that the diode is open circuit. Besides, current of diode $I_D = 0A$.

So, the out put voltage.

$$V_o = I_R \times R$$
$$= I_D \times R$$
$$= 0 \times R$$
$$= 0V$$

4) Here,

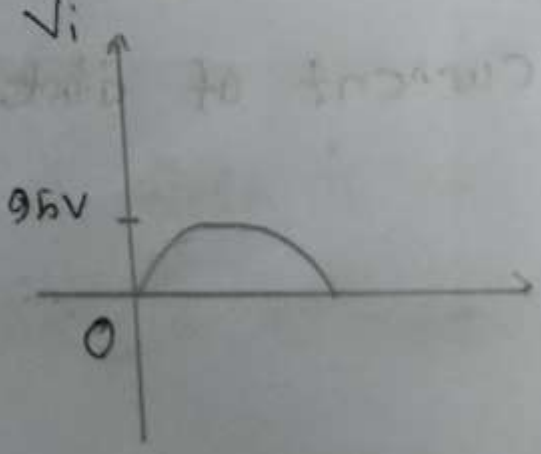
Diode peak inverse voltage $= V_X$

$\therefore PIV = V_m + V_R$

$= V_X + 0V \quad [V_m = V_X]$

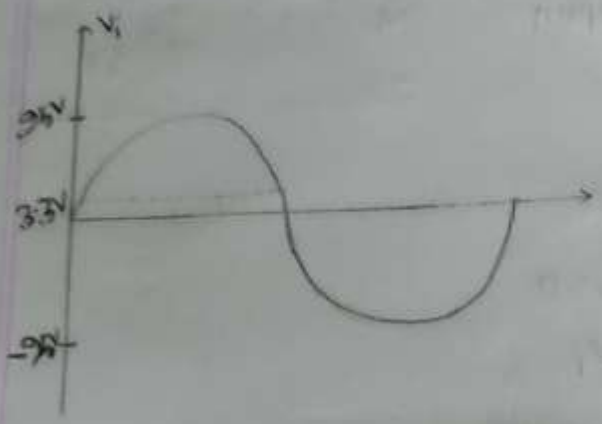
$= V_X$

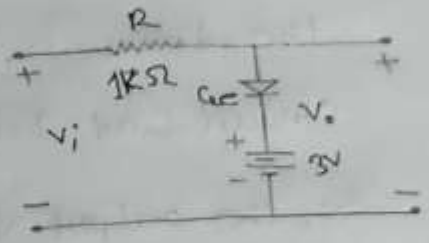
$= 95V$



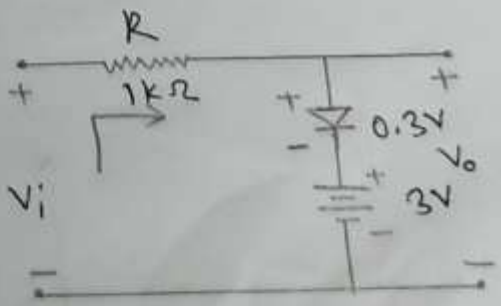
Problem 2:-

Here, $V_x = 9.5\,V$





During positive half cycle, we see that the diode is forwarded bias and here Germanium is used as a diode. So, we get 0.3 V for germanium and voltage source has 3V

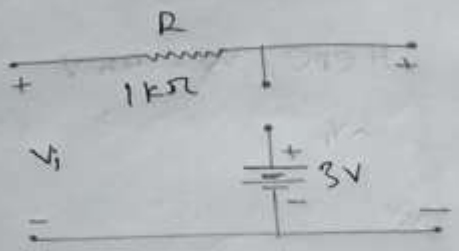


So, $V_o = V_D + V$

$= 0.3 + 3$

$= 3.3V$

During negative half cycle, we see that the diode is an open circuit and $I=0$



So, the output voltage.

$$-V_i - V_o = 0$$

$$\Rightarrow V_o = -V_i$$

$$= -9.5V$$