Ministry of Higher Education		
Higher Institute for Engineering and Technology at El-Manzala		
First semester : 2022/2023		Level: 1
Department: Electronic Engineering.		
Sheet No. (2)		Code: COM113
Course title: fundamental of electronics	Examiner: Dr. Mohamed Abdel Rahman	

Answer all of the Following Questions

Question (1):

A Full wave rectifier (FWR) is operated from 50Hzsupply with $E_{s(rms)} = 120\ \text{V}$. It is connected to a load drawing $I_{DC} = 60\,\text{mA}$ and using $C = 100\,\mu\text{F}$ filter capacitor. Calculate the dc output voltage and the root mean square value (rms) of the ripple voltage V_{rms}. Also calculate the ripple factor γ.(3 marks)

Question (2):

Aided with the provided I-V characteristics of the diode and the circuit shown in Fig.1, find the diode current and voltage graphically using load line analysis for the following:

$V_s = 1\,\text{V}$ and $R = 20\,\Omega$.

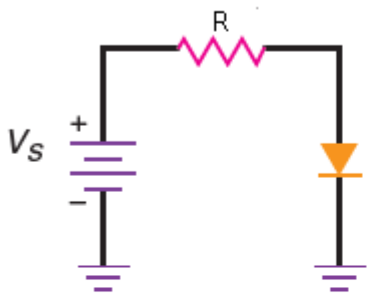


Fig. (1a)

Fig. (1b)

Question (3):

a)

No.	Parameters	Light emitting diode (LED)	Photo diode
1	function		
2	Schematic symbol		
3	Bias for normal operation		
4	Applications		

Question (4):

a) Aided with the configurations, sketch a bridge rectifier and demonstrate the output voltage in case of with and without capacitor filter.

b) An abrupt silicon p-n junction having doping of $N_A = 10^{18}\,\text{cm}^{-3}$; $N_D = 10^{15}\,\text{cm}^{-3}$ and a circular cross section with diameter of 0.02 inch. Consider $n_i = 1.5\times10^{10}\,\text{cm}^{-3}$ for silicon at room temperature, relative permittivity $\varepsilon_S = 11.9$ and $\varepsilon_o = 8.85\times10^{-14}$ F/cm.

Determine the following:

i) The value of built in voltage V_o.

ii) ii) The depletion width in n-region x_{no}.

iii) The depletion width in n-region x_{po}.

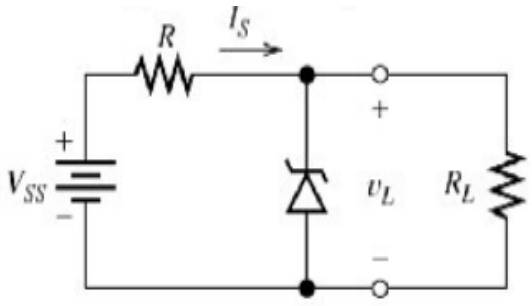
iv) iv) Total depletion width W_d.

v) Sketch the electric field intensity *E*, charge density ρ distributions and potential *V* across the junction.

Question (5):

a) Draw the zener diode I-V characteristics and label each region.

b) Consider a zener diode regulator circuit as shown in Fig. 1. $V_{SS} = 30\,\text{V}, R = 1.5\,\text{k}\Omega,\ R_L = 6\,\text{k}\Omega$ and $V_Z = 10\,\text{V}$. Compute the following:



Fig

i) The current flowing through the load, I_L …….

ii) The source current, I_S…..

i) The zener current I_Z at full load…….

ii) Power of zener diode P_Z…….

iii) Power supplied by the source, P_S. …….

v) Output voltage with removing the zener diode ……..