

(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS

YEAR ONE SEMESTER ONE

**FOR THE DEGREE OF BACHELOR IN
(COMPUTER SCIENCE)**

COURSE CODE: CSC 113

COURSE TITLE: ELECTRONICS

DATE: 20/12/2022

TIME: 9.00 A.M. – 11.00 A.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO (2)

QUESTION ONE (COMPULSORY) [30 MARKS]

- a) Name the semiconductor devices in figure 1 and name the parts labeled P, Q and R. [3 marks]

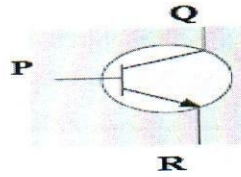
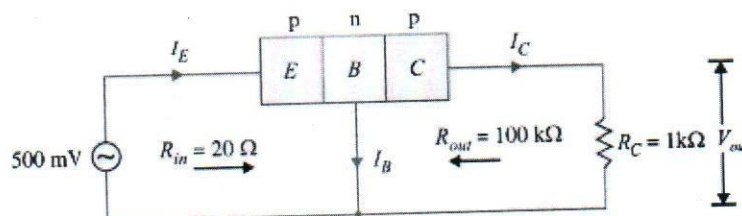


Figure 1

- b) What is intrinsic semiconductor? How do we make it extrinsic semiconductor, and why? [5 marks]
- c) Draw the schematic of a pn-junction diode [2 marks]
- (i) Forward-biased mode. [2 marks]
- (ii) reverse-biased mode [2 marks]
- Show in each case the polarity of voltage source (positive and negative terminal of the source) and the current direction. [2 marks]
- d) With the aid of diagrams outline the difference between npn and pnp transistors. [4 marks]
- e) A load line intersects the forward V-I characteristic of a silicon diode at Q, where the slope of the curve is 40mA/V. Calculate the diode resistance at the point Q. [4 marks]
- f) A common base transistor amplifier has an input resistance of 20 Ω and an output of resistance 100kΩ. The collector load is 1kΩ. If a signal of 500 mV is applied between emitter and base, find the voltage amplification. Assume α_{ac} to be nearly one. [4 marks]



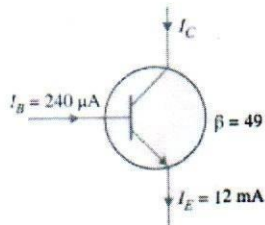
- g) In a common base configuration, $I_E=1\text{mA}$, $I_C=0.95\text{mA}$. Calculate the value of I_B . [4 marks]

QUESTION TWO [20MARKS]

- a) Outline **THREE** advantages of light emitting diode (LED) as a solid-state light source. [3 marks]
- b) With the help of a neat diagram, explain the operation of a Bridge Rectifier. What is PIV for the diode used here [7 marks]
- c) Describe Zener diode and briefly explain how it regulates the voltage? What happens to the series current, load current and zener current when the d.c. input voltage of a zener regulator increases? [10 marks]

QUESTION THREE [20 MARKS]

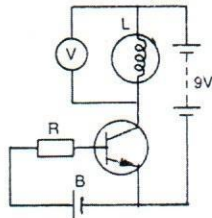
- a) Find the rating of the transistor shown in figure 3a. hence determine the value of I_C using both α and β rating of the transistor. [6 marks]



- b) Calculate value of series resistance is required to limit the current through a LED to 20mA with a forward drop of 1.6V when connected to a 10V supply. [4 marks]
- c) Distinguish between majority and minority carriers in a semiconductor. Define mobility of charge carriers. [10 marks]

QUESTION FOUR [20 MARKS]

- a) In the circuit diagram given, a volt meter is connected across a lamp, what changes would occur at lamp "L" and voltmeter "V", if the resistor R is reduced in value? Give reason(s) for your answer? [3 marks]



- b) With the aid of diagrams differentiate between CE, CB and CC configurations of BJT's. State **ONE** application of each configuration [9 marks]

c) For the circuit of figure 4c calculate

- (i) The output voltage [2 marks]
- (ii) The voltage drop across series resistance [2 marks]
- (iii) The current through Zener diode [4 marks]

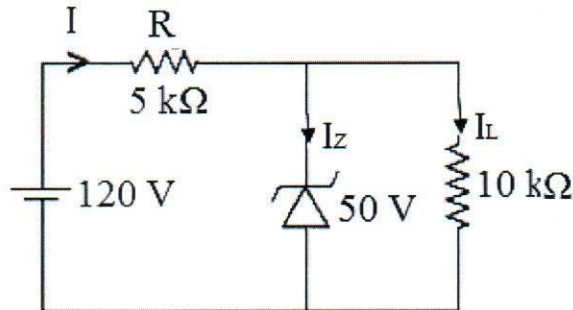


Figure 4c

QUESTION FIVE [20 MARKS]

- a) Draw the circuits to obtain the input and output characteristics of an NPN transistor in CE configuration. [10 marks]
- b) Discuss how a depletion layer is formed in a P-N junction and how does it vary with biasing? Draw V-I characteristics of P-N junction diode. [10 marks]