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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
SECOND YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: 26th July 2022
Time: 8.30am –10.30am

KCS 203 - ELECTRONICS

INSTRUCTIONS TO CANDIDATES

ANSWER **QUESTION ONE (COMPULSORY)** AND **ANY OTHER TWO** QUESTIONS

QUESTION ONE (30 MARKS)

a) Differentiate between AC and DC current. (2 marks)

b) Define the following terms as used in electrostatic.

i) Electromotive force (emf)

ii) Electric Charge

iii) Resistance (2 marks)

c) Three Resistors R1 = 2Ω, R2 = 4Ω and R3 = 6Ω are connected in parallel in a circuit with a 24V voltage source.

i) Find the equivalent resistance (2 marks)

ii) Find the current across each resistor. (4 marks)

iii) What is the total current in the circuit? (4 marks)

d) Briefly explain the two main types of semi-conductors (4 marks)

e) Doping is the process of adding impurities to a pure semi-conductor. Why do we add impurities to a pure semi-conductor? (2 marks)

f) Give three applications of each of the following types of diodes

i) Zener diode (3 marks)

ii) Tunnel Diode (3 marks)

QUESTION TWO (20 MARKS)

a) Define tunnel diode and briefly discuss tunnelling effect.
(6 marks)

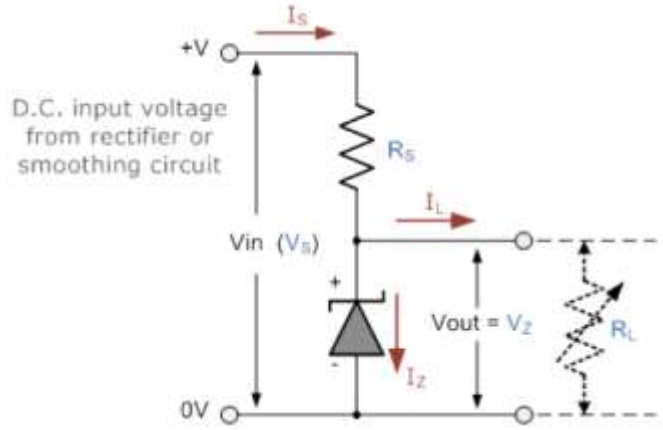
b) What is depletion layer in a p-type and n-type semi-conductor. With the help of a diagram explain is formed. (8 marks)

c) Explain the term doping. What is the effect of temperature on extrinsic semiconductor?
(6 marks)

QUESTIONS THREE (20 MARKS)

a) Discuss the differences between p-type and n-type semi-conductor materials?
(8 marks)

b) The figure below shows a zener regulator circuit.



A 5.0V stabilized power supply is required to be produced from a 12V DC power supply input source. The maximum power rating P_Z of the zener diode is 2W. Using the zener regulator circuit above calculate.

i) The maximum current flowing through the zener diode.
(3 marks)

ii) The minimum value of the series resistor, RS
(3 marks)

iii) The load current I_L if a load resistor of 1kΩ is connected across the zener diode.
(3 marks)

iv) The zener current I_z at full load.
(3 marks)

QUESTION FOUR (20 MARKS)

a) Explain the following zener diode specification

i) Zener voltage

ii) Current I_z (max)

iii) Current I_z (min)

iv) Power rating (8 marks)

b) Differentiate between forward bias and reverse bias (4 marks)

c) Briefly discuss the two types of Metal Oxide Semiconductor Field Effect Transistor (MOSFET) (4 marks)

d) A transistor has a β_{DC} of 250 and a base current, I_B, of 10μA. Calculate the collector current, I_C (4 marks)

QUESTION FIVE (20 MARKS)

a) Define a transistor and briefly explain the transistor biasing? (4 marks)

b) With the aid of a well labeled diagram, Discus three configuration characteristics of a bipolar transistor. (12 marks)

c) Explain the following operation modes in Bipolar Junction Transistor (BJT)

i) Cut-off mode

ii) Saturation mode (4 marks)