



# **KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR**

**SECOND YEAR SECOND SEMESTER  
SUPLIMENTARY EXAMINATIONS**

**FOR THE DEGREE OF B.SC (PHYSICS)**

**COURSE CODE: SPC 223**

**COURSE TITLE: ELECTRONICS I**

**DATE: 29/07/2022**

**TIME: 2:00PM-4:00PM**

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**INSTRUCTIONS TO CANDIDATES**

TIME: 2 Hours

Answer question ONE and any TWO of the remaining

KIBU observes ZERO tolerance to examination cheating

**QUESTION ONE (30 marks) Compulsory**

- (a) Distinguish between nucleus and extra nucleus in atomic structure (2mks)
- (b) With justification, identify the orbit electrons that determines the physical, chemical and electrical properties of a material. (3mks)
- (c) Briefly describe the contribution of valence electrons in the determination of chemical activity of a material. (8mks)
- (d) Discuss the differences between conductors, insulators and semiconductors in terms of energy bands. (9mks)
- (e) Describe how bonding takes place in semiconductors. (8mks)

**QUESTION TWO (20 marks)**

- (a) Distinguish between n-type and p-type conductors (2mks)
- (b) Briefly describe forward biasing and reverse biasing (4mks)
- (c) Describe full wave rectification using two diodes and a centre-tapped transformer. (12mks)
- (d) State any two disadvantages of full wave rectification using two diodes(2mks)

**QUESTION THREE (20 marks)**

- (a) Define the following terms as used in transistors:
  - i. Emitter (1mk)
  - ii. Collector (1mk)
  - iii. Base (1mk)
- (b) Describe the working of the two types of transistors (10mks)
- (c) Differentiate between FET and BJT transistors. (7mks)

**QUESTION FOUR (20 marks)**

- (a) Describe the working of a light-emitting diode (LED) (10mks)
- (b) State any two applications of LED, (2mks)
- (c) A transistor is connected in common emitter (CE) configuration in which collector supply is 8V and the voltage drop across resistance  $R_{R_c}$  connected in the collector circuit is 0.5V. the value of  $R_c = 800\Omega$ . If  $\alpha = 0.96$ , determine:
  - i. The collector-emitter voltage (3mks)
  - ii. Base current (5mks)

**QUESTION FIVE (20 marks)**

(a) Define the following terms:

iii. Breakdown voltage

(1mk)

iv. Knee voltage

(1mk)

(b) Discuss the resistance of crystal diode

(11mks)

(c) Show that for a transistor configuration, the base current amplification factor,  $\beta$  and emitter current amplification factor,  $\alpha$  are related by:

$$\beta = \frac{\alpha}{1 - \alpha}$$

(7mks)