



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INDUSTRIAL TECHNOLOGY
ELECTRONIC ENGINEERING DEPARTMENT
ELECTRONIC ENGINEERING DEVICES AND CIRCUITS
EEE 1213**

Examination Paper

March 2025

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: S. Nhema

INSTRUCTIONS

1. Answer ANY **4 QUESTIONS**
2. Start the answer for each question on a fresh page

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
TOTAL	100

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QUESTION 1

- a. What is the difference between Insulator, Semi-conductor and Conductor [5]
- b. Define the terms:
 - I. Band structure of a material
 - II. Valence band
 - III. Conduction band and
 - IV. Draw the energy band structure of an insulator, semi-conductor and conductor [6]
- c. What is an intrinsic semiconductor? Give 2 examples [4]
- d. Explain the mechanism by which a hole contributes to conductivity. [4]
- e. How is a PN junction formed [2]
- f. Briefly explain Diffusion, Junction barrier [4]

QUESTION 2

- a. What is a Zener diode [2]
- b. Draw the symbol of a photodiode and list 2 applications [3]
- c. With the aid of a diagram explain the Zener diode I-V Characteristics [8]
- d. Explain the principle of operation of a photodiode [4]
- e. List 3 advantages and 3 disadvantages of a photodiode [6]
- f. What is a Clamper Circuit [2]

QUESTION 3

- a. With the aid of a diagram describe the characteristics of a photodiode [10]
- b. Explain the 2 major categories of field effect transistors [8]
- c. What is a Field Effect Transistor [2]
- d. State 3 Advantages and 2 Disadvantages of an LED [5]

QUESTION 4

- a. Explain the construction of BJT and draw its symbols [12]
- b. For a Bipolar Junction Transistor briefly explain the following:
 - I. Common Base Configuration
 - II. Common Emitter Configuration
 - III. Common Collector Configuration [9]
- c. List 4 applications of LEDs [4]

QUESTION 5

- a. Write 4 differences between Photodiode and Phototransistor [8]
- b. Write 4 differences between LCD and LED [8]
- c. Explain the working principle of an LED [5]
- d. What are the characteristics of a Rectifier circuit [4]