



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ARCHITECTURE

EAR 2203: BUILDING ENVIRONMENT SCIENCE I

(THERMAL DESIGN)

END OF SEMESTER EXAMINATION

YEAR TWO SEMESTER ONE

SERIES: DECEMBER 2024

TIME: 2 HOURS

DATE: DECEMBER 2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (30 MARKS)-COMPULSORY

- a) Define the following terminologies
 - i. Thermal Comfort (2 marks)
 - ii. Sun Path Diagram (2 marks)
 - iii. Altitude angle (2 marks)
 - iv. Daylighting (2 marks)
- b) With the aid of sketches, outline FOUR types of Glare. (12 marks)
- c) Explain FIVE personal factors that affect thermal comfort. (10 marks)

QUESTION TWO (15 MARKS)

- a) Outline THREE techniques of sun shading outdoor spaces (3 marks)
- b) With the aid of sketches, explain THREE techniques of sun shading buildings. (12 marks)

QUESTION THREE (15 MARKS)

Explain the following concepts:

- a) Passive solar architecture. (4 marks)
- b) Active solar architecture. (4 marks)
- c) Building's Carbon Footprint. (3 marks)
- d) Sustainable architecture. (4 marks)

QUESTION FOUR (15 MARKS)

A new office building is being designed for a hot and humid climate. As the architect, explain FIVE passive cooling strategies you would incorporate into the design to minimize energy consumption for air conditioning. Use sketches.

QUESTION FIVE (15 MARKS)

- a) Elaborate bioclimatic architecture. (3 marks)
- b) You are commissioned to design a community center in an area with extreme seasonal temperature variations (very hot summers and very cold winters). Using diagrams, outline FOUR passive strategies you would employ to ensure year-round thermal comfort. (12 marks)