



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT
UNIVERSITY EXAMINATION FOR:
DIPLOMA IN ARCHITECTURE
**EAR 2205: BUILDING ENVIRONMENT SCIENCE-LIGHTING
DESIGN**

SPECIAL & SUPPLEMENTARY EXAMINATION
YEAR TWO SEMESTER TWO

SERIES: JULY 2025

TIME: 2 HOURS

DATE: July, 2025

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) – COMPUSOLRY

- a) Explain the difference between Artificial and Natural sources of light. (2 marks)
- b) Define 'Daylighting' and list FIVE requirements for quality daylighting design. (6 marks)
- c) Your client has constructed a large 5 bedroom house, however, they have noted that artificial light is not adequate at night. List TWO ways you would increase the lighting in their home. (2 marks)
- d) Explain the functional difference between the following lamps and indicate TWO possible applications for each in design.
- I. Fluorescent and Incandescent (4 marks)
 - II. Light Emitting Diode and Neon Lamps (4 marks)
 - III. Fluorescent Tubes and Halogen lamps (4 marks)
- e) Describe FOUR types of glare (8 marks)

QUESTION TWO (15 MARKS)

Using a well labelled sketch and sun path, illustrate a spatial layout designed to receive adequate natural light throughout the day in the following spaces; Kitchen, Living Room, Bed Room, Storage, Staircase, Veranda.

QUESTION THREE (15 MARKS)

- a) You have been commissioned to design student residences in Glasgow where they receive only 1203 hours of sunshine a year. List FIVE types of 'Light Therapy' you can recommend to manage Seasonal Affective Disorder.(5 marks)
- b) Your client wants to construct a 5 story Library building. Using sketches illustrate FIVE daylighting strategies you can implement to provide adequate natural light in the library. (10 marks)

QUESTION FOUR (15 MARKS)

- a) You are the lead consultant in a shopping mall project. Explain FIVE factors you must consider when selecting light sources for the project. (10 marks)
- b) Define the following terms:
- I. Retina (1 mark)
 - II. Brightness (2 marks)
 - III. Contrast (2 marks)



QUESTION FIVE (15 MARKS)

- a) Define Glare (1 mark)
- b) Using labeled sketches illustrate the following sun path diagrams used to assess solar exposure of a building throughout the year.
 - a. Sky Dome (3 marks)
 - b. Vertical sun path diagram (3 marks)
- c) Explain TWO considerations that inform the method of mounting lighting fixtures in design. (4 marks)
- d) Sun shading is a necessary consideration for design along the equator. List FOUR shading strategies you can implement for a residential house in Mombasa County. (4 marks)