TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE (DA 13 M)

EAR 2205: BUILDING ENVIRONMENTAL SCIENCE – LIGHTING DESIGN

END OF SEMESTER EXAMINATION
SERIES: AUGUST 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Non-programmable Scientific Calculator*

This paper consists of **FIVE** questions. Answer any **THREE** questions of the **FIVE** questions
All questions carry equal marks
Maximum marks for each part of a question are as shown

Use neat, large and well labeled diagrams where required.
This paper consists of **TWO** printed pages

Question One

a) State the TWO types of lighting and their corresponding purpose. **(2 marks)**

b) Enumerate TWO properties of the objects that we see. **(2 marks)**

c) Vision is the most important communication channel between man and his environment, light being a prerequisite. Briefly outline the sources of light. **(5 marks)**

d) Explain the nature of light **(5 marks)**

e) Describe the transmission of light **(6 marks)**

Question Two

Discuss the following sub-titles

a) Reflection **(10 marks)**
b) Coloured light **(5 marks)**
c) Munsell system **(5 marks)**

Question Three

Vision is a function of the eye and light. Discuss. **(20 marks)**

Question Four

a) Discuss the inverse square law as used in the determination of the direct component of illluminance. **(10 marks)**

b) A uniform source of light which gives out 25133lm is placed 3m directly above point A on a working plane. Point B is on the same plane but 4m away from A. Evaluate the direct illuminance at each point using the cosine law of illuminance. **(10 marks)**

Question Five

A room measures 20 x 9m and the light fittings are mounted on the ceiling 2.5m above the working plane. The required illuminance is 300lux with an mf of 0.8. Calculate:

a) Room index **(5 marks)**
b) U.F **(5 marks)**
c) Number of light fittings **(5 marks)**
d) Whether spacing to mounting height is acceptable use of: **(5 marks)**
  (i) B24 luminate with maximum spacing to mounting height
  (Φ)
  (ii) Lighting design lumens for lumps = 6134 lm, 1 lamp per luminaire
  (iii) Lower flux utilance = 0.88
  UFU = 0.42
  DLOR = 50%

ULOR = 20%