TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE (DARC)

EAR 2205: BUILDING ENVIRONMENTAL SCIENCE (LIGHTING DESIGN)

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 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) Highlight the following:
- **(i)** Vision **(3 marks)**
- **(ii)** Artificial lighting **(3 marks)**
- **(iii)** Purposes of lighting **(3 marks)**
- **(iv)** Natural lighting **(3 marks)**

b) Give an account of the sub topics below:
- **(i)** Illumination **(4 marks)**
- **(ii)** Nature of light **(4 marks)**

Question Two

a) Discuss transmission with regard to light. **(10 marks)**

b) Reflection is a function of light and the surface quality of an object. Discuss. **(10 marks)**

Question Three

As an Architect:

a) Explain what discomfort glare from artificial lighting installations is **(10 marks)**

b) How would you pre-empt and react to the glare in (a) above **(10 marks)**

Question Four

Describe the following laws of illuminance:

- **a)** Inverse square law of illuminance **(10 marks)**
- **b)** Cosine law of illuminance **(10 marks)**

|Question Five

a) A uniform source which gives out 25144 lm is placed 2.7m directly above point P on a working plane. Point Q is on the same plane but 5m away from point P. Evaluate direct illuminance at each point using the cosine law of illuminance **(4 marks)**

b) Using a manufacturer's data sheet, design a lighting installation for a college seminarY room such that the average illuminance is 500 lux on the horizontal working plane using the information below:

Room	=	12 x 8 x 3.2m
Working plane	=	0.85m above floor
Reflectances	Ceiling = 70%	
	Walls = 50%	

Working plane = 20%
MF = 0.74

Luminaires = 7800, twith tube, ceiling mounted, DLOR = 44%, max s/Hm = 1.73:1
Lamps = 1800mm, 75w, white light, 5500 LOL/lamp **(16 marks)**