Technical University of Mombasa

Faculty of Engineering and Technology

DEPARTMENT OF MEDICAL ENGINEERING

DIPLOMA IN MEDICAL ENGINEERING
(DME 111 Y3 S2)

EHL 2303
OPTO ELECTRONICS

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER, 2013
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

-You should have a Scientific Calculator for this paper
-Answer **ANY THREE** questions.

This paper consists of **3 PRINTED** pages

QUESTION ONE

(a) Explain, with aid of a transistorized circuit diagram, how a photoconductive cell may be used in health care industry to sound an alarm whenever light is interrupted. **(10 marks)**

(b) (i) List the **THREE** modes of laser operation
(ii) Explain the laser modes in (i) **(9 marks)**
(iii) Define the term attenuation as used in optical fibre cables **(1 marks)**

QUESTION TWO

(a) (i) State the two parameters by which fibre optic cables may be classified.
(ii) Explain the fibre-optic cable types in each of the classes in (i) **(10 marks)**

(b) Draw a LDR Resistance versus Illumination curve and explain its shape. **(6 marks)**

(c) Draw the phototransistor symbol and its VA curve. **(4 marks)**

QUESTION THREE

(a) With the aid of sketches, explain the **TWO** types of extrinsic attenuation encountered in fibre optic cables. **(9 marks)**

With the aid of a diagram, explain the operation of a photo-darlington relay control circuit. **(7 marks)**

Explain **TWO** areas of application of microwaves. **(4 marks)**

QUESTION FOUR

(a) With the aid of a diagram, explain the construction and operation of a NEHE laser. **(12 marks)**

(b) A step index fibre optic cable has a core diameter of 50μm, numerical aperture of 0.23 and wavelength of input light energy of 0.82μm. Determine the number of modes. **(4 marks)**

(c) Define the following terms:-

(i) Photon II
(ii) Dark current **(4 marks)**

QUESTION FIVE

(a) With the aid of energy level diagrams, explain the LASER action. **(9 marks)**

(b) Explain the following photo-detector characteristics. **(5 marks)**

(i) Responsivity
(ii) Spectral response
(iii) Frequency response.

(c) Explain **THREE** application of laser in health care (hospital) **(6 marks)**