



MACHAKOS UNIVERSITY

University Examinations for 2016/2017
SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL AND
ELECTRONICS ENGINEERING

EED 109: ELECTRICAL INSTALLATION TECHNOLOGY

DATE: 30/5/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

SECTION A: COMPULSORY QUESTION

1.
 - a) State any two types of cathodic protection . (2 marks)
 - b) With the aid of a well labelled diagram, explain the sacrificial anode corrosion protection system. (6 marks)
 - c) Two head lamps of a car are in parallel. They together consume 48W with the help of a 6V battery. Calculate the resistance of each bulb. (4 marks)
 - d) Define the following terms-
 - (i) Space factor (2 marks)
 - (ii) Diversity factor . (2 marks)

State the space factors for the following

- Conduit
- Trunking
- Ducts

(3marks)

- (e) A 27A single phase load supplied by a 15m long twin PVC sheathed cable running alongside other two similar cables on a tray is protected by a rewirable fuse. If the ambient temperature is 45°C, and the maximum allowable voltage drop is 4%, determine the suitable cable size to satisfy the load current and voltage drop requirements. (Use table 1 provided). (7 marks)

Table 1

Factors affecting cable rating	Value/type	Correction factor
Ambient temperature	45°C	0.91
Grouping	3 cables	0.70
Type of protective device	Rewirable	0.725
Nominal cross-sectional area of conductor (mm²)	Current rating (A)	Volt drop per Ampere per meter (MV/A/M)
4.0	36	11.0
6.0	46	7.3
10.0	63	4.4
16.0	85	2.8
25.0	112	0.17

- (f) A five-amps rated switch is rated is to be used to control a circuit consisting of 150watts, 240 volts tungsten bulbs. Determine the maximum number of lamps that may be connected. (6 marks)

SECTION B: ANSWER ANY TWO

2. a) Define the following terms:
- Accessory
 - Wiring system (4 marks)
- b) List any 4 types of accessories used in Electrical Installation (2 marks)
- (c) With the aid of a diagram, explain the term “Protective multiple earthing” (5 marks)
- (d) With aid of a diagram, explain Radial and Ring final sub circuits (2 marks)
- e) Two lamps, rated at 240V, 60W and 240V, 100W respectively, are connected in parallel to a 240V supply. Calculate the total current drawn from the supply. (5 marks)

- (f) What would be the rating of the Third Lamp to be connected in parallel with the existing two lamps in (e) above to increase the current drawn from the supply to 1 Ampere? (2 marks)
3. a) Define the following terms:
- i. Earth,
 - ii. earthed,
 - iii. earth electrode,
 - iv. earth continuity conductor,
 - v. earthing lead (5 marks)
- b) Explain what live metal work is (2 marks)
- c) Highlight the main functions of earthing (3 marks)
- d) Explain the main earthing tests stating the instrument and reading expected (10 marks)
4. a) Explain the purpose of testing and inspection. (3 marks)
- b) State the sequence of testing and inspection as recommended in the IEE regulations. (4 marks)
- c) With the aid of a circuit diagram, explain the operation of a current operated earth leakage circuit breakers. (11 marks)
- d) State TWO IEE regulation requirements regarding the use of earth leakage circuit breakers. (2 marks)
5. (a) Define the following terms associated with fuses
- (i) Fuse element
 - (ii) Current rating
 - (iii) Fusing current
 - (iv) Fusing factor (8 marks)
- (b) Given that the fusing current of a rewirable fuse is 30A, and the fusing factor is 1.5, determine the current rating of the fuse. (2 marks)
- (c) Explain the term discrimination as applied in excess current protection, giving examples (4 marks)
- (d) Explain any Three types of special wiring systems (6 marks)