



# MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

SUPPLEMENTARY EXAMINATION

EED 212: ELECTRICAL INSTALLATION TECHNOLOGY IV

DATE: 31/8/2017

TIME: 8:30 – 10:30 AM

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## INSTRUCTIONS

Attempt question ONE and any two questions

### QUESTION ONE

- (a) State **TWO** faults found in underground cables. (2 marks)
- (b) With aid of a well labeled circuit diagram, describe the Varley loop test method used to locate the position of earth fault in underground cables. (8 marks)
- (c) State any **THREE** factors that affect soil resistivity. (2 marks)
- (d) A twin cable of length 1000 metres has developed a low resistance earth on one core. A fall of potential test is taken from both ends, P and Q. The readings taken at P are  $V_1 = 15V$ , and  $I_1 = 3A$ . The readings at Q are  $V_2 = 30V$ , and  $I_2 = 3A$ . Find the position of the fault. (2 marks)
- (e) (i) Define the following terms;
  - I. Hazardous area
  - II. Flash point(4 marks)
- (ii) Distinguish between the following hazardous area zone 1 and 2. (2 marks)
- (f) With aid of a well labeled diagram, describe the operation of zener diode safety barrier circuit (10 marks)

## QUESTION TWO

- (a) Define the following terms as used in earthing:-  
(i) Earthed  
(ii) Dead (4 marks)
- (b) With the aid of well labeled diagram, describe the necessity of earthing with respect to prevention of electric shock. (8 marks)
- (c) (i) With aid of well labeled diagram describe the operation of voltage operated earth leakage circuit breaker. (6 marks)  
(iii) State any two applications of voltage operated earth leakage circuit breaker. (2 marks)

## QUESTION THREE

- (a) Define the following terms as used in electric heating  
(i) Heat  
(ii) Temperature (4 marks)
- (b) Differentiate the following terms conduction and convection as used in heat transfer (2 marks)
- (c) Describe the following types of electric heaters:  
(i) Convector  
(ii) Panel (4 marks)
- (d) With aid of well labeled diagram describe the following types of water heating systems:-  
(i) Free outlet water heater  
(ii) Pressure water heater (10 marks)

## QUESTION FOUR

- (a) State:  
(i) Three advantages of multiple rope drives  
(ii) Four points to consider when using flat driving belts (7 marks)
- (b) Differentiate the following terms  
(i) Drip proof and flame proof types of enclosures  
(ii) Group and individual drives as used in electrical machines (5 marks)
- (c) With aid of well labeled diagrams describes the following methods:  
(i) Vee belts  
(ii) Multiple rope drives (8 marks)

## QUESTION FIVE

- (a) (i) State four factors affecting the earth resistance (4 marks)  
(ii) State two methods used for earthing (2 marks)
- (b) Describe effects of moisture on earth resistance (2 marks)
- (c) With aid of labeled diagram explain the procedure of measuring earth electrode resistance area. (12 marks)