



# TECHNICAL UNIVERSITY OF MOMBASA

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Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING

EEE4201: WORKSHOP PRACTICE PAPER 2

SPECIAL/SUPPLEMENTARY EXAMINATION

**SERIES: SEPTEMBER 2018**

**TIME: 2 HOURS**

**DATE: SEPTEMBER 2018**

## Instructions to Candidates

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **five** Questions; Question ONE is compulsory. In addition attempt any Other **TWO** Questions.

**Do not write on the question paper.**

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## Question ONE (Compulsory 30 marks)

- (a) (i) State IEE regulations on final sub circuits
- (ii) Describe final sub circuit rated under 15A
- (iii) Explain why circuit fuses must not exceed the rating of the smallest flexible cord in the circuit
- (iv) A cooker is rated at 12KW and supplied from 240V. Find the rating of the circuit cable for this cooker **(7mks)**
- (b) (i) Sketch electrical symbols for the following installation equipments
- (I) Distribution board
- (II) Consumer Control Unit

(III) Socket out let

(iv) Two way switch

(vi) Intermediate switch

(ii) Draw the circuit diagrams for the following;

(I) Two lamps controlled by 2 one way switches fed through consumer control unit

(II) Four lamps controlled by 2 two way switches fed through consumer control unit.

(III) Three lamps controlled by 2 two way switches and an intermediate switch fed through the consumer control unit

(IV) Two lamps controlled from more than three positions **(14mks)**

(c) (i) State regulations 13-7 on protection

(ii) Describe overload and short circuit as used in installation work

(iii) Draw the sequences of control for equipment at the intake point for single phase system **(9mks)**

## Question TWO

(a) (i) Describe the following wiring systems stating their application, advantages, of the system.

(I) PVC (polyvinyl chloride sheathed system

(I) PCP

(III) Mineral insulated copper sheathed cable

(ii) (I) State two reasons for earthing

(II) With aid of a sketch describe rod method of earthing and state two advantages

(III) Describe the earth fault loop impedance test with aid of a circuit diagram. **(14mks)**

(b) An installation is to consist of three lamps controlled by two way switches and a one way switch and intermediate switch. The one way switch is to act as a master switch. Four socket outlets three connected in ring and the fourth a spur all done in steel class B conduit system

(i) List the material required

(ii) Draw the circuit of the system

(iii) Describe how you will carry out the installation

(iv) State TWO tests that can be carried out on the complete installation before its powered **(6mks)**

### Question THREE

- (a) (i) Define a final sub circuit and explain the difference between a point and a final sub circuit
- (ii) State EEE regulations 27(a)(i) governing final sub circuits and their significance in electrical installation work
- (iii) With aid of a sketch illustrate 3 different methods of connecting distribution fuse boards **(8mks)**
- (b) (i) Define a circuit breaker and state its TWO advantages
- (ii) State factors to be considered when choosing a circuit breaker
- (iii) With aid of a circuit diagram describe the operations of magnetic trip circuit breaker **(8mks)**
- (c) An installation is to be carried out using PVC class B conduit system. It consists of the following final sub circuits.
- A cooker control unit circuit
  - A lighting circuit made of 4 Lamps. The lamps are controlled by three two way switches X, Y AND Z. Switch Y acts as a slave of switch X and Z and one position it switches lamps 1 and 2 and at the other position it switches lamps 3 and 4
- (i) List the material and accessories required for the installation
- (ii) Draw the circuit diagram for this installation ,showing cable rating in each case
- (iii) Describe how the installation can be carried out **(4mks)**

### Question FOUR

- (a) (i) State the need of automatic earth protection **(2mks)**
- (ii) With aid of a circuit diagram describe the operations of residual current ELCB. **(6mks)**
- (iii) Explain the term “lack of discrimination” as used in protection **(2mks)**
- (b) With aid of circuit describe how PME earthing system can be implemented **(5mks)**
- (c) An installation is to be done on PVC sheathed system consisting of the following final sub circuits.
- 4 lighting points controlled by 2 five independent different positions
  - A fluorescent fitting
  - 3 socket outlets wired in ring main

- (i) List the materials and accessories required for this installation
- (ii) Draw the circuit diagram for this installation
- (iii) Explain steps to be carried out to complete the installation **(5mks)**

#### **Question FIVE**

- (a)
  - (i) Explain the main purpose of testing an installation and state FOUR factors which an installation need to be protected from **(6mks)**
  - (ii) Describe the main purpose of verification of polarity test and with aid of a circuit diagram explain how the test is done and results expected. **(6mks)**
  - (iii) With aid of a circuit diagram describe insulation resistance test on a complete installation **(4mks)**
- (b)
  - (i) Describe Tinning and plating as used in industrial production
  - (ii) Explain the process of assembling a simple transistor radio using a bread board **(4mks)**