

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF  
SCIENCE IN ELECTRICAL ENGINEERING

EENG 114: WORKSHOP PRACTICE II

STREAMS: BSc. EENG

TIME: 2 HOURS

DAY/DATE: MONDAY 14/04/2025

8.30 A.M. – 10.30 A.M.

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INSTRUCTIONS:

- Question one is compulsory
- Attempt Question one and any other two

QUESTION ONE (30 MARKS)

- (a) Distinguish between workshop safety rules and I.E.E Regulations as applied in electrical workshop **(2 marks)**
- (b) Draw and state the functions of the following basic electrical tools
- (i) Flat medium screw driver
  - (ii) Steel metre rule
  - (iii) A pair of pliers **(6 marks)**
- (c) (i) State any TWO advantages of digital- over analogue- electrical measuring Instruments
- (ii) A moving coil ammeter has a full-scale deflection of 5A and a resistance of  $0.035\Omega$ . Determine the shunt required to be connected with the ammeter to read 150A **(4 marks)**
- (d) (i) State any TWO factors that determine the choice of electrical cables
- (ii) With the aid of a diagram distinguish between Britannia and married types of cable joints

- (iii) List any TWO I.E.E regulations with reference to cable joints **(6 marks)**
- (e) Draw labelled diagrams of the following type of printed circuit boards:
- (i) Single sided
  - (ii) Double sided
  - (iii) Multi-layer **(6 marks)**
- (f) Draw a labeled wiring circuit diagram of two lighting points controlled independently from two positions, using one -gang two- way switches connected through a 30A junction box and state in sequence the main tests which should be carried after completion a new electrical installation **(6 marks)**

**QUESTION TWO (20 MARKS)**

- (a) (i) Distinguish between electrical appliances and accessories giving an example of each **(4 marks)**
- (b) Draw the following types of accessories and state at least one example of each:
- (i) Tumbler switch
  - (ii) Lamp holder
  - (iii) Fuse **(6 marks)**
- (c) (i) With the aid of a diagram explain the constructional features of a paper insulated lead sheathed steel wire armored 3 core 4wire pvc sheathed copper cable
- (ii) A 3kw water heater is to be supplied from a 240V 50Hz supply with a loosely clipped pvc cable of 30m. Calculate the voltage drop and acceptable size
- (iii) State any two I.E.E Regulations which must be considered while making cable joints **(10 marks)**

**QUESTION THREE (20MARKS)**

- (a) (i) Distinguish between gross and systematic type of errors of measuring instruments and state one example of each **(4 marks)**
- (b) A voltmeter having a sensitivity of  $1,000\Omega/V$  reads 100V on its 150V scale when connected to a milliammeter. When the milliammeter reads 5mA calculate the:
- (i) Apparent resistance of the unknown resistor

- (ii) Actual resistance of the unknown resistor
- (iii) Percentage error due to the loading effect of the voltmeter **(6 marks)**
- (c) (i) Draw a complete wiring diagram of a fourfilament lamps lighting system controlled by one gang one way switches independently using pvc sheathed cables
- (ii) Explain how you would carry out verification of polarity test of the circuit (i) above **(10 marks)**

**QUESTION FOUR (20 MARKS)**

- (a) (i) Describe the method of producing printed circuit boards using photo-Resist boards
  - (ii) A moving coil voltmeter reads upto 20mV and has a resistance of  $5\Omega$  calculate the value of the resistor required to enable it read 300V **(10 marks)**
  - (b) (i) State any two reasons of earthing electrical installation works
  - (ii) Explain how to make a married and tee-joint of cable using  $2.5\text{mm}^2$  pvc sheathed stranded cable and state their applications **(10 marks)**
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