



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN BUILDING TECHNOLOGY

DIPLOMA IN CIVIL ENGINEERING

DBT/DCE 2211: WORKSHOP TECHNOLOGY (ELECTRICAL)

END OF SEMESTER EXAMINATION

SERIES: APRIL 2025

TIME: 2 HOURS

DATE: Pick DateSelect MonthPick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt any THREE Questions

Do not write on the question paper.

QUESTION ONE

- a) Briefly explain how electricity supply to a building is achieved from the following sources:
- i) Hydro
 - ii) Solar (4Marks)
- b) Draw a labelled diagram of:
- i) A typical secondary power distribution system supplying three houses of 1- Φ load appliances and a factory containing a 3- Φ load appliances, and indicate the various standard voltage levels applicable in Kenya.
 - ii) Series-parallel wiring of four solar PV modules to DC load in a building. (8Marks)
- c) State any FOUR advantages of:
- i) Solar - electric power supply system over conventional generators
 - ii) Series-parallel wiring of solar PV modules for electricity supply. (8Marks)

QUESTION TWO

- a) State any FIVE factors that determines the selection of cable size for a given application in building installation. (5Marks)
- b) State an application area of each of the following types of electric cables in building installation:
- i) Single core
 - ii) Twin-core
 - iii) Twin-core with earth
 - iv) Four-core. (4Marks)
- c) A PVC insulated and sheathed twin cable of 20 m run supplies current from the switchboard in a ship to a 6 kW, 240 V load, which incorporates a 5 A socket outlet in the control unit. Table 1 illustrates the ratings of typical electric cable sizes.

Table 1

Cross-sectional Area (mm ²)	Typical Current Rating (A)	Recommended Circuit Breaker Rating (A)
1.5	7.9 – 15.9	8
2.5	15.9 – 22	15
4	22 – 30	20
6	30 – 39	30
10	39 – 54	40
16	54 - 72	60
25	72 – 93	80
50	117 – 147	125
70	147 – 180	150
95	180 – 216	200
120	216 -250	225
150	250- 287	275
185	287 - 334	300
240	334 - 400	350

If the maximum allowable voltage drop in the circuit is designed to be 2.5% of the voltage to be supplied by the cable, find the:

- i) Minimum size of cable required to comply with IEE regulations
- ii) Rating of MCB/Fuse to be used. (11Marks)

QUESTION THREE

- a) Define:
- i) Batten wiring system.
 - ii) Conduit wiring system
 - iii) Ducting wiring system (3Marks)

- a) State any THREE:
 - i) Advantages of steel conduit over PVC conduit wiring system
 - ii) Areas of application of PVC conduit wiring system. (6Marks)
- b) For a duct wiring system, state the necessary minimum depth of cover to underground cables:
 - i) Below the open ground
 - ii) Below the road
 - iii) Below the concrete paved area (3Marks)
- c) Using a labelled diagram, describe catenary wiring system and state FOUR precautions to be observed when installing catenary wing system. (8Marks)

QUESTION FOUR

- a) Explain the following as applied to building installation design.
 - i) Consumer Intake point
 - ii) Consumer Control Unit
 - iii) Installation diagram
 - iv) Wiring diagram (4Marks)
- b) Sketch a neat wiring diagram for the electricity supply at the customer's intake point on a building and describe each content present. (12Marks)
- c) State any TWO IEE regulations regarding the meter box under the following considerations:
 - i) Overcurrent protection and meter box sizing
 - ii) Hiring a qualified electrician for meter box inspections. (4Marks)

QUESTION FIVE

- a) Draw the electrical circuits illustrating the use of each of the following in measuring electrical quantities in a workshop and state any TWO characteristics for each:
 - i. Ammeter coil
 - ii. Voltage coil (8marks)
- b) State any FOUR advantages of using a digital multi-meter over analogue meters for measuring electrical quantities in a workshop. (4marks)
- c) A P.M.M.C. instrument gives full scale deflection at 10 V p.d. and 5 mA current.
 - i) Design a range circuit for:
 - I) Ammeter measuring 0 - 100 A range
 - II) Voltmeter measuring 0-500 V range.
 - ii) Sketch the design circuit for the measurement system. (8Marks)