



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: JULY 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) Explain how electricity supply to a building is achieved from the following sources:
- i) Diesel
 - ii) Hydro
 - iii) Solar (6Marks)
- b) State any THREE:
- i) Disadvantages of having DC power supply over AC power supply to domestic buildings.
 - ii) Reasons as to why the use of fossil fuel as source of domestic energy is highly diminishing in urban dwellings. (6Marks)
- c) A secondary power distribution system in Kenya uses a three phase delta-star transformer to supply single phase loads in three domestic houses and a three phase loads in a factory. Sketch a neat diagram for the power distribution system and indicate the various standard voltage levels. (8Marks)

QUESTION TWO

- a) Draw a labelled diagram of main section of PILC SWA cable and explain how lug termination of a cable is achieved. (10Marks)
- b) 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. (10Marks)

QUESTION THREE

- a) Explain the following methods of wiring systems.
- i) Conduit wiring system
 - ii) Catenary wiring system
 - iii) Ducting wiring system. (6Marks)
- b) State any FOUR:
- i) Advantages of PVC conduit over steel conduit wiring system.
 - ii) IEE Regulations for conduit wiring system in buildings. (8Marks)
- c) Explain any THREE reasons why ducting is preferred in most building installations. (6Marks)

QUESTION FOUR

- a) Distinguish between a wiring diagram and an installation diagram, stating the significance of each in Building installation design (6Marks)
- b) Figure Q 1 (b) illustrates an installation system for the socket outlet final circuit

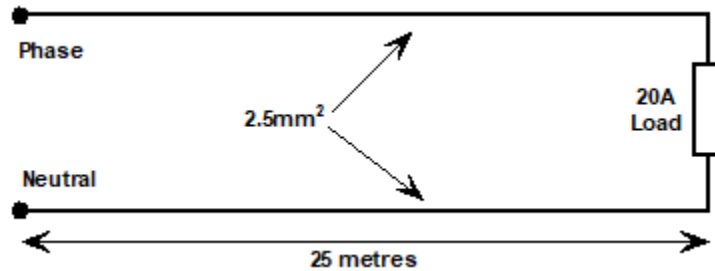


Figure Q 1 (b)

- i) Given the resistivity of the cable conductor is $17.21 \mu\Omega\text{-mm}$, determine from the diagram:
- I) Resistance of the conductors in the cable
 - II) Voltage drop in the cable.
 - III) Power dissipated by the cable
- ii) Transform the diagram above into a wiring diagram for a Ring circuit with 4 socket outlets.
- iii) State any FOUR IEE regulations governing the installation of the circuit in (ii) (14Marks)

QUESTION FIVE

- a) Draw a typical arrangement of an electrical circuit to show the connection of:
- i) Ammeter coil measuring current.
 - ii) Voltage coil measuring voltage. (4Marks)
- b) With the aid of a circuit diagram, describe how a series ohmmeter can be used to measure continuity of a conductor material in a workshop. (8Marks)
- c) Determine the required shunt and series resistances that will enable you use a P.M.M.C. instrument which gives full scale deflection at 50 mV p.d. and 10 mA current as:
- i) Ammeter 0 - 10 A range
 - ii) Voltmeter 0-250 V range.

Draw the range circuit (8Marks)