

6. (a) When an electrical installation is finished a number of tests are carried out. List the sequence of tests required.

- (i) before the supply is connected (5 marks)
- (ii) with the supply connected (4 marks)

(b) List four types of instruments that are commonly used to test electrical installations.

(4 marks)

(c) A householder calls an electrician to trace a fault in the electrical installation consisting of a number of lighting and power circuits. The householder reports that "the circuit breaker trips and does not reset"

Explain in steps how the electrician proceeds to trace the fault, assuming that the fault is either in lighting or in a power circuit. State the instruments used to carry out each step. (7 marks)



## EXAMINATION: AUTHORISATION A

JULY 2016

Paper II (Electrical Installation Technology)

Time Allowed - 3Hrs

**END OF PAPER**



**WRITE ALL YOUR WORK ON THE ANSWER BOOK PROVIDED. EVERY ANSWER SHOULD INCLUDE ALL WORKINGS, NECESSARY DIAGRAMS AND FORMULAE.**

**START EACH ANSWER ON A FRESH PAGE.**

Choose any **FIVE** questions.

- Draw a complete circuit diagram showing how a 12V electric bell controlled by a simple push button can be supplied from a 230V 50Hz A.C. supply. (5 marks)
  - Why is a transformer required for a bell circuit? (3 marks)
  - What precautions should be taken when Extra-low voltage (ELV) circuits are passed through a conduit having other circuits operating at 230V? (5 marks)
  - With the aid of a simple diagram briefly describe how a Closed circuit burglar alarm operates. In your diagram show two sensors. (7 marks)
- A single-phase circuit is to be installed in cable trunking together with three other circuits to feed a refrigeration area of a super-market. The cable is to be thermoplastic general purpose PVC and the ambient temperature is estimated to be 55 degrees Celsius.

The load to be fed by the cable is 10 KW at 0.85 pf lagging and the supply voltage is 230 volts, single phase.

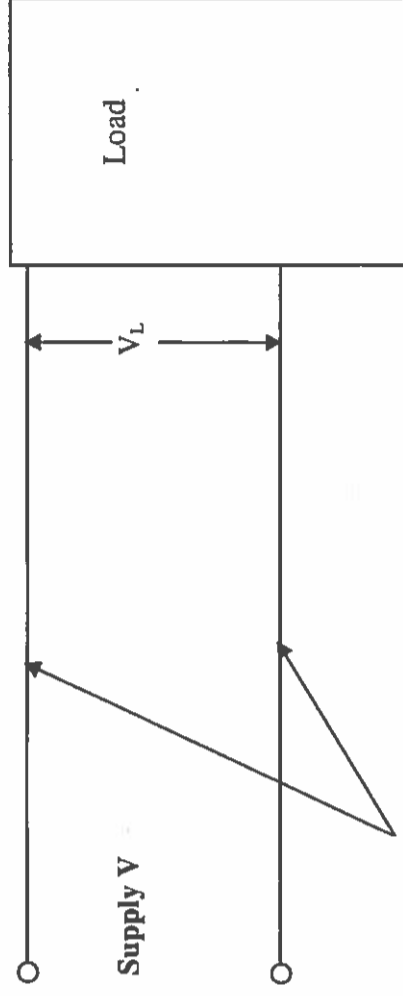
Find:

  - The design current. (2 marks)
  - The nearest size of MCB to be installed. (2 marks)
  - The current that the cable would have to carry after the required factors are applied. (5 marks)
  - The correct size of cable chosen from table 4D2A if the voltage drop in the cable is not to exceed 5 volts and the cable is 25 metres long. (6 marks)
  - What is the actual voltage drop in the cable chosen in (d) above. (5 marks)

- With the aid of a diagram describe how you would do the wiring for a fluorescent tube circuit. In your answer state the functions of the starter and the choke in such a circuit. (6 marks)
  - If the starter is removed when the fluorescent tube is ON will the tube go OFF? (2 marks)
  - Draw a neat circuit diagram for a Lead – Lag fluorescent tube circuit and state where and why this type of circuit is used. (6 marks)
  - Suggest a type of luminaire for each of the following cases and write short notes to justify your answer. (2 marks)
  - A car showroom
  - A restaurant
  - An office

- Using a clear and well-labelled diagram describe the construction of a single-phase watt-hour meter. (8 marks)
  - Describe the operation of the watt-hour meter. (8 marks)
  - Using a diagram show how you would connect the meter to a single phase installation. (4 marks)

- What is the meaning of voltage drop? (2 marks)



Cable voltage drop  $V_C$

Figure 1

- From figure 1 above write down the equation for the full supply voltage V. (2 marks)
  - IET Regulations 525 and Appendix 12 require that the voltage drop V should not be so excessive that the equipment does not function safely. Work out the nominal voltage percentages for the following missing voltages:

	LV Lighting ( ? %)	LV Power ( ? %)
230 V single-phase	6.9 V	?
400V three-phase	?	20

- List and explain briefly the causes of voltage drop. (6 marks)
  - List and explain briefly the causes of voltage drop. (10 marks)