



**EXAMINATION: AUTHORISATION A**

**JULY 2015**

**Paper II (Electrical Installation Technology)**

**Time Allowed - 3Hrs**



**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.

1. Refer to 'Fault finding and repairs in Electrical Installation'.
  - (a) Explain what is meant by the following conditions reported in a maintenance inspection schedule and state the type of remedial action required:
    - (i) an acceptable condition
    - (ii) an unacceptable condition
    - (iii) improvement is recommended **(6 marks)**
  - (b) List the main causes of electrical faults in an electrical installation. **(3 marks)**
  - (c) List the steps to be followed for a successful electrical fault finding. **(5 marks)**
  - (d) Explain why there is a need to inspect and test an electrical installation. **(6 marks)**
  
2. (a) With the aid of diagrams explain the main difference in connections for the following transformers:
  - (i) A single-phase double-wound transformer **(3 marks)**
  - (ii) A single-phase auto-transformer **(3 marks)**
  - (iii) List and briefly explain the type of losses commonly encountered when using transformers. **(2 marks)**
- (b) State the requirements of the IEE regulations with regard to an auto-transformer. **(6 marks)**
- (c) State for what purposes an auto-transformer may be used, and what general precautions would be necessary. **(6 marks)**
  
3. (a) Draw a neat and well labelled diagram of the type of thermostat used in electric water heaters. **(5 marks)**
- (b) Explain how this type of thermostat works. **(5 marks)**
- (c) Draw a neat and well labelled diagram of the type of thermostat used in an electric iron. **(5 marks)**
- (d) Explain how this type of thermostat works. **(5 marks)**

4. (a) With the aid of a diagram explain what is meant by the term “Discrimination”. Explain how good discrimination is achieved in an electrical installation. (5 marks)
- (b) What is meant by diversity factor and state its importance. (5 marks)
- (c) A bakery shop is supplied from a single phase 230V 50Hz supply. The load connected to the installation comprises the following items:
- (i) 20 lighting filament lamps at 100W each
  - (ii) 10 twin 13Amp socket outlets (2 ring circuits).
  - (iii) A 10kW cooker controlled from a cooker unit combined with a 13A socket outlet.

Calculate the assumed current demand for the installation by applying the diversity factor as provided in the table below. (10 marks)

The following table gives the necessary diversity information that must be applied.

Purpose of the final circuit	Diversity to be applied
Lighting	90% of the total current demand
Cooking appliance	10 amperes + 30% full load of the connected cooking appliance in excess of 10 amperes + 5 amperes if a socket outlet is incorporated
Heating and Power	100% of total current demand up to 10 amperes + 50% of any current demand in excess of 10 amperes.

5. (a) For each of the earthing systems listed below draw well labelled diagrams showing the system layout and provide a brief explanation of each.
- (i) TT system. (2 marks)
  - (ii) TN-S system. (2 marks)
  - (iii) TN-C-S system. (2 marks)
  - (iv) TN-C system. (2 marks)
  - (v) IT system. (2 marks)
- (b) What are the advantages of earthing an electrical installation? (4 marks)
- (c) What is meant by the term bonding? (3 marks)
- (d) What is the purpose of supplementary bonding? (3 marks)

6. (a) What is a Tungsten Halogen Lamp and how does it differ from an ordinary tungsten lamp? (6 marks)
- (b) Describe the construction and features of a Tungsten Halogen Lamp. (10 marks)
- (c) Name four applications where a Tungsten Halogen Lamp can be used. (4 marks)

**END OF PAPER**