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**EXAMINATION: AUTHORISATION B**

**Paper II (Electrical Installation Technology)**

**Time Allowed: 3 Hrs**

**February 2018**

**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.**

Answer any **FIVE** Questions

1. (a) State what is meant by the term Electrode Boiler, and state the advantages and disadvantages of an electrode boiler compared with an immersed element boiler. **(10 marks)**  
(b) Describe how the electricity regulations provide for safety in the installation of electrode boilers. **(5 marks)**  
(c) Draw a circuit diagram of an electrode boiler and its protection system. **(5 marks)**
2. Describe the tests you would carry out to ensure the correct operation of:  
(a) An under-voltage release **(6 marks)**  
(b) An over-current release **(6 marks)**  
(c) The delay feature in a push-button type starter for three-phase, three wire, cage type induction motor. **(8 marks)**
3. (a) Describe, using diagrams, the construction of a mineral insulated cable. **(6 marks)**  
(b) Name four advantages of this type of cable. **(4 marks)**  
(c) Terminations of a mineral insulated cable must be effectively sealed against the ingress of moisture. Make a neat and well-labelled diagram showing a termination of the above-mentioned cable. **(6 marks)**  
(d) How would you test a mineral insulated cable against ingress of moisture? **(2 marks)**  
(e) If in the above test the insulation is found to be low. How would you get rid of the moisture from the insulation? **(2 marks)**
4. (a) Draw and label a diagram of a 230 volts single-phase capacitor-start, capacitor-run induction motor. **(5 marks)**  
(b) From the circuit drawn in (a) describe the operation of this motor from the time it is switched on until the time it reaches full speed. **(10 marks)**  
(c) State the main reason why a single-phase capacitor-start, capacitor-run induction motor may be used to drive a large air-conditioning fan, instead of a split-phase motor of the same rating. **(5 marks)**
5. (a) State six common cases of failure likely to be encountered in AC and DC motors, generators and starters. **(6 marks)**  
Describe how you would diagnose and rectify the six common cases of failure stated in (a). **(6 marks)**  
(b) Explain and illustrate the forward and reverse starter for an induction motor. **(8 marks)**
6. (a) A new hotel is to be built. During the design and building process of the new hotel the following documents and drawings were prepared:  
i. The tender documents  
ii. Design drawings  
iii. As-fitted drawings  
Write short notes on each of these documents showing the difference between them. **(8 marks)**  
(b) Why are as-fitted drawings necessary? **(3 marks)**  
(c) What do as-fitted drawings show? **(3 marks)**  
(d) What are the advantages to the client of having as-fitted drawings? **(3 marks)**  
(e) What are the responsibilities of the technician in-charge of the electrical installation team with regards to the preparation of as-fitted drawings? **(3 marks)**

**END OF PAPER**