8202-531 APRIL 2018
8202 Level 3 Advanced Technical Diploma in Electrical Installation (450)
Level 3 Electrical Installation – Theory exam

If provided, stick your candidate barcode label here.  

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• If any additional answer sheets are used, enter the additional number of pages in this box.

• Please ensure that you **staple** additional answer sheets to the **back** of this answer booklet, clearly labelling them with your full name, enrolment number, centre number and qualification number in BLOCK CAPITAL.

• All candidates need to use a **black/blue pen**. Do not use a pencil or gel pen.

• If provided with source documents, these documents will **not** be returned to City & Guilds, and will be shredded. **Do not** write on the source documents.

*I declare that I had no prior knowledge of the questions in this assessment and that I will not divulge to any person any information about the questions.*

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You should have the following for this examination

• a pen with blue or black ink

• non-programmable scientific calculator

Permitted reference material:

BS 7671

IET On-site Guide

General instructions

This question paper is the property of City and Guilds of London and should be returned after the examination.

The maximum marks for each question is shown in brackets.

Answer all questions.
1. State **three** human resource factors that will require monitoring during an electrical installation project. (3 marks)

2. Explain the operating principles of a wind turbine. (3 marks)

3. A 0.318 H inductor has a resistance of 20 Ω and is connected in series with a capacitor of 38.9 μF. They are connected to an AC 230 V supply at 50 Hz. Calculate the circuit’s power factor. (5 marks)
4 When a voltage of 110 V is applied to a circuit, a current of 20 A flows at a power factor of 0.95. Calculate the kVA. 

(2 marks)

5 An inductor has an inductive reactance of 4 kΩ when it is connected across a 24 V, 50 kHz AC supply. Calculate the supply current. 

(2 marks)

6 Explain how the wound rotor on an AC induction motor achieves a high starting torque. 

(3 marks)

7 State the three principles of space heating. 

(3 marks)
8 Describe the operating principle of a thermostat in an immersion heater. (3 marks)

9 State the earthing arrangement shown in Figure 1 and identify the parts labelled X and Y. (3 marks)

![Figure 1]

10 Determine a suitable type and nominal rating of protective device for a single-phase circuit supplying a total loading of 4000 W discharge lighting. (4 marks)

11 State the two methods used to determine the suitability of a protective conductor CSA for thermal constraints during earth fault conditions as given in BS 7671. (2 marks)
12 State **three** non-statutory publications associated with the Initial Verification of electrical installations. (3 marks)

13 Explain the purpose of a polarity test on a lighting circuit having LED luminaires. (3 marks)

14 Describe three behaviours that would help maintain good relationships with the client during the commissioning process. (3 marks)
15 State **three** health and safety considerations that would contribute to a risk assessment before carrying out fault diagnosis work. (3 marks)

16 State **three** common examples of activities that can result in a short circuit. (3 marks)

17 Explain the fundamental rule of basic protection. (3 marks)
18 Define an exposed-conductive-part.  

19 State three methods that can be used when determining the characteristics of an incoming supply.  

20 State three situations that require the completion of an Electrical Installation Certificate.
21 You have been asked to be part of the design team for an electrical installation within a farm complex consisting of a main farmhouse, stables, garage, and out buildings. One of the outbuildings is to be converted into a milking parlour. The supply and installation is to form a three-phase TN-C-S, 400 V supply, where $Z_e$ is 0.35 $\Omega$ at the origin of the circuit. Protection for this circuit is by a Type C RCBO. Installation details are shown in Figure 2 below.

![Figure 2](image)

Determine a suitable installation design that complies with BS 7671. (15 marks)

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