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### 8202-531 JUNE 2017

## Level 3 Advanced Technical Diploma in Electrical Installation (450)

### Level 3 Electrical Installation – Theory Exam

If provided, stick your candidate barcode label here.

Wednesday 21 June 2017  
09:00 – 11:00

Candidate name (first, last)

First

Last

Candidate enrolment number

Date of birth (DDMMYYYY)

Gender (M/F)

Assessment date (DDMMYYYY)

Centre number

Candidate signature and declaration\*

• 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 CAPITALS.

• 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.**

#### You should have the following for this examination

- non-programmable scientific calculator
- a pen with blue or black ink

#### Permitted reference material:

BS7671 2008 (2015)  
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 section is shown in brackets.
- Answer **all** questions.



- 1 State the simple steps an electrician will take to estimate the time required for an installation to be completed. (3 marks)

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- 2 State **three** renewable energy sources utilised for producing electricity. (3 marks)

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- 3 Complete the boxes in Table 1 by providing the correct match of colour codes used for conductor identification. (4 marks)

Function	Old conductor colour	New conductor colour
Line 1 of a.c.	_____	Brown
Line 2 of a.c.	_____	Black
Line 3 of a.c.	_____	_____
Neutral of a.c.	Black	Blue
Protective conductor	Green-and-yellow	Green-and-yellow

Table 1

4 Determine the neutral current from the circuit in Figure 1.

(3 marks)

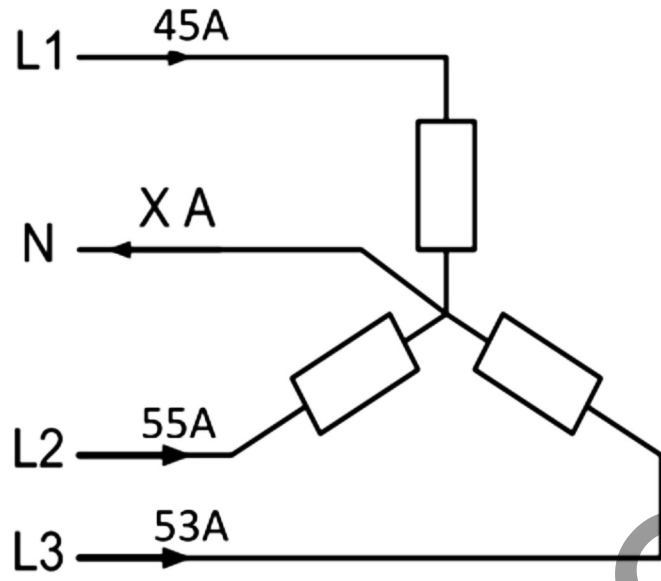


Figure 1

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5 Calculate the current flowing in the circuit shown in Figure 2.

(5 marks)

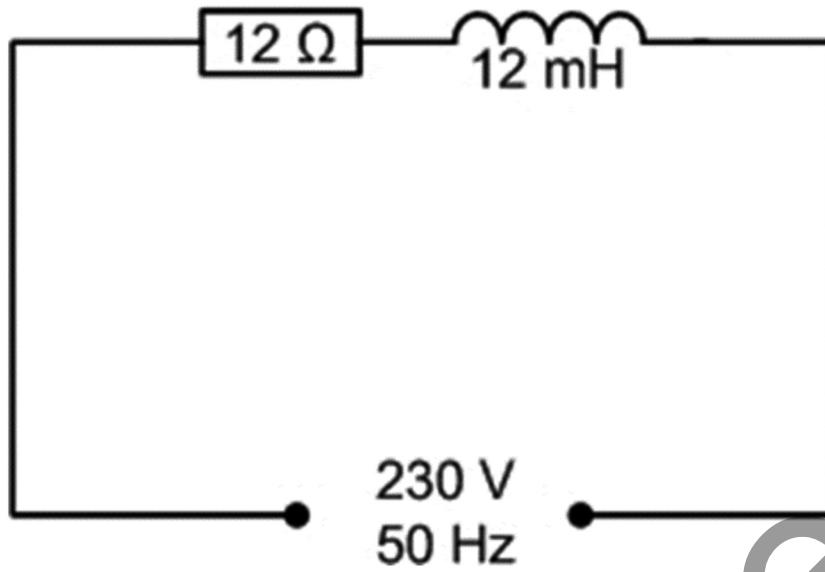


Figure 2

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6 State the equation required to calculate the synchronous speed if connected to a 50 Hz supply.

(1 mark)

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7 Describe the function of the capacitor in a capacitor start motor. (3 marks)

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8 State the type of gas used in the following types of lamps. (1 mark)

a) SON. (1 mark)

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b) Flourescent. (1 mark)

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9 Describe the required relationship between the circuit design current, nominal rating of the overcurrent protective device and the current rating of circuit live conductors. (3 marks)

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10 Determine the following rating factors:

a) 70 °C thermoplastic cable at an ambient temperature of 35 °C.

(1 mark)

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b) A cable surrounded by thermal insulators for a length of 400 mm.

(1 mark)

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c) Where a protective device is a semi-enclosed fuse to BS 3036.

(1 mark)

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11 Calculate the volt drop for a 5 kW single-phase circuit wired in 4 mm<sup>2</sup> single-core 70 °C thermoplastic cable. The circuit is 25 m in length and installed in accordance with method A.

(3 marks)

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12 State **three** pieces of equipment required to complete the safe isolation procedure.

(3 marks)

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13 Describe how different earthing arrangements affect measured values of earth fault loop impedance. (3 marks)

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14 Explain the reasons for the method that **must** be used when verifying the continuity of the main and supplementary bonding conductors. (3 marks)

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15 Describe how to test when locating an open circuit on a securely isolated radial circuit. (4 marks)

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16 Evaluate the following two faults giving each a classification code which would be recorded on an Electrical Installation Condition Report.

a) An earth fault loop impedance 2 Ω higher than that permitted.

(1 mark)

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b) A damaged switch-plate leaving exposed live parts.

(1 mark)

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17 Describe what the requirements of BS 7671 is intended to protect.

(4 marks)

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18 State how BS 7671 defines double Insulation.

(2 marks)

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19 Explain how to test to confirm protection by PELV.

(4 marks)

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20 Using the information contained in BS 7671, determine the **maximum** floor area served for the following circuits.

a) 20 A radial final circuit.

(1 mark)

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b) 30/32 A radial final circuit.

(1 mark)

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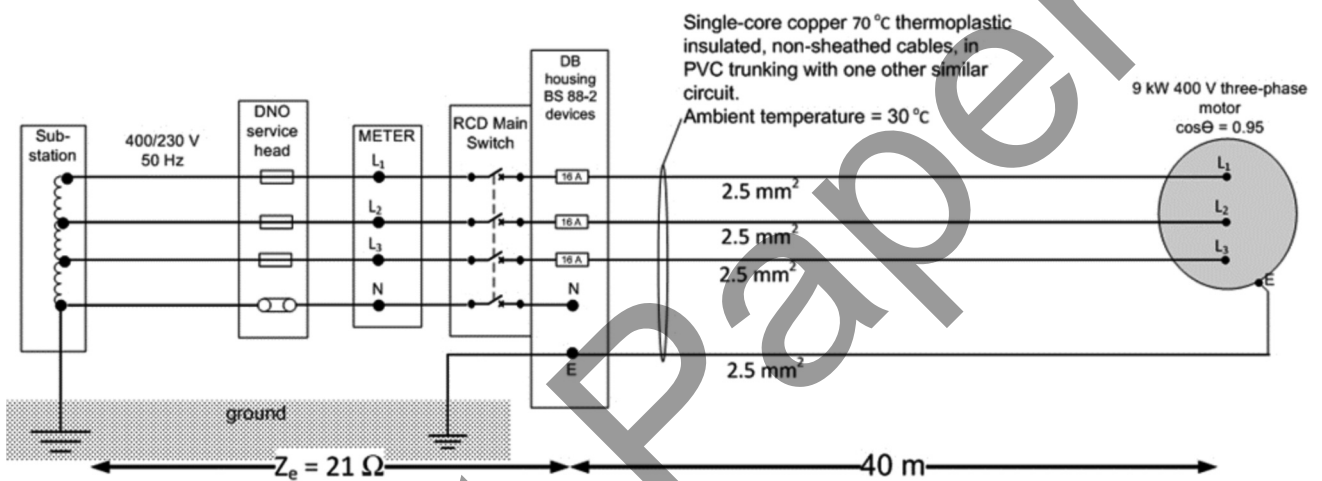


Figure 3

21 The supply and final circuit arrangement shown in Figure 3 relate to questions 21a) and 21b).

a) Identify three important characteristics of the supply for the installation.

(3 marks)

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