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8202-531 JUNE 2022
Level 3 Advanced Technical Diploma in Electrical Installation (450)
Level 3 Electrical Installation – Theory exam (1)

If provided, stick your candidate barcode label here.

Thursday 16 June 2022
09:30 – 12:00

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 additional answer sheets are used, enter the additional number of pages in this box. ➡ 0 0
- Before taking the examination, **all candidates** must check that their barcode label is in the appropriate box. Incorrectly placed barcodes may cause delays in the marking process.
- Please ensure that you staple additional answer sheets to the **back** of this answer booklet, clearly labelling these 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, unless otherwise instructed.
- 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 examination and that I will not divulge to any person any information about the questions.**

You should have the following for this examination:
- a pen with blue or black ink
- a 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 are shown in brackets.
- Answer **all** questions.

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1 List **three** technical specifications relating to the selection of a wall mounted light switch, when recording on a materials list. (3 marks)

2 State the **two** types of losses associated with a transformer core. (2 marks)

3 State **two** types of single-phase AC motor. (2 marks)

4 State **two** types of fuse commonly found in electrical installations, protecting the circuits. (2 marks)

5 List **three** protective conductors commonly installed in electrical installations as given in BS 7671. (3 marks)

6 List the first **three** tests carried out on a newly installed radial lighting circuit. (3 marks)

7 List **three** documents that would assist in fault diagnosis which are to be kept by the client. (3 marks)

8 List **three** factors that affect the decision between repairing or replacing a faulty item of equipment. (3 marks)

9 State the **two** methods of providing Basic Protection within a dwelling, in accordance with BS 7671. (2 marks)

10 List **three** labels, as given in BS 7671, that would be located on the installation consumer unit at the origin of an electrical installation. (3 marks)

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11 A 20 kVA transformer has a turns ratio of 8:3 and an input voltage of 400 V single-phase. Determine the output current. (3 marks)

12 Determine, for the circuit shown in **Figure 1**, the circuit

a) supply current (I_s) (4 marks)

b) power factor. (1 mark)

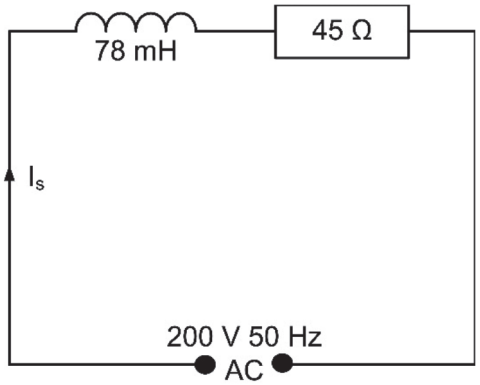

Figure 1

13 A three-phase installation had the following load characteristics.
L1 = 45 A
L2 = 72 A
L3 = 66 A

Determine the resulting neutral current. (4 marks)

14 Determine the illuminance level on a surface 3 m directly below a lamp having a luminous intensity of 800 candela. (3 marks)

15 Explain the difference between an earth fault and short circuit. Include in your answer if each fault would operate a suitably rated circuit breaker and a suitably rated RCD. (4 marks)

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16 Determine the overall voltage drop across the distribution and final circuit shown in **Figure 2**. (2 marks)

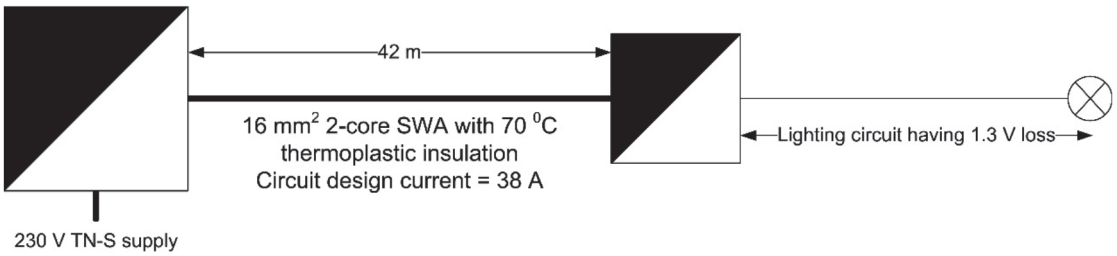

Figure 2

17 A continuity of ring-final circuit test is being undertaken during an initial verification. During step 1, the following measurements were made:

- $r_1 - 0.8\,\Omega$
- $r_n - 0.8\,\Omega$
- $r_2 - 1.34\,\Omega$

Explain the relationship between these results and the expected results when line and neutral are cross connected and tested at each socket-outlet. (3 marks)

18 Explain why the earthing conductor **must** be disconnected from the installation main earthing terminal whilst undertaking a test to obtain a value of Z_e. (3 marks)

19 **Figure 3** shows the intended location of a new socket-outlet within a room, as requested by the client. The cable used to supply the socket-outlet is to be concealed in the plastered wall to a depth of 35 mm and run from point A in the ceiling void above.

Describe how to run the cable from point A to the socket in compliance with BS 7671, including any further protection required. (7 marks)

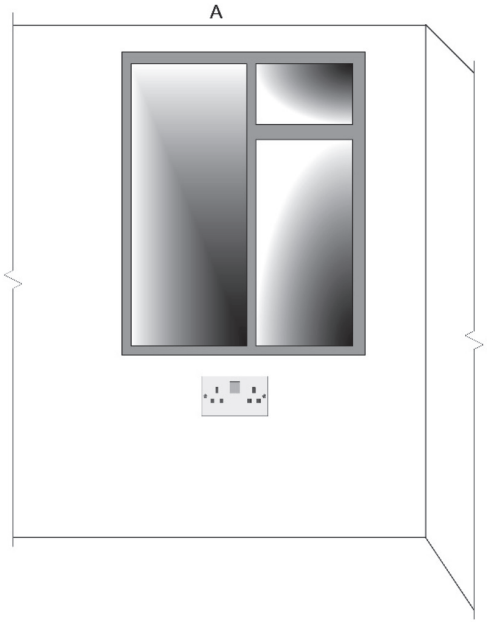

Figure 3

20 **Figure 4** shows the complete earth fault loop path and supply network for a radial power circuit in an electrical installation.

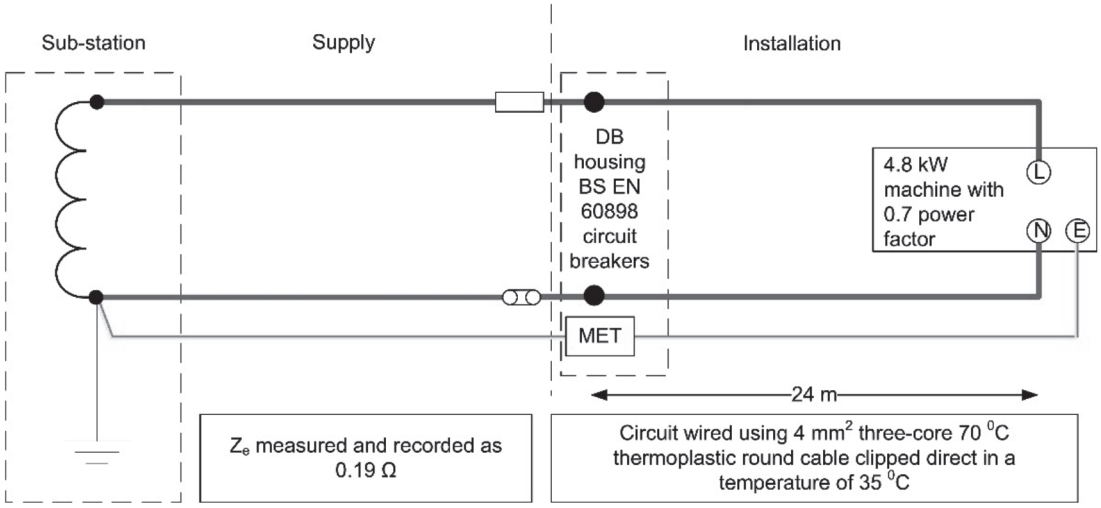

Figure 4

Evaluate the 230 V single-phase circuit for compliance with BS 7671 in terms of current capacity, voltage drop and disconnection under earth fault conditions. (15 marks)

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End of examination