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8202-531 JUNE 2023
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 15 June 2023
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
- blue or black ballpoint pen
- pencil for drawing only
- ruler
- protractor and compass
- non-programmable scientific calculator

Permitted reference material
- BS 7671
- IET On-Site Guide

General instructions
This question paper is the property of City & Guilds Limited and should be returned after the examination.
- Answer all questions.
- Show all calculations. If you use a calculator, show sufficient steps to justify your answers.
- Use pencil for drawing only. Any pencil drawings must be bold and clear for scanning purposes.
- The maximum marks for each question are shown in brackets.

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1 List **three** organisations which issue cards that may be used on a construction site to prove a level of competency. (3 marks)

2 Explain the operating principle of a 30 mA single-phase RCD. (3 marks)

3 List the **three main** components of a UPS system supplying AC to a computer system. (3 marks)

4 *Excluded from the paper*

5 List **three** ways that heat can be transferred from an electric fire to heat a room. (3 marks)

6 Determine the neutral current within a three-phase circuit where the current for each phase is L_1 = 70 A, L_2 = 90 A and L_3 = 35 A. (4 marks)

7 Determine, showing all working, the kVA and power factor where a motor has a rating of 21 kW and 14 kVAr. (5 marks)

8 Explain how a shaver socket, used in a domestic bathroom, provides shock protection when somebody comes into contact with a live part. (3 marks)

9 List **three** exposed conductive parts likely to be present in an industrial electrical installation. (3 marks)

10 Explain when a Type B circuit breaker should be used in preference to a Type C or Type D. (3 marks)

11 State the **minimum** IP level to provide basic protection for
a) the side of a domestic consumer unit.
b) the accessible top horizontal surface of a distribution board.
c) steel trunking containing unsheathed low-voltage cables. (3 marks)

12 Explain why live conductor polarity must be verified at each 230 V BS 1363 socket-outlet in a domestic installation. (3 marks)

13 Explain why the entire domestic installation must be safely isolated when carrying out an external earth fault loop impedance Z_e test for the premises. (3 marks)

14 State the missing values by completing the table. (3 marks)

Minimum values of insulation resistance		
Circuit nominal voltage	Test voltage DC	Minimum insulation resistance
(V)	(V)	(MΩ)
SELV and PELV	250	
Up to and including 500 V		1.0
Above 500 V	1000	

Table 1

15 List **three** materials which would require disposal as hazardous materials, if present within equipment replaced during electrical fault rectification. (3 marks)

16 State what needs to be confirmed for supplementary bonding to be omitted in a location containing a bath. (3 marks)

17 Explain why arc fault detection devices (AFDDs) are required to be installed at the origin of socket-outlet circuits within Houses in Multiple Occupation (HMOs). (5 marks)

18 State **two** sources for safety services as given in BS 7671. (2 marks)

19 Explain why continuity of conductors must be tested prior to insulation resistance during the initial verification of a new circuit. (2 marks)

20 A ring final circuit is to be installed in a school to supply 12 computers via socket-outlets, as shown in Figure 2.

The circuit is to be wired from DB3 using 70 °C thermoplastic flat profile cable with protective conductor.

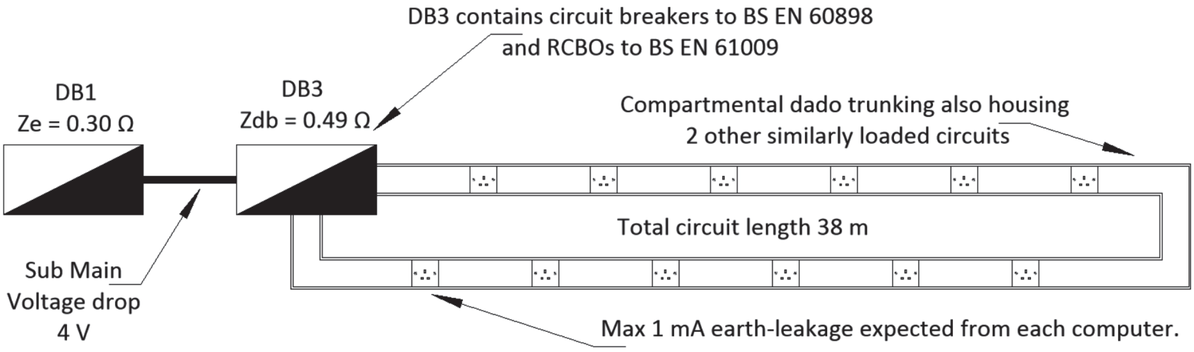

Figure 2

Justify the choice of a ring circuit for this installation and evaluate suitable circuit protection and a cable to comply with BS 7671. (15 marks)

End of examination