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City & Guilds

8202-531 APRIL 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 26 April 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. ➡ 0 0
- 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.

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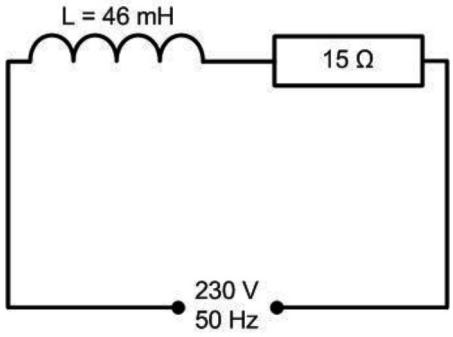
1 Describe how an electrician, working as a self-employed sole trader, can prove to potential customers a level of competence. (3 marks)

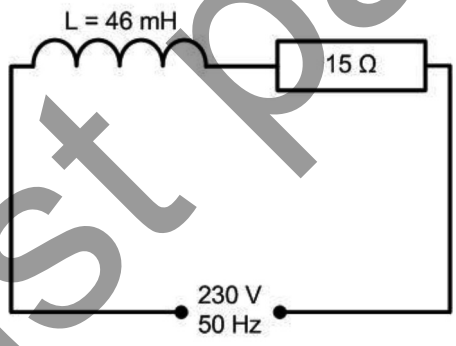
2 Calculate the approximate transformer ratio that would step down the maximum super grid voltage to 33 kV. (3 marks)

3 Construct an impedance triangle showing the relationship between resistance, impedance and power factor. (3 marks)

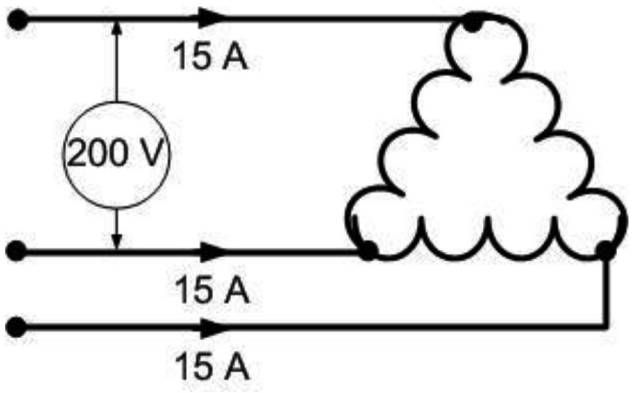
4 Determine, for the circuit shown below, the inductive reactance and impedance. (3 marks)



5 Determine, for the circuit shown below, the power factor and the voltage across the inductor. (3 marks)

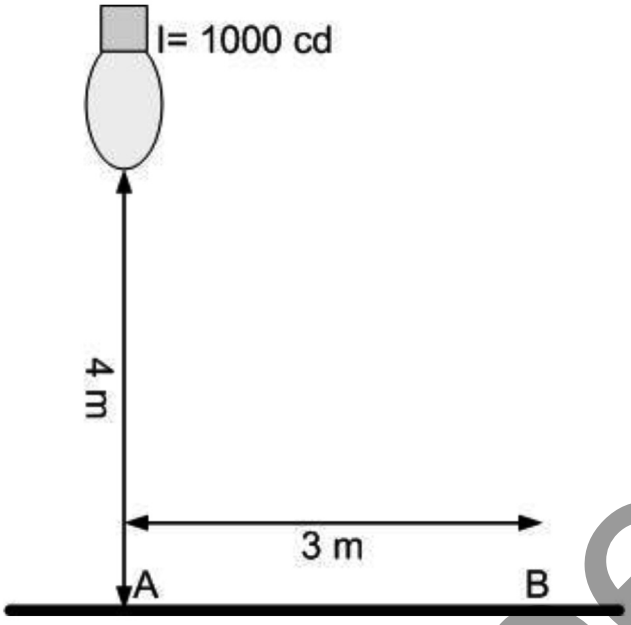


6 Calculate the phase current (I_P) and phase voltage (V_P) for the circuit shown below. (3 marks)



7 List **three** component parts, within a d.c. compound motor, that involve a magnetic process. (3 marks)

8 Calculate, for the luminaire shown below, the illuminance at point B. (3 marks)



9 State the **maximum** permitted disconnection times for **each** of the following circuits.

a) A 230 V, 6 A, lighting circuit on a TN system. (1 mark)

b) A 110 V, 16 A, socket-outlet on a construction site. (1 mark)

c) A 400 V, 45 A, pump on a TT system. (1 mark)

10 A socket-outlet circuit in a public library is protected by a 32 A, RCBO to BS EN 61009.

a) State the **most** suitable type to be used. (1 mark)

b) Determine how quickly, in seconds, the RCBO would disconnect with a short circuit current of 100 A. (1 mark)

c) State the component within the RCBO that would cause disconnection if a short circuit of 300 A occurred. (1 mark)

11 a) Determine the **maximum** permissible rating for a lighting circuit containing B15 and B22 lamp-holders. (1 mark)

b) Determine the current in the extra-low voltage section of a 12 V lighting circuit containing 3 x 50 W halogen lamps. (1 mark)

c) Determine the **most** appropriate rating of BS 1362 fuse to be used in a fused connection unit supplying a 3 kW hand drier unit. (1 mark)

12 a) An inspection is to be carried out to items within a distribution board during initial verification. Describe, for **each** of the following senses, **one** inspection that would be undertaken.

i) Sight. (1 mark)

ii) Touch. (1 mark)

b) State the document that satisfactory inspections are recorded on. (1 mark)

13 List all the test results that are entered onto a schedule of test results under the heading ring-final circuit continuity. (3 marks)

14 Explain why a test of prospective fault current is undertaken as part of an initial verification and what is meant by the rating I_{cs} on a circuit breaker. (3 marks)

15 Describe **two** requirements of GS38 regarding test leads. (2 marks)

16 List **four** items of documentation, relevant to a particular electrical installation, that could be used for fault diagnosis work. (4 marks)

17 List **three** types of electrical installation work excluded from the scope of BS 7671. (3 marks)

18 Describe **one** type of circuit that **must** have additional protection, as given in BS 7671. (3 marks)

19 PVC trunking housing non-sheathed cables is to be installed 2 m above finished floor level in an escape route.
Describe the requirements of BS 7671 with regard to the protection of the installed cables by the trunking and how the trunking is to be supported. (4 marks)

20 Describe the requirements of BS 7671 for lighting installed in Zone 0 of a swimming pool. (2 marks)

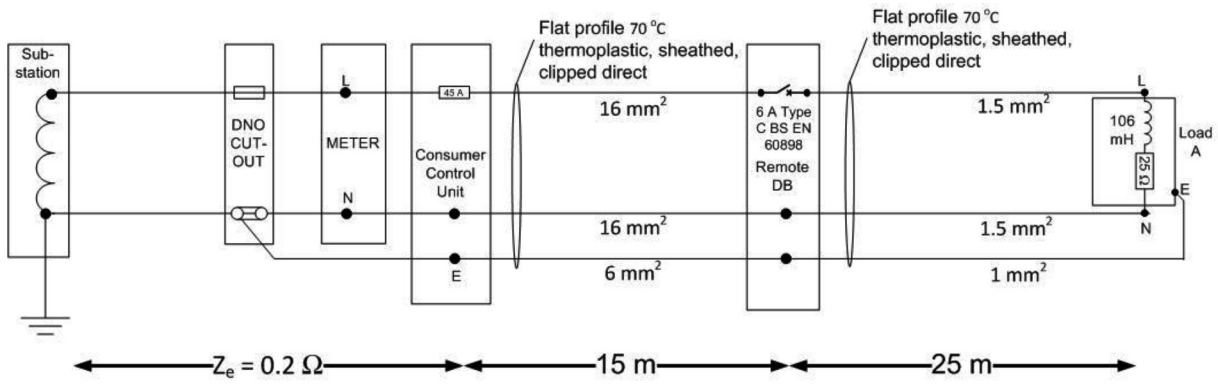


Figure 1

21 a) Identify **three** important characteristics of the supply for the installation shown in Figure 1. (3 marks)

See next page

b) Analyse the final circuit shown in Figure 1 and evaluate the suitability for loading and earth fault protection. (12 marks)

End of examination