8202-531 JUNE 2017
Level 3 Advanced Technical Diploma in Electrical Installation (450)
Level 3 Electrical Installation – Theory Exam

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)

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

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Old conductor colour</th>
<th>New conductor colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1 of a.c.</td>
<td></td>
<td>Brown</td>
</tr>
<tr>
<td>Line 2 of a.c.</td>
<td></td>
<td>Black</td>
</tr>
<tr>
<td>Line 3 of a.c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral of a.c.</td>
<td>Black</td>
<td>Blue</td>
</tr>
<tr>
<td>Protective conductor</td>
<td>Green-and-yellow</td>
<td>Green-and-yellow</td>
</tr>
</tbody>
</table>

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

(3 marks)
5. Calculate the current flowing in the circuit shown in Figure 2. (5 marks)

6. State the equation required to calculate the synchronous speed if connected to a 50 Hz supply. (1 mark)
7 Describe the function of the capacitor in a capacitor start motor. (3 marks)

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

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)
10 Determine the following rating factors:

a) 70 °C thermoplastic cable at an ambient temperature of 35 °C. (1 mark)

b) A cable surrounded by thermal insulators for a length of 400 mm. (1 mark)

c) Where a protective device is a semi-enclosed fuse to BS 3036. (1 mark)

11 Calculate the volt drop for a 5 kW single-phase circuit wired in 4 mm² single-core 70 °C thermoplastic cable. The circuit is 25 m in length and installed in accordance with method A. (3 marks)

12 State three pieces of equipment required to complete the safe isolation procedure. (3 marks)
13 Describe how different earthing arrangements affect measured values of earth fault loop impedance. (3 marks)

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

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

b) A damaged switch-plate leaving exposed live parts. (1 mark)

17 Describe what the requirements of BS 7671 is intended to protect. (4 marks)

18 State how BS 7671 defines double Insulation. (2 marks)

19 Explain how to test to confirm protection by PELV. (4 marks)
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)

b) 30/32 A radial final circuit.  
(1 mark)

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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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**Figure 3**

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b) Evaluate the final circuit design, including the requirements for ADS, for compliance with BS 7671. Your evaluation should also include recommendations relating to the residual current setting of the RCD main switch. (12 marks)