



Complete, fold and seal
(see note 2 below)

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Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.

1	Student Number	<u>Irwin 18846726</u>
2	Title of Examination Paper	<u>Design of electrical installations</u>
3	Module Code	<u>G01E4001</u> <u>(M4x00930)</u>
4	Date and Time of Examination	<u>2pm</u> <u>12/01/22</u>
5	Examination Venue	
6	Seat Number	
7	Number of Answer Books handed in	<u>1</u>

List the numbers of the questions you have attempted	Office Use
Question 1a	3
1b	0
2a	0
2b	2
2c	1
3a	3
3b	3
3c	1
4a	0
5a	0
5b	0
6a	2
b	0
g	3
Total	18/60

= 30% ✓KF

Question one

Question No.

Examiner Only

a) With the aid of the tables attached, determine a suitable size trunking.

$$\begin{aligned}
 & 9 \times 1.5 \text{ mm}^2 = 13.5 \text{ mm}^2 \\
 & 6 \times 2.5 \text{ mm}^2 = 15 \text{ mm}^2 \\
 & 9 \times 6 \text{ mm}^2 = 54 \text{ mm}^2 \\
 & 3 \times 10 \text{ mm}^2 = 30 \text{ mm}^2
 \end{aligned}$$

$$\begin{aligned}
 & (9 \times 1.5) + (6 \times 2.5) + (9 \times 6) + (3 \times 10) \\
 & = 112.5 \text{ mm}^2 \times 1000 \\
 & = 112500 \text{ mm}^2
 \end{aligned}$$

(3)

The suitable trunking is a ~~225 mm x 150 mm~~ 75 mm x 25 mm

b) Determine the maximum number of 10 mm² cables that could be installed in the trunking

$$(10) + (10) + (10) + (10) = 40 \text{ mm}^2$$

$$= 40 \text{ mm}^2 \times 1000$$

$$= 40000 \text{ mm}^2$$

$$\text{Suitable trunking} = 50 \text{ mm} \times 38 \text{ mm}$$

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Question two

Q) Determine the neutral current under normal conditions

$$L_1 = 120 \text{ Amps}$$

$$L_2 = 230 \text{ amps}$$

$$L_3 = 90 \text{ amps}$$

$$\sqrt{(L_1^2 + L_2^2 + L_3^2)} + (L_1 \times L_2) + (L_2 \times L_3) + (L_1 \times L_3)$$

$$\sqrt{(L_1^2 + L_2^2 + L_3^2)} + (L_1 \times L_2) + (L_2 \times L_3) + (L_1 \times L_3)$$

$$\sqrt{(120^2 + 230^2 + 90^2)} + (120 \times 90) + (230 \times 90) + (120 \times 230)$$

$$\sqrt{(75400)} + (10800) + (20700) + (27600)$$

$$\sqrt{(75400)} + (59100)$$

$$\sqrt{75400}$$

$$= 393.06 \text{ Amps}$$

b) If the loads were to be partly reactive, how would this affect the calculation?

It would be effected by have different values meaning different amp input/output from each of the phase. overall meaning a different current being moved which may cause a short.

(2)

c) If in order to balance the loads you find that there are two or more phases supplying a single room. Describe 1 action you must make.

The action is that to make sure there is a correct earthing to the circuit and the as to protect the people using the circuit.

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Question three

$$\frac{\text{distance}}{F \times MF \times VF}$$

a) Using the lumen method, determine the theoretical quantity of lamps required to provide a minimum light level of 370 lux.

$$\frac{D \times L}{F \times MF \times VF} = \frac{(16 \times 45) \times 370}{16,000 \times 0.8 \times 0.7} = \frac{277500}{8960}$$

$$\frac{750}{8960} = 30.97 = 31 \text{ Lamps.}$$

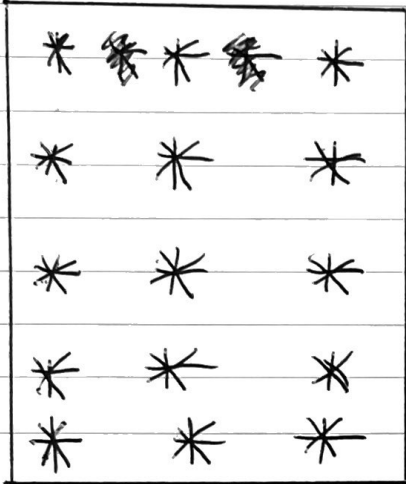
3

b) What is the lighting level 8m directly below one of the luminaires assuming a luminous intensity of 8000 cd?

$$\frac{I}{d^2} = \frac{8000}{(8)^2} = \frac{8000}{64} = 125 \text{ lumens}$$

(3)

(c) With the aid of a sketch explain how you would arrange the locations of the luminaires.



The Layout of light would be as shown in the diagram on the left.

1

7/10

Question Five.

a) Determine the prospective fault current.

b) Determine the time until the fuse will break the circuit by applying the chart given in Figure 4

It would take 10 Just over 10 seconds for the breaker to work ~~in 10 seconds~~

0/15

Question Six

a) In the context of an electrical installation explain what exposed conductive parts are? Give two examples of devices that may be used.

1. metal ~~conduct~~ trunking trunking ✓

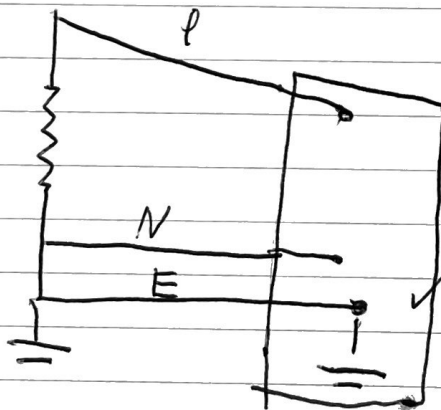
2. the housing of socket as if wired wrong can place live current into the person using it.

(2)

b) PME systems require additional electrodes in the supply system. State a reason for this.

As it is more negative charges in it system it requires more electrodes to counter aid it's system.

c) With the aid of a sketch, explain the operation of a TN-S earth system during a fault condition.



P = Positive
N = Neutral
E = earth.

(3)

in a fault the TN-S earth system places the fault current ~~thru~~ through the earth which would either be placed in ground or if this system was in a street with other houses a large earth would place to connect them.

d) Give two possible advantages of a TN-C-S earth system over a TT earth system.

1. one of them would be cost of TT system

2. inclusion of the TT system ~~as it is~~ ~~large~~ ~~and expensive~~ ~~on~~

Question four

Q) Determine the minimum live conductor and c.p.c. sizes for a factory installation circuit comprising an industrial process heater.

$$Z_s = Z_e + \frac{(R_1 + R_2) \times L \times 1.7}{1000}$$

$$= 0.58 +$$

✓ 5/10