



## 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.

Complete, fold and seal  
(see note 2 below)

SURNAME: Corsio

FORENAME(S): Joshua

|   |                                  |                                            |
|---|----------------------------------|--------------------------------------------|
| 1 | Student Number                   | C0118839576                                |
| 2 | Title of Examination Paper       | Design of electrical installations.        |
| 3 | Module Code                      | GOEE 4001                                  |
| 4 | Date and Time of Examination     | 12/1/2022<br>2pm                           |
| 5 | Examination Venue                | centre number<br><del>68860</del><br>68860 |
| 6 | Seat Number                      | 10                                         |
| 7 | Number of Answer Books handed in |                                            |

| List the numbers of the questions you have attempted | Office Use |
|------------------------------------------------------|------------|
| 1                                                    | 0          |
| 2                                                    | 9          |
| 3                                                    | 10         |
| 5                                                    | 5          |
| 6                                                    | 2          |
| 4                                                    | 0          |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
| Total                                                | 26/60      |

$\frac{26}{60} = 43\%$  ✓ KF.

$$\frac{(r1 + r2) \times \text{multiplier} \times \text{length}}{1000}$$

$$Ans + 2e$$

$$\frac{V}{Ans} = \text{Fault current}$$

$$\sqrt{(a^2 + b^2 + c^2) - (a+b) - (a+c) - (b+c)}$$

$$\frac{E \times A}{F \times \mu_f \times \mu_f}$$

$$\sqrt{\frac{I^2 \times t}{k}} \quad k = 115$$

$$\frac{(Ma/A/m) \times lb \times \text{length}}{1000}$$

$$\frac{I^2 ?}{C_i + C_g + C_a + C_f}$$

✓ 0/5

i) a.  $9 \times 1.5 \text{ mm}^2 = 13.5 \text{ mm}^2$

$$6 \times 2.5 \text{ mm}^2 = 15 \text{ mm}^2$$

$$9 \times 6 \text{ mm}^2 = 54 \text{ mm}^2$$

$$3 \times 10 \text{ mm}^2 = 30 \text{ mm}^2$$

$$= 112.5 \text{ mm}^2$$

134 mm<sup>2</sup> conduit is needed.

b. 13  $\times$  10 mm<sup>2</sup> cables would be able to fit based on the conduit being 134 mm<sup>2</sup>. Leaving 4 mm<sup>2</sup> free.

2) 
$$\sqrt{(I_1^2 + I_2^2 + I_3^2) - (I_1 \times I_2) - (I_1 \times I_3) - (I_2 \times I_3)}$$

$$I_1 = 120 \text{ A}$$

$$I_2 = 230 \text{ A}$$

$$I_3 = 90 \text{ A}$$

$$120^2 + 230^2 + 90^2$$

$$= 75400 \text{ A} - (120 \times 230) - (120 \times 90) - (230 \times 90)$$

$$= 75400 - 27600 - 10800 - 20700$$

$$= \sqrt{16300} \checkmark$$

$$= 128 \text{ Amp} \checkmark$$

b) If the loads were reactive, this would affect the calculation because it's based off of a non reactive circuit, causing the neutral to be affected when reactive.

(1)

c) separate the two loads and use one to supply another room to keep balance. This will keep consistency throughout.

(2)

✓ 9/10

3) a. 
$$\frac{E \times A}{F \times \mu_f \times U_f}$$

$$E = 16000 \times 370$$

$$A = 16 \times 45 \text{ (m}^2\text{)}$$

$$F = 370 \times 16000$$

$$\mu_f = 0.7$$

$$U_f = 0.8$$

$$\frac{370 \times 16 \times 45}{16000 \times 0.8 \times 0.7} \quad \checkmark$$

$$= \frac{266400}{8960}$$

$$= 29.7 \text{ lamps} \quad \checkmark$$

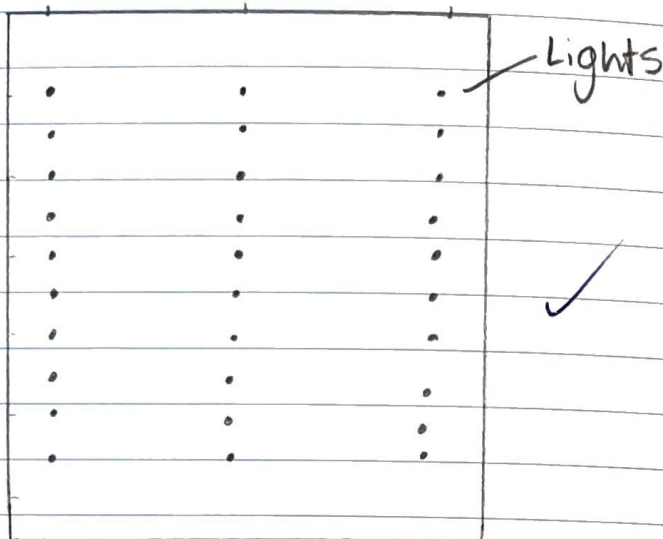
$$= \text{minimum of } 30 \text{ lamps} \quad \checkmark$$

(5)

$$b. \quad \frac{E}{L^2} = \frac{8000 \text{ cd}}{8^2} \checkmark$$

$$= 125 \text{ lux} \checkmark$$

c.



(3)

(2)

✓ 10/10

4) a. Fault current

$$Z_e = 0.58 \text{ ohms}$$

$$L = 32 \text{ metres}$$

$$5) \quad a) \quad \frac{(r_1 + r_2) \times \text{multiplier} \times \text{length}}{1000}$$

$$= \frac{10.49 \times 75 \text{ m} \times 1.2}{1000} \checkmark$$

$$= 0.94 \Omega \checkmark$$

$$= 0.94 + 0.35 \checkmark$$

$$= 1.29 \checkmark$$

$$\frac{230}{1.29} = 178.3 \text{ A} \checkmark$$

(5)

✓ 5/10

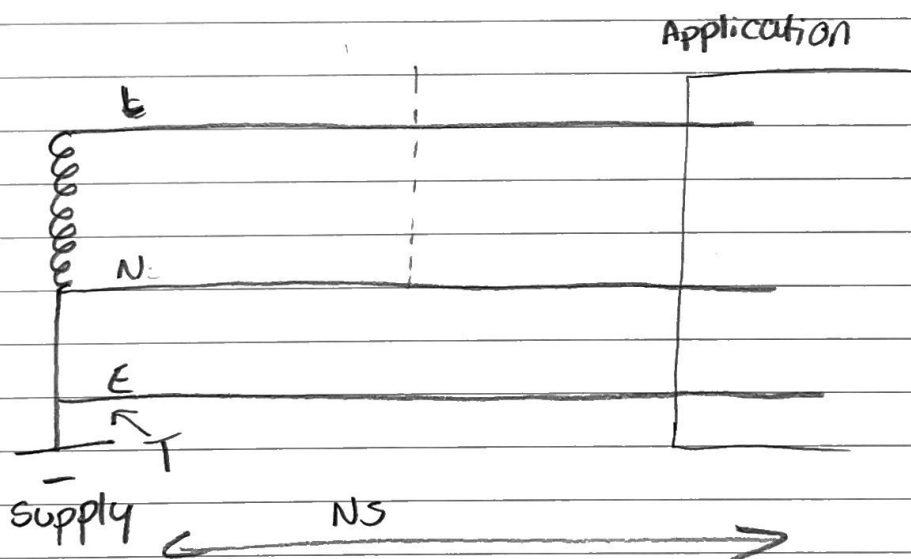
5 b. ~~At~~ 0.85 seconds will be the time the fuse takes to break.

6) a. ~~4 examples~~ is  
An exposed conductive part is something involved in the electrical work that will be visible to the average person ~~in the~~ in the room.

2 examples of this are steel trunking and sockets.

b. PME adds another ~~supp~~ source of power to the system, meaning additional electrodes are necessary in order to supply all lines with sufficient power.

c.



d. 1) TN-C-S doesn't require you to have an overhead supply, more versatile.

2) TT requires a consumer source that isn't needed in TN-C-S

(2)

2/10

$$4) \frac{(r1 + r2) \times \text{length} \times \text{multiplier}}{1000}$$

$$L = 32 \text{ m}$$

$$m = 1.2$$

$$r1 + r2 = 14.82$$

$$\frac{14.82 \times 32 \times 1.2}{1000}$$

$$= 0.57$$

$$+ ze$$

$$= 1.15$$

$$\frac{V}{1.15} =$$

$$S = \frac{\sqrt{I^2 \times t}}{K}$$

$$= \frac{\sqrt{838^2 \times 1}}{115}$$

$$= 12.6 \text{ mm}^2$$

$$\frac{(Ma/A/m) \times lb \times \text{length}}{1000}$$

$$= \frac{18 \times 38 \times 32}{1000}$$

$$= \frac{21888}{1000}$$

$$= 21.8 \text{ mm}^2$$