



SURNAME:

Walczak

FORENAME(S):

Daniar

12 Pages

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.**

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

$= 47\%$ ✓ KF

Q4

a)

$$13.5 = 9 \times 1.5$$

$$15 = 6 \times 2.5$$

$$54 = 9 \times 6$$

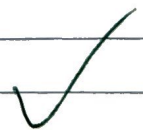
$$30 = 3 \times 10$$

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

I would choose 150mm x 150mm trunking

b) In my trunking I can only fit 15 cables of 10mm²

$$15 \times 10 = 150 \text{ mm}^2$$



0/5

Rhif y Cwestiwn

Q2
$$I_n = \sqrt{((I_a^2 + I_b^2 + I_c^2) - (I_a \times I_b) - (I_b \times I_c) - (I_a \times I_c))}$$

a)
$$\begin{aligned} I_a &= 120 \text{ A} \\ I_b &= 230 \text{ A} \\ I_c &= 90 \text{ A} \end{aligned}$$

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

$$I_n = \sqrt{75400 - 27600 - 20700 - 10800}$$

$$I_n = \sqrt{16300}$$

$$I_n = 127.67 \text{ A} \checkmark$$

(6)

b) Calculation might differ from this calculation

c) Calculate each neutral current for each phase.
~~and add them up~~

3

a) $16\text{m} \times 45\text{m} = A$ $u_f = 0.8$
 $16000 = F$ $m_f = 0.7$
 $E = 370$

$$N = \frac{E \times A}{F \times u_f \times m_f}$$

$$N = \frac{370 \times (16 \times 45)}{16000 \times 0.8 \times 0.7}$$

$$N = 29.7$$

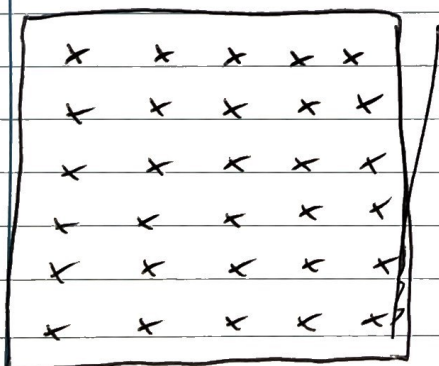
round it up to 30 lamps needed.

b) $\frac{I}{d^2}$ (lux) $8000 = F$
 $d = 8\text{m}$

$$\frac{8000}{8^2} = 125 \text{ lux}$$

lighting level needed 125 lux

c) I would put them evenly across and horizontal just like in sketch



x = lamps

(5)

(3)

(2)

10/10

Q4
a)

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

$$I_f = \frac{V_{oc}}{Z_s}$$

$$Z_s = Z_e + (R_1 + R_2)$$

$$R_1 + R_2 = \frac{(r_1 + r_2) \times 1.2 \times 32}{1000}$$

$$= \frac{(1.182 \times 1.2 \times 32)}{1000}$$

$$R_1 + R_2 = 0.57 \Omega$$

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

$$Z_e = 0.58 \Omega$$

$$k = 115$$

$$I_f = \frac{V_{oc}}{Z_s}$$

$$Z = Z_e + (R_1 + R_2)$$

$$R_1 + R_2 = \frac{(r_1 + r_2) \times 1.2 \times 32}{1000} \checkmark$$

$$R_1 + R_2 = 0.57 \Omega$$

$$Z_s = 0.58 + 0.57 \Omega$$

$$Z_s = 1.15 \Omega$$



Question No.

Examiner Only

$$If = \frac{230}{1.15}$$

$$If = 200A$$

$$S = \frac{200^2 \times 0.1}{115}$$

$$S = 34.78 \text{ mm}^2$$

Rhif y Cwestiwn

0/15

Arholwr yn unig

Q5

a)

$$I_f = \frac{V_{oc}}{Z_s}$$

$$V_{oc} = 230V$$

$$Z_s = Z_0 + (R_1 + R_2)$$

$$r_1 + r_2 = 6.16 \checkmark$$

$$Z_s = 0.35 + (R_1 + R_2)$$

$$= 0.35 + (6 + 462)$$

$$= 0.35 + 468$$

$$Z_s = 468.35$$

$$R_1 + R_2 = 6.16 + 75m$$

$$R_1 (R_1 + R_2) = \frac{(r_1 + r_2) \times 1.2 \times 75}{1000}$$

$$6.16 \times 1.2 \times 75 \checkmark$$

$$I_f = \frac{230}{468.35}$$

$$I_f = 0.49A$$

$$R_1 + R_2 = 0.56 \Omega$$

$$Z_s = 0.35 + 0.56$$

$$Z_s = 0.91 \Omega$$

$$I_f = \frac{230}{0.91}$$

b) ~~0.1s~~

$$I_f = 252.74 \Omega \checkmark$$

(5)

b) 0.1s

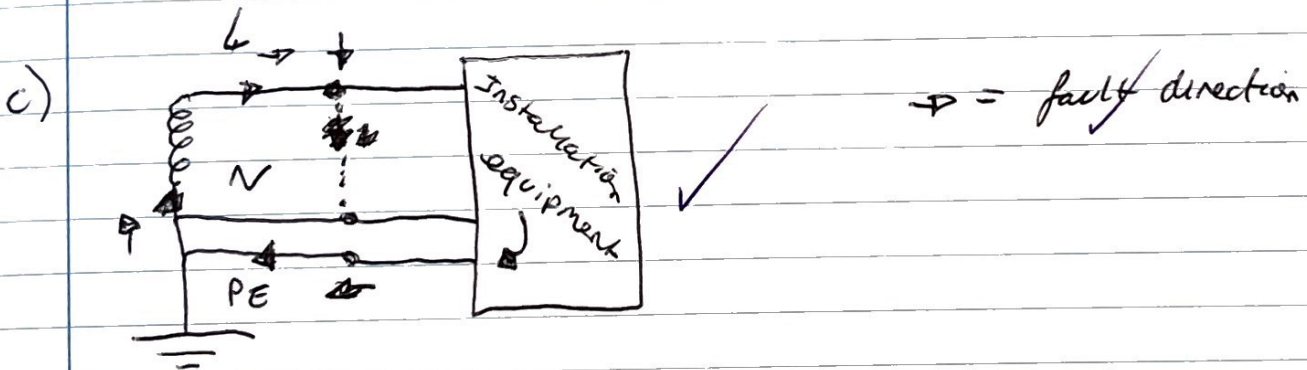
Question No

Q6

- a) exposed conductive parts are part of an installation circuit that are in risk of voltage occurring if fault ~~has~~ occurs. They might be steel conductors, cables with metal sheath.

(4)

- b) If fault occurs it will go straight ~~to~~ to that electrode avoiding a ~~short~~ voltage occurring on any other exposed parts conductive parts and leading to a shock.



(3)

- d) - lost effective as only 2 core cable is needed not 3 core
- No need for RCD on ^{each} terminal

7/10

Rhif y Cwestiwn