



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

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: Ross

FORENAME(S): Ben Owen

1	Student Number	7184 1199
2	Title of Examination Paper	Electrical Power
3	Module Code	GOEE5000
4	Date and Time of Examination	14/05/2026 1:32 pm
5	Examination Venue	Gower College, Tychoch
6	Seat Number	
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	16 ✓
Q2	18 ✓
Q3	0 ✓
Q4	0 ✓
Total	34/100 ✓

12
34%

(Gweler yr ochr arall am y fersiwn Cymraeg)

1.

a. 240V $\angle 0^\circ$ supply

$$Z_T = (1.3j\Omega) + (5 + 0.7j\Omega) + (2 + 0.8j\Omega)$$

$$Z_T = 7 + 2.8j\Omega$$

$$Z_T (\text{Polar}) = 7.5 \angle 21.8^\circ \quad \text{show workings}$$

$$\theta = 21.8^\circ$$

$$\cos \theta = 0.92849$$

4/5

$$\text{Power Factor} = 0.93 \text{ lagging}$$

b. $Z_1 = \cancel{30} 60 + 30j\Omega$

$$Z_2 = 0 - 10j\Omega$$

$$Z_1 Z_2 = \frac{(60 + 30j)(0 - 10j)}{60 + 30j + 0 - 10j}$$

$$Z_1 Z_2 (\text{Polar}) = (67 \angle 26.5^\circ)(10 \angle -90^\circ)$$

$$67 \angle 26.5^\circ + 10 \angle -90^\circ$$

$$Z_1 Z_2 = \frac{-600j + 300}{60 + 20j} \quad \text{or} \quad \frac{670.82 \angle -63.43^\circ}{63 \angle 18.4^\circ}$$

$$Z_1 Z_2 = 10.65 \angle 45.03^\circ \quad \text{or} \quad 7.52 + 7.53j \quad \text{E.C.F.}$$

$$Z_T = 20 + 7.52 + 7.53j = 27.52 + 7.53j$$

$$Z_T = 28.53 \angle 15.3^\circ \quad \text{E.C.F.} \quad 8/10$$

$$I = \frac{V}{Z_T} = \frac{230 \angle 0^\circ}{28.53 \angle 15.3^\circ} = 8 \angle -15.3^\circ \quad \text{E.C.F.} \quad 2/2$$

$$S = V \times I = 230 \angle 0^\circ \times 8 \angle -15.3^\circ = 1840 \angle -15.3^\circ \text{ VA} \quad \text{Correct method.} \quad 2/4$$

$$P = 1840 \text{ W}$$

$$Q = 15.3 \text{ VAR}$$

Q116/25Q1a4/5Q1b12/20

2.

$$a. Z_{\Delta} = 20 - 15j \text{ or } 25 \angle -36.86^\circ$$

$$1. V_{ab} = 330 \angle 0^\circ \text{ V}$$

$$V_{bc} = 330 \angle (0^\circ - 120^\circ) = 330 \angle -120^\circ \text{ V}$$

$$V_{ca} = 330 \angle (0^\circ + 120^\circ) = 330 \angle 120^\circ \text{ V} \quad 2/2$$

$$2. I_{AB} = \frac{330 \angle 0^\circ}{25 \angle -36.86^\circ} = 13.2 \angle 36.86^\circ \text{ A}$$

$$I_{BC} = \frac{330 \angle -120^\circ}{25 \angle -36.86^\circ} = 13.2 \angle -156.86^\circ \text{ A} \quad 5/6$$

$$I_{CA} = \frac{330 \angle 120^\circ}{25 \angle -36.86^\circ} = 13.2 \angle 83.14^\circ \text{ A}$$

$$3. I_A = I_{AB} \sqrt{3} \angle -30^\circ = 22.86 \sqrt{3} \angle -36.86^\circ - 30^\circ$$

$$I_A = 22.86 \angle -66.86^\circ \text{ A}$$

$$I_b = I_a \sqrt{3} \angle -120^\circ = 22.86 \sqrt{3} \angle -156.86^\circ - 30^\circ$$

$$I_b = 34.6 \angle -186.86^\circ \text{ A}$$

$$I_c = I_a \sqrt{3}$$

$$I_{cb} = I_a \angle -120^\circ = 22.86 \angle -66.86^\circ - 120^\circ$$

$$I_{cb} = 22.86 \angle 186.86^\circ \text{ A} \quad E.C.F$$

$$I_c = I_a \angle +120^\circ = 22.86 \angle -66.86^\circ + 120^\circ$$

$$I_c = 22.86 \angle 53.14^\circ \text{ A}$$

$$4. P_p = VI \cos \phi$$

$$P_p = (330) (13.2) \cos 36.86^\circ$$

$$P_p = 3485.25 \text{ W} \quad 3/3$$

Q2

18/25

Q2a

11/13

b.

$$\begin{aligned}
 1. \quad V_{an} &= 220 \angle 0^\circ \text{ V} \\
 V_{bn} &= 220 \angle 0^\circ - 120^\circ = 220 \angle -120^\circ \text{ V} \\
 V_{cn} &= 220 \angle 0^\circ + 120^\circ = 220 \angle 120^\circ \text{ V}
 \end{aligned}$$

Q2b

7/12

$$\begin{aligned}
 2. \quad V_{AB} &= \sqrt{3} 220 \angle 0 + 30^\circ = 381.05 \angle 30^\circ \text{ V} \\
 V_{BC} &= V_{AB} \angle -120^\circ = 381.05 \angle -90^\circ \text{ V} \\
 V_{CA} &= V_{AB} \angle +120^\circ = 381.05 \angle 150^\circ \text{ V}
 \end{aligned}$$

3. ~~The formulas for~~ The formulas for Phase Voltage and Phase Current are the same, so:

$$\begin{aligned}
 I_{AN} &= 381.05 \angle 0^\circ \text{ A} \\
 I_{BN} &= 220 \angle -120^\circ \text{ A} \\
 I_{CN} &= 220 \angle 120^\circ \text{ A}
 \end{aligned}$$

4.

$$\begin{aligned}
 Z_{\text{line}} &= 6 - j2 \Omega = 6.32 \angle -18.43^\circ \\
 Z_{\text{load}} &= 12 + j8 \Omega = 14.42 \angle 33^\circ
 \end{aligned}$$

~~I_{AN}, I_{BN}, I_{CN}~~ Pass through Z_{load}

$$I_{AN} = \frac{220 \angle 0^\circ}{14.42 \angle 33^\circ} = 15.25 \angle -33^\circ \text{ A}$$

$$I_a = V_{an} / Z_Y$$

$$\text{Total Impedance per phase} = Z_{\text{line}} + Z_{\text{load}}$$

$$Z_Y = (6 - j2) + (12 + j8) = 18 + j6 = 20.5 \angle 29^\circ$$

$$I_a = \frac{220 \angle 0^\circ}{20.5 \angle 29^\circ} = 10.67 \angle -29^\circ \text{ A}$$

E.C.F

$$I_b = I_a \angle -120^\circ = 10.67 \angle -149^\circ \text{ A}$$

E.C.F

$$I_c = I_a \angle +120^\circ = 10.67 \angle 91^\circ \text{ A}$$

E.C.F

correct method.

B

$$5. S_P = V_P I_P \quad \times(3)$$

$$I_P = \frac{V_P}{Z_T} = 10.67 \angle -29^\circ \text{ A} \quad \underline{\underline{L/3}}$$

$$S_P = (220 \angle 0^\circ \text{ V}) (10.67 \angle -29^\circ \text{ A}) \quad \text{E.C.F}$$

$$S_P = 2347.4 \angle -29^\circ \text{ KVA}$$

$$P = 2347.4 \text{ kW} \quad \times$$

$$Q = 29 \text{ VAR} \quad \times$$