



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: STANDING

FORENAME(S): LIAM

1	Student Number	P150310
2	Title of Examination Paper	Mechanical Principles
3	Module Code	MSX02201
4	Date and Time of Examination	12:00 10/5/2019
5	Examination Venue	IQ310
6	Seat Number	G022
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	10
2	4
3	9
4	8
5	4
Total	35

70%

1.) Multiplate

$$P = 20,000$$

$$N = 4000$$

$$\mu = 0.25$$

$$D_i = 80 \text{ mm} \quad r_i = 0.04 \text{ m}$$

$$D_o = 160 \text{ mm} \quad r_o = 0.08 \text{ m}$$

$$W = 600 \text{ N}$$

$$a). \quad T = \frac{2}{3} \mu W \frac{(r_2^3 - r_1^3)}{(r_2^2 - r_1^2)} \times 2n.$$

$$P = \frac{2\pi NT}{60}$$

$$T = \frac{60P}{2\pi N}$$

$$T = \frac{60 \times 20000}{2 \times \pi \times 4000}$$

$$T = 47.74648293$$

$$\frac{T \times 3 \times (r_2^2 - r_1^2)}{2 \mu W (r_2^3 - r_1^3)} = 2n$$

$$2n = \frac{47.74648293 \times 3 \times (0.08^2 - 0.04^2)}{2 \times 0.25 \times 600 (0.08^3 - 0.04^3)}$$

$$2n = 5.1156946$$

$$n = \frac{5.1156946}{2}$$

$$n = 2.5578473$$

$\therefore$ requires 3.

$$b) \quad T = 47.74648293$$

$$T = \frac{\mu W (r_2 + r_1)}{2} \times 2n \quad 2n = \frac{T \times 2}{\mu W (r_2 + r_1)}$$

$$2n = 5.30516477$$

$$n = 2.65258238 \therefore 3 \text{ required}$$

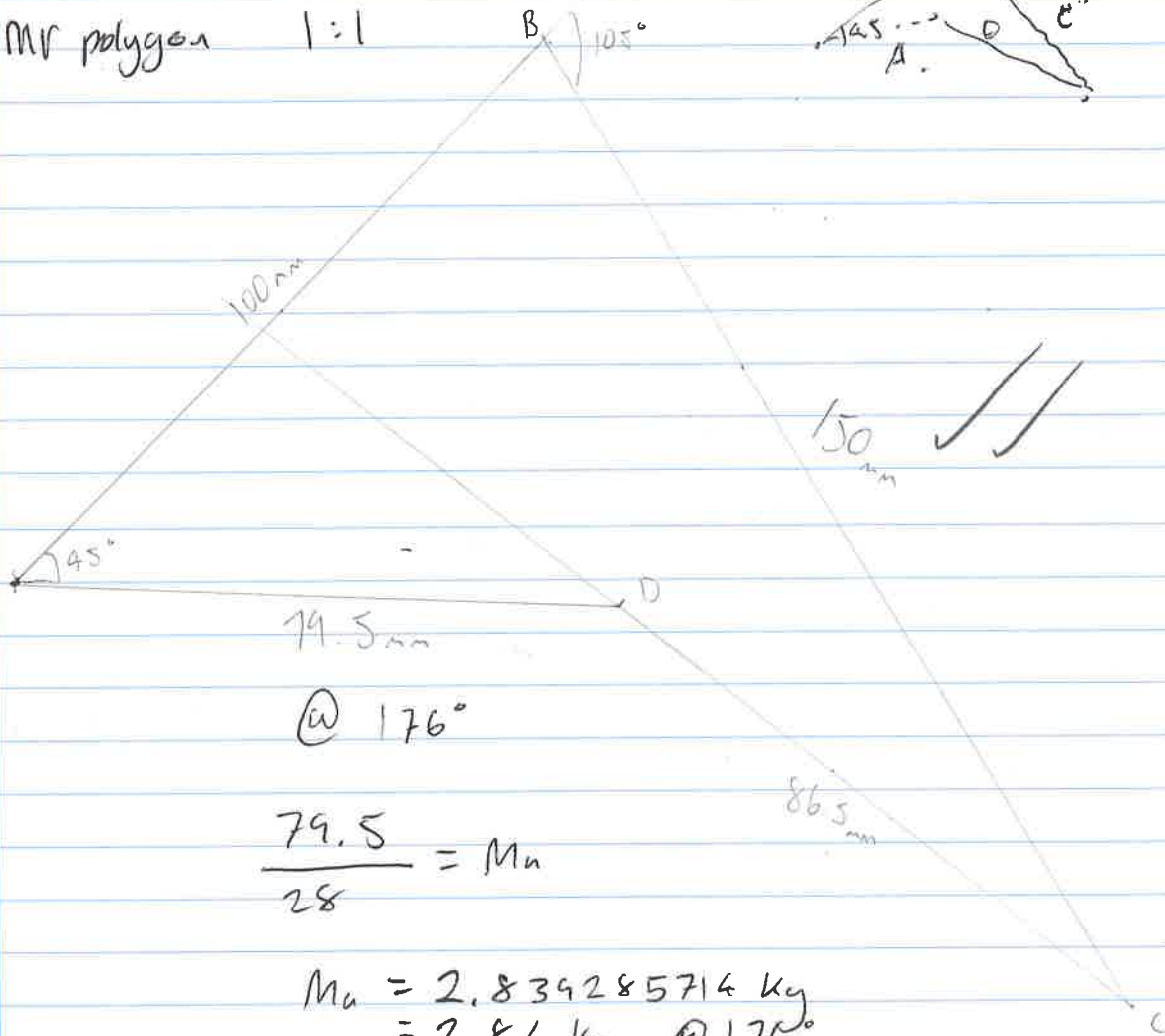
$$D.) = 3.6 \text{ belts } \times 4 \text{ Belts required.}$$

$$\frac{V_{\text{total}}}{V_{\text{per belt}}} = 3.6727643$$

$$C) \frac{P}{4} = 1875 \text{ w per belt.}$$

c)	m	r	mr	
A	m_a	28	$28m_a$	@ ?
B	5	20	100	@ 45°
C	3	80	150	@ 60°
D	3.04	28	86.52	@ 140.5°

MR polygon 1:1



$$\frac{79.5}{28} = M_a$$

$$M_a = 2.839285714 \text{ kg} \\ \approx 2.84 \text{ kg @ } 176^\circ$$

-1 accuracy.

5. anticlockwise @ Gear A $N = 1500$
 $T = 15 \text{ Nm}$
 $\eta = 0.85$

a) ~~माना~~ ~~माना~~ ~~माना~~

$$GR = \frac{32}{20} \times \frac{36}{26} \times \frac{39}{16} = 5.4$$

$$GR = N_1 \quad \frac{1500}{GR} = N_2$$

$$\frac{N_2}{N_1} = \frac{1500}{5.4} = 277.7 \text{ rev/min}$$

$$N_2 = 277.7 \text{ rev/min clockwise}$$

b) $GR \times t_1 = t_2$ $5.4 \times 15 = 81 \text{ Nm}$

$$Power_{out} = \frac{2 \times \pi \times 277.7 \times 81}{60}$$

$$P_{\text{ent}} = 2355.614579 \text{ w}$$

c) $t_1 + t_2 + t_3 = 0$

$$\begin{aligned} t_3 &= -t_1 - t_2 \\ t_3 &= -15 - 81 \\ t_3 &= -96 \text{ Nm} \end{aligned}$$



Question No.

Examiner Only

