



Prifysgol Cymru
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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.**

Complete, fold and seal
(see note 2 below)

SURNAME:

MOORA

FORENAME(S):

JOAO

1	Student Number	P 151905
2	Title of Examination Paper	MECHANICAL PRINCIPLES
3	Module Code	M5X02201
4	Date and Time of Examination	10/5/2019
5	Examination Venue	IQ 310
6	Seat Number	G050
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	4
2	10
4	8
5	8
3	0
Total	30

a)

① $P = 20 \text{ kW} = 20000 \text{ W}$

$$N = 4000 \text{ rpm}$$

$$\mu = 0.25$$

$$d_2 = 160 \text{ mm} = 0.08 \text{ m}$$

$$d_1 = 80 \text{ mm} = 0.04 \text{ m}$$

$$\omega = 600 \text{ rad/s}$$

$$T = \frac{2}{3} \mu W \frac{(R_2^3 - R_1^3)}{(R_2^2 - R_1^2)} \times 2 \text{ m} \checkmark$$

$$T = \frac{2}{3} \times 0.25 \times 600 \frac{(0.08^3 - 0.04^3)}{(0.08^2 - 0.04^2)} \times 2 \text{ m}$$

$$T = 9.33 \text{ Nm} \times$$

~~$$9.33 = \frac{2}{3} \times 0.25 \times 600 \frac{(0.08^3 - 0.04^3)}{(0.08^2 - 0.04^2)} \times 2 \text{ m}$$~~
~~$$T = 9.33 \text{ Nm}$$~~

$$9.33 = 2 \text{ m} \times$$

$$m = \frac{9.33}{2} \times$$

$$m = 4.66 \times$$

$$n^{\circ} \text{ Clutch Plates} = 5 \checkmark$$

b)

$$T = \frac{\mu W (R_2 + R_1)}{2} \checkmark$$

$$T = \frac{0.25 \times 600 (0.08 + 0.04)}{2}$$

$$T = 9 \text{ Nm} \times$$

$$9 = 2 \text{ m} \rightarrow m = \frac{9}{2} = 4.5$$

$$n^{\circ} \text{ Clutch Plates} = 5 \checkmark$$
~~$$n^{\circ} \text{ Clutch Plates} = 4$$~~

$$F_1 = 1.87 F_2$$

$$F_1 + F_2 = 400 \quad \checkmark$$

$$1.87 F_2 + \textcircled{1} F_2 = 400$$

$$2.87 F_2 = 400 \quad \checkmark$$

$$F_2 = \frac{400}{2.87}$$

$$F_2 = 139.37 \text{ N}_{\text{min.}} \quad \checkmark$$

$$F_1 = 1.87 F_2$$

$$F_1 = 1.87 \times 139.37$$

$$F_1 = 260.63 \text{ N}_{\text{min.}} \quad \checkmark$$

$$c) P = \sqrt{F_1 - F_2}$$

$$P = 21.87 (260.63 - 139.37)$$

$$P = 2651.96 \text{ W} \quad \checkmark$$

d)

$$\text{No Belts} = \frac{7500}{2651.96}$$

$$\text{No Belts} = 2.82 \rightarrow \textcircled{3 \text{ Belts}} \quad \checkmark$$

c)

$$I = \frac{BW}{\omega_m^2 \phi}$$

$$I = \frac{450}{248.71^2 \times 0.105} \quad \text{Error carries}$$

$$I = 0.07 \text{ Kg m}^2 \quad \checkmark$$

d)

$$I = MK^2$$

$$M = 13 \text{ Kg}$$

$$0.07 = 13 \cdot K^2$$

$$K^2 = \frac{0.07}{13}$$

$$K^2 = 5.38 \times 10^{-3}$$

$$K = \sqrt{5.38 \times 10^{-3}}$$

$$K = 0.073 \text{ (m)} \quad \times$$

e)

$$N_i = 1500 \text{ Rpm}$$

$$T_i = 15 \text{ Nm}$$

$$\eta = 85\% = 0.85 \quad \checkmark$$

a)

$$G_{rat} = \frac{32}{20} = 1.6$$

$$G_{ref} = \frac{39}{16} = 2.44$$

$$G_{p=cd} = \frac{36}{26} = 1.38$$

$$G_p = 5.42 \quad \rightarrow$$

~~Q4~~ #

$$T_0 = \frac{2002.77}{28.98}$$

$$T_0 = 69.10 \text{ Nm} \checkmark$$

$$t_h = -t_i + t_o$$

$$t_h = -15 - 69.10$$

$$t_h = -84.1 \text{ Nm}$$

$$t_h = 84.1 \text{ Nm} \quad \times \quad \times$$

————— 4 —————

③

$$28 \text{ mm} = 0.028 \text{ m}$$

$$20 \text{ mm} = 0.02 \text{ m}$$

$$AB = 80 \text{ mm} = 0.08 \text{ m}$$

$$BC = 70 \text{ mm} = 0.07 \text{ m}$$

$$CD = 100 \text{ mm} = 0.1 \text{ m}$$

No table
or diagrams.



Question No.

Examiner Only



Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn

