



Prifysgol Cymru
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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 accept your 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: Coney

FORENAME(S): Benjamin

1	Student Number	1703189
2	Title of Examination Paper	Mechanical Principles
3	Module Code	MSX02201
4	Date and Time of Examination	10/05/2019
5	Examination Venue	IQ 310
6	Seat Number	6029
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	4
2	2
5	7
4	0
3	0
Total	13

1. $P = 20000 \text{ W}$
 $N = 4000 \text{ RPM}$
 $\mu = 0.25$
 $d_i = 0.08 \text{ m}$
 $d_o = 0.16 \text{ m}$
 $\omega = 600 \text{ N}$

a) $T = \frac{2}{3} \mu \omega \frac{(r_2^3 - r_1^3)}{(r_2^2 - r_1^2)} \times 2\pi \checkmark$

$r_2 = 0.08 \text{ m}$
 $r_1 = 0.04 \text{ m}$

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

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

$P \times 60 = 2\pi NT$

$T = \frac{2\pi N}{60P} \frac{2\pi N 60}{P} = 75.4 \text{ Nm} \times$

error comes

~~$2\pi T = \frac{2}{3} \mu \omega \frac{(r_2^3 - r_1^3)}{(r_2^2 - r_1^2)}$~~

~~$2\pi = \frac{2}{3} \mu \omega \frac{(r_2^3 - r_1^3)}{(r_2^2 - r_1^2)} = \frac{2}{3} \times 0.25 \times 600 \frac{(0.08^3 - 0.04^3)}{(0.08^2 - 0.04^2)}$~~
~~75.4~~

~~$2\pi = \frac{2}{3} \mu \omega \frac{(r_2^3 - r_1^3)}{(r_2^2 + r_1^2)}$~~

2. $P = 7500 \text{ W}$
 $N = 3800 \text{ RPM}$
 $d = 0.11 \text{ m}$
 $\mu = 0.3$
 $\theta = 120^\circ = 2.09 \text{ rads}$ ✓
 $T_i = 200 \text{ N}$

a) $v = \omega r$
 $v = 3800 \times 2.09$
 $v = 7942 \text{ m/s}$ X

b) $T_{\text{max}} = F_i$
 $F_1 + F_2 = \text{Constant} = F_1 + F_2 = 2000 \text{ N}$ X

$F_2 = 200 \text{ N} + F_2$
 $F_1 = 200 F_2$ X
 $F_1 = \frac{300 \text{ N}}{200}$
 $F_2 = 1.5$

c) $P_{\text{max}} = P \times \mu = 2250 \text{ W per belt}$ X

d) $\therefore 4 \text{ belts}$ ✓ based on ^{carried errors}
 because the power output is 7500 W
 and each belt can transmit 2250 W .

$$c) \quad t_i + t_o + t_h = 0$$

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

$$t_o = 0.85 \times 15 = 12.75 \text{ Nm}$$

$$t_h = t_i - t_o = 2.25 \text{ Nm} \quad \times$$

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