



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: Liddell

FORENAME(S): Harrison Lewis

1	Student Number	1700953
2	Title of Examination Paper	Mechanical Principles
3	Module Code	M5X02201
4	Date and Time of Examination	10/05/2019 11:56
5	Examination Venue	IQ
6	Seat Number	G027
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	4
2	1
3	1
4	6
5	4
Total	16

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

a) $P = 20000$

$N = 4000$

$\mu = 0.25$

$d_1 = 80 \text{ mm} = 0.08 \text{ m}$ $r_1 = 0.04$

$d_2 = 160 \text{ mm} = 0.16 \text{ m}$ $r_2 = 0.08$

$W = 600 \text{ N}$

$T = 47.75 \text{ Nm}$ ✓

a) uniform pressure;

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

For 1 plate $\frac{2}{3} \times 0.25 \times 600 \times \frac{(0.08^3 - 0.04^3)}{(0.08^2 - 0.04^2)} \times 2 \pi n$

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

~~$$2 \pi n = \frac{47.75 \times 3 (0.08^2 - 0.04^2)}{2 \times 0.25 \times 600 \times (0.08^3 - 0.04^3)}$$~~

~~$$2 \pi n = \frac{2}{3} \times \frac{0.25 \times 600}{2} \times \frac{(0.08^3 - 0.06^3)}{(0.08^2 - 0.06^2)} \times 47.5$$~~ X

$2 \pi n = 502.14$

$n = \frac{502.14}{2} = 251.07$ X

b) uniform wear;

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

$2 \pi n = \frac{0.25 \times 600 \times (0.08 + 0.06)}{2} \times 47.75 = 50.14$ X

$2 \pi n = 50.14$ $n = \frac{50.14}{2} = 25.07$ X

3.

	$m \text{ (kg)}$	$r \text{ (mm/kg)}$	mr
A	~~md~~	~~250~~	~~80 mA~~
B	5	~~80~~	400
C	3	~~150~~	450
D	md	250	250 md

	$m \text{ (kg)}$	$r \text{ (mm/kg)}$	mr
A	~~md~~ 2.9	28	~~28 md~~
B	5	20	100
C	3	50	150 ✓
D	~~md~~ 3.6	28	28 md.

$$MA = \frac{80}{28} = 2.9 \text{ m.}$$

$$Md = \frac{100}{28} = 3.6 \text{ kg}$$

$$I = \frac{B W}{\omega m^2 \phi}$$

$$I = \frac{450}{248.71^2 \times 0.12} = 15.08 \quad \times$$

~~$$I = \frac{m r^2}{2}$$~~

$$I = \frac{m r^2}{2} \quad \times$$

$$r = \sqrt{\frac{2 \times I}{m}}$$

$$r = \sqrt{\frac{2 \times 15.08}{13}}$$

$$r = 1.52 \text{ m} \quad \times$$

