



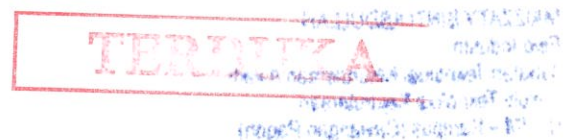
UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022**

- COURSE NAME : STATICS
- COURSE CODE : BNP 10102
- PROGRAMME CODE : BNA/BNB/BNC
- EXAMINATION DATE : JULY 2022
- DURATION : 2 HOURS 30 MINUTES
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS AN **ONLINE ASSESSMENT AND CONDUCTED VIA CLOSED BOOK.**
 3. STUDENTS ARE **PROHIBITED TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK**

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

- Q1**
- (a) With the aid of a diagram, briefly explain about parallelogram rule. Then, give **ONE (1)** example application of this rule. (5 marks)
 - (b) Determine the maximum mass of the engine that can be supported without exceeding a tension of 2kN in chain AB and 2.2kN in chain AC as shown in **Figure Q1 (b)**. (10 marks)
 - (c) Evaluate the resultant force and couple moments acting at point A as shown in **Figure Q1 (c)**. (Note: Use your own value of F as stated in **Table 1**). (10 marks)
- Q2**
- (a) With the aid of a diagram, briefly explain **TWO (2)** categories of three-dimensional force systems. Then, give **ONE (1)** example of a real application for each force system. (6 marks)
 - (b) The building slab is subjected to four parallel column loadings as shown **Figure Q2 (b)**. Determine F1 and F2 if the resultant force acts through the point (12 m, 10 m). (Note: Use your own value of W_1 and W_2 as stated in **Table 1**). (9 marks)
 - (c) Determine the force components acting at the roller A, on the ball and socket D and the tension on the cord CB as shown in **Figure Q2 (c)**. (Note: Use your own value of W_3 and W_4 as stated in **Table 1**). (10 marks)
- Q3**
- (a) Identify **THREE (3)** examples of friction occurring in a real application. (6 marks)
 - (b) Calculate the friction force at the surface of contact as shown in **Figure Q3 (b)**. (Note: Use your own value of P as stated in **Table 1**). (5 marks)
 - (c) Determine the smallest force P needed to lift the W_3 load as shown in **Figure Q3 (c)**. The coefficient of static friction between A and C and between B and D is $\mu_s = 0.3$, and between A and B $\mu_s = 0.4$. Neglect the weight of each wedge. (Note: Use your value of W_5 as stated in **Table 1**). (14 marks)



- Q4** (a) Distinguish the centroid of lines and their centroid of the area. Then, explain it when used in a real application. (6 marks)
- (b) Evaluate the centroidal coordinates of the line in **Figure Q4 (b)**. (Note: Use your own value of L_1 , L_2 and r as stated in **Table 1**. (8 marks)
- (c) Analyse and sketch the location of the centroid of the composite area by dividing it into 2 parts as shown in **Figure Q4 (c)**. (Note: Use your own variable of a , b and c as stated in **Table 1**. (11 marks)

- **END OF QUESTIONS** -

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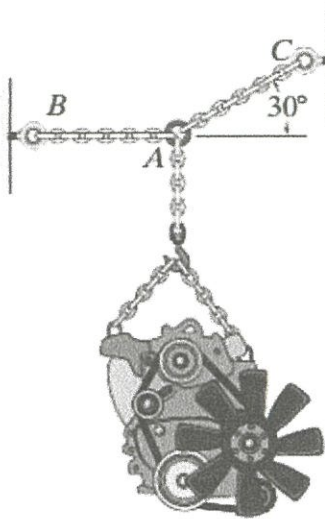


Figure Q1 (b)

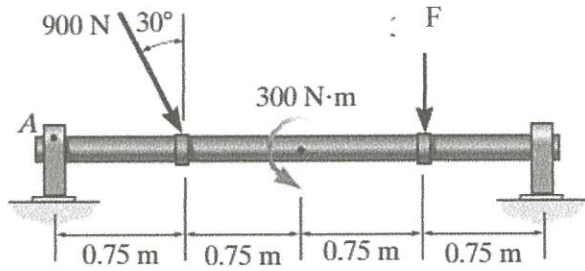


Figure Q1 (c)

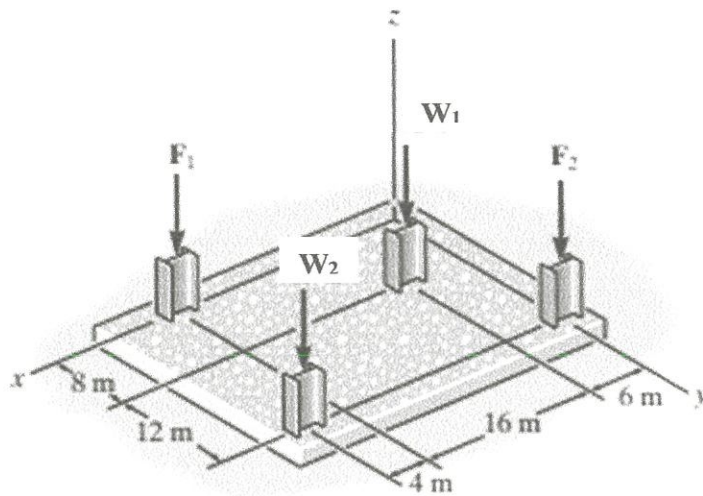


Figure Q2 (b)

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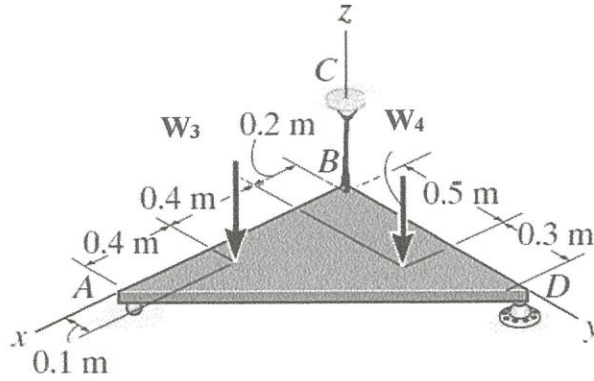


Figure Q2 (c)

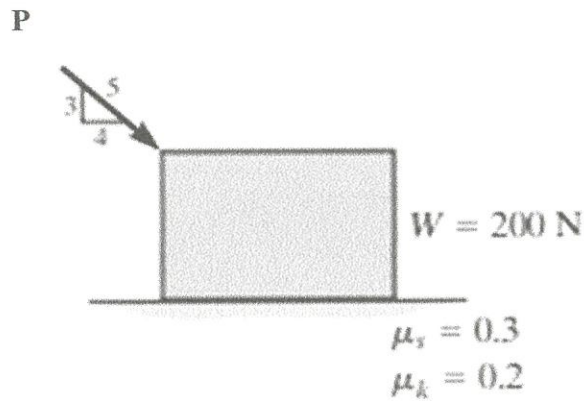


Figure Q3 (b)

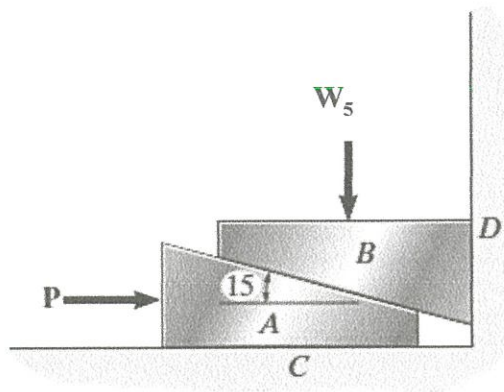


Figure Q3(c)

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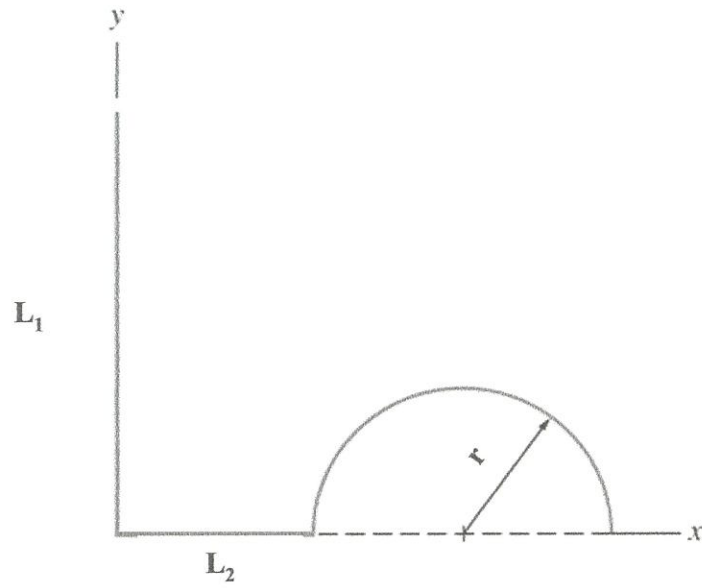


Figure Q4 (b)

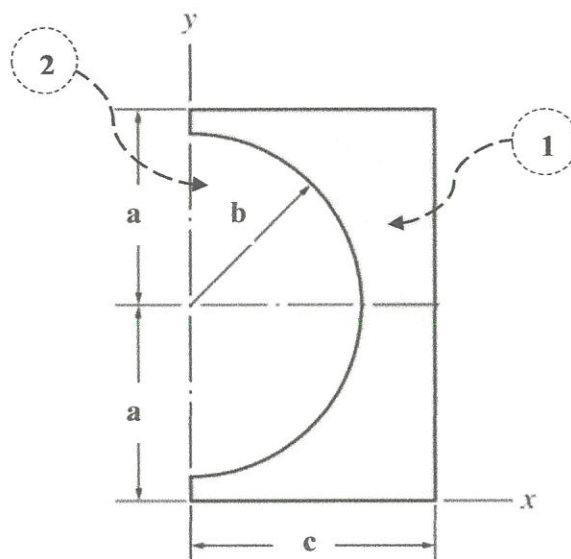


Figure Q4 (c)



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Table 1: Variable for Q1 (c), Q2 (b-c), Q3 (b-c) and Q4 (b-c)

	SEC. 1	F	W1	W2	W3	W4	P	W5	L1	L2	r	a	b	c
1	CN210296	300	20	60	20	60	500	60	60	20	15	30	27	30
2	CN210299	350	35	80	35	80	510	80	60	20	10	35	32	35
3	CN210310	320	45	90	45	90	520	90	60	30	15	40	37	40
4	CN210019	300	35	100	35	100	530	100	60	30	10	45	42	45
5	CN210345	250	40	60	40	60	540	60	70	20	15	50	47	50
6	CN210005	200	45	80	45	80	550	80	70	20	10	55	53	55
7	CN210157	280	35	90	35	90	560	90	70	30	15	60	57	60
8	AN210069	380	40	100	40	100	570	100	70	30	10	65	62	65
9	CN210370	400	45	60	45	60	580	60	75	20	15	70	67	70
10	AN210041	380	30	80	30	80	590	80	75	20	10	75	72	75
11	AN210097	350	25	90	25	90	600	90	75	30	15	80	77	80
12	CN210317	300	20	100	20	100	610	100	75	30	10	85	82	85
13	AN210088	250	30	60	30	60	620	60	75	35	15	90	87	90
14	CN210387	200	25	80	25	80	630	80	75	35	10	95	92	95
15	AN210057	280	20	90	20	90	640	90	70	35	15	100	97	100

