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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2013/2014**

COURSE NAME : STATICS
COURSE CODE : DAM 10103
PROGRAMME : 3 DAM
EXAMINATION DATE : JUNE 2014
DURATION : 3 HOURS
INSTRUCTION : A) ANSWER ALL QUESTIONS
B) ANSWER **THREE (3)**
QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF NINE (9) PAGES

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SECTION A

Q1 Refer to Figure **Q1**, if $F_1 = 600 \text{ N}$ and $\theta = 30^\circ$.

- (a) Draw and label the parallelogram for F_1 and F_2 only. (3 marks)
- (b) Convert F_1, F_2 and F_3 to F_x and F_y direction. (3 marks)
- (c) Compute the F_x and F_y resultant force (F_{Rx} and F_{Ry}) (4 marks)
- (d) Calculate the magnitude of resultant force and its direction measured clockwise from the positive x axis. (10 marks)

Q2 The block A has a mass of 300 kg and the wedge B. The coefficient of static friction equals 0.3 for all surfaces of contact as shown in Figure **Q2**. Neglect the weight of the wedge B.

- (a) Draw the free body diagram (FBD) of the Figure **Q2**. (4 marks)
- (b) Identify the smallest value of force P necessary to raise the block A.. (16 marks)

SECTION B

Q3 Refer to Figure **Q3**, the weight of chandelier is 50kg.

- (a) Draw a free body diagram (FBD) of joint B and D. (4 marks)
- (b) Calculate the tension develop in cable CD and BD (10 marks)
- (c) Using the result from (b) identify the tension in AB and BC cable (6 marks)

- Q4** Two couples of force in Figure **Q4** act on the beam. The resultant couple is zero
- (a) By using “definition of couple”, find F and P (4 marks)
- (b) Find d by using “apply net moment equal to zero” equation. (8 marks)
- (c) Refer to Figure **Q4(c)** the member is subjected to a force of $F= 6$ kN. If $\theta = 45^\circ$, determine the moment produced of F about point A . (8 marks)
- Q5** Given distributed loading act on the beam shown at Figure **Q5**
- (a) Define the magnitude and its location of resultant force of each distributed loading measured from B . (6 marks)
- (b) Specify the equivalent resultant force and its location measure from A (14 marks)
- Q6.** Four forces of magnitude 5 kN, 10 kN, 10 kN and 5 kN acted on the truss as shown in Figure **Q6**.
- (a) Draw a free body diagram (FBD) of the truss. (5 marks)
- (b) Determine the forces in members BC , BE , and EF of the truss. (12 marks)
- (c) State if the members are in tension or compression. (3 marks)
- Q7** (a) Determine the segment area in term of a and b as shown in Figure **Q7(a)**. (5 marks)
- (b) Determine the coordinate of centroids for a plate as shown in Figure **Q7(b)** (15 marks)

- END OF QUESTION -

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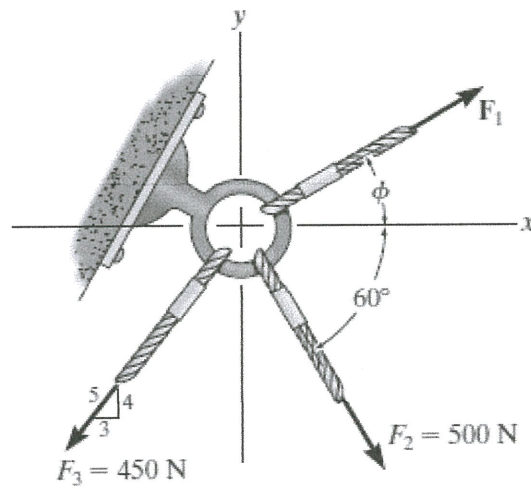


FIGURE Q1

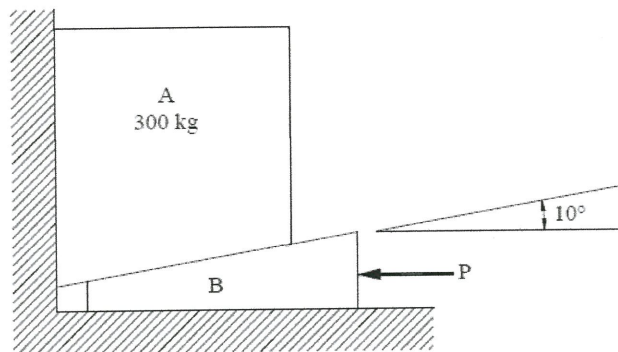


FIGURE Q2

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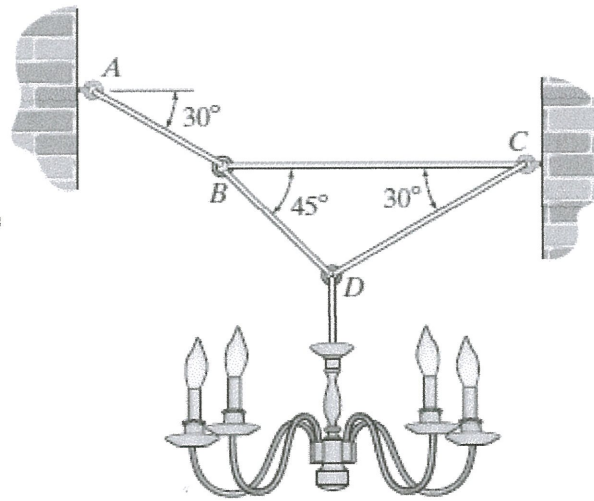


FIGURE Q3

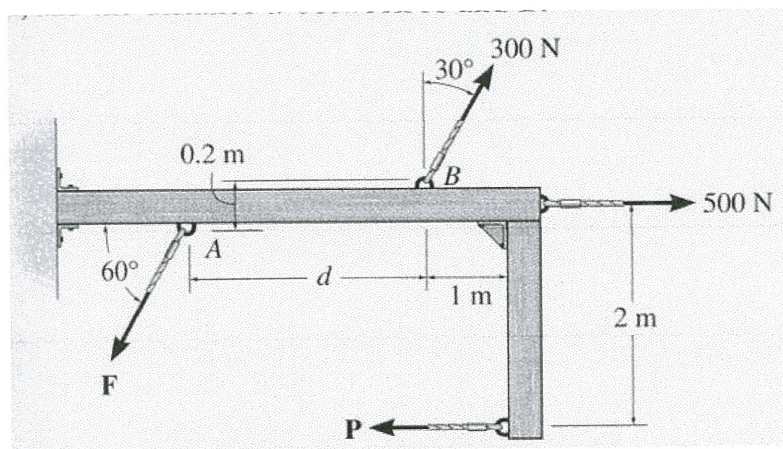


FIGURE Q4

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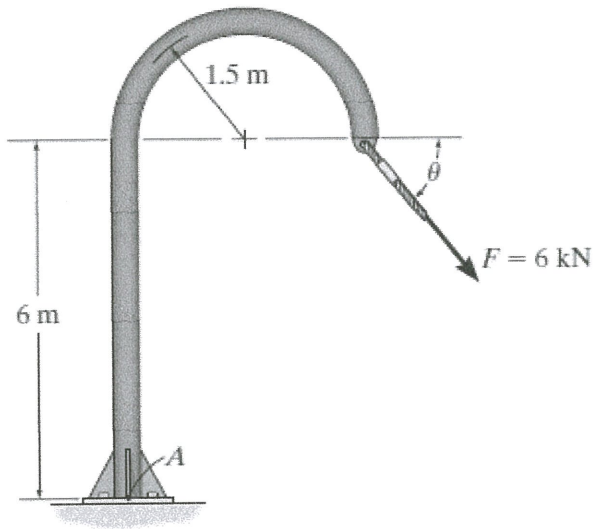


FIGURE Q4(c)

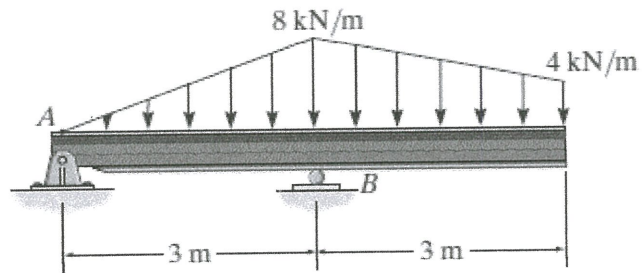


FIGURE Q5

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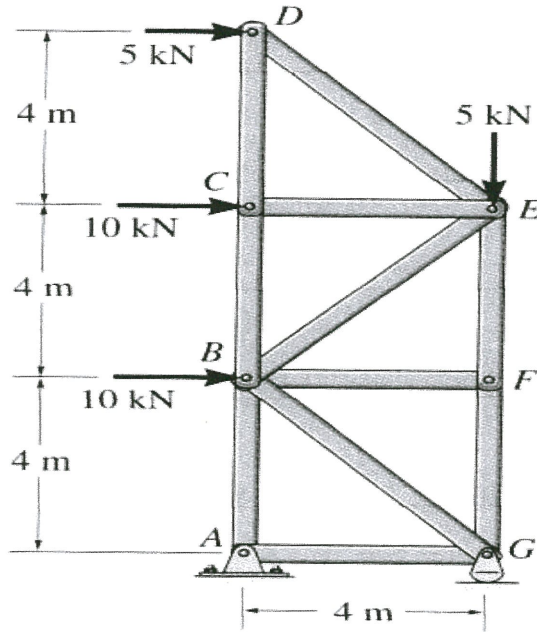


FIGURE Q6

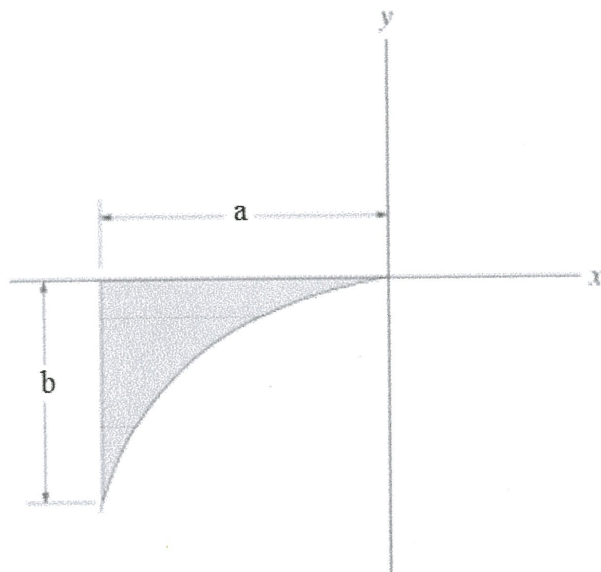


FIGURE Q7(a)

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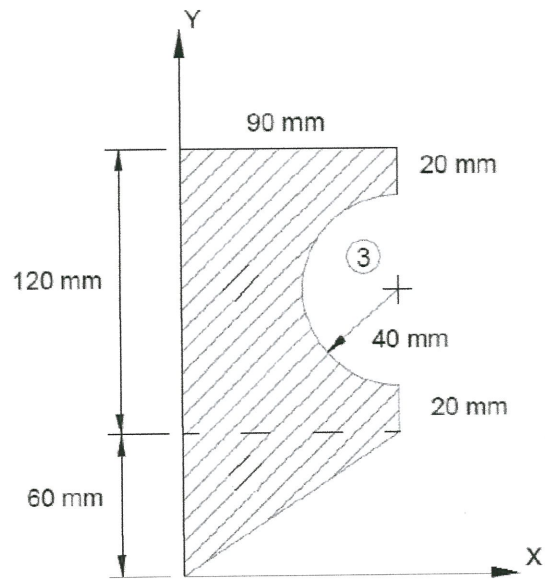


FIGURE Q7(b)

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Shape		\bar{x}	\bar{y}	Area
Triangular area			$\frac{h}{3}$	$\frac{bh}{2}$
Quarter-circular area		$\frac{4r}{3\pi}$	$\frac{4r}{3\pi}$	$\frac{\pi r^2}{4}$
Semicircular area		0	$\frac{4r}{3\pi}$	$\frac{\pi r^2}{2}$
Quarter-elliptical area		$\frac{4a}{3\pi}$	$\frac{4b}{3\pi}$	$\frac{\pi ab}{4}$
Semielliptical area		0	$\frac{4b}{3\pi}$	$\frac{\pi ab}{2}$
Semiparabolic area		$\frac{3a}{8}$	$\frac{3h}{5}$	$\frac{2ah}{3}$
Parabolic area		0	$\frac{3h}{5}$	$\frac{4ah}{3}$
Parabolic spandrel		$\frac{3a}{4}$	$\frac{3h}{10}$	$\frac{ah}{3}$
General spandrel		$\frac{n+1}{n+2} a$	$\frac{n+1}{4n+2} h$	$\frac{ah}{n+1}$
Circular sector		$\frac{2r \sin \alpha}{3\alpha}$	0	αr^2