



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**PEPERIKSAAN AKHIR
SEMESTER 1
SESI 2013/2014**

NAMA KURSUS : STATIK
KOD KURSUS : DAM 10103
KURSUS : 1 DAM
TARIKH PEPERIKSAAN : DISEMBER 2013/ JANUARI 2014
JANGKA MASA : 3 JAM
ARAHAN : JAWAB LIMA (5) SOALAN SAHAJA

KERTAS SOALAN INI MENGANDUNGI SEPULUH (10) MUKA SURAT

SOALAN DALAM BAHASA MELAYU

S1 Tiga (3) daya bertindak ke atas pendakap seperti ditunjukkan dalam Rajah S1

- (a) Tentukan magnitud daya paduan yang bertindak ke atas pendakap dan arahnya diukur mengikut arah lawan jam dari paksi positif x' jika $F_1 = 300 \text{ N}$ dan $\theta = 10^\circ$.
(8 Markah)
- (b) Jika magnitud daya paduan yang bertindak keatas pendakap adalah 800 N diarahkan sepanjang paksi positif x' tentukan magnitud F_1 dan arah θ .
(12 Markah)

S2 Tiga (3) daya bertindak ke atas pendakap seperti yang ditunjukkan dalam Rajah S2.

- (a) Terangkan momen paduan bagi system daya sesatah.
(2 Markah)
- (b) Tentukan momen paduan bagi daya-daya tersebut di titik A. Ambil $F_1 = 250\text{N}$, $F_2 = 300\text{N}$ dan $F_3 = 500\text{N}$
(8 Markah)
- (c) Sekiranya momen paduan bagi titik A adalah 4800 N.m mengikut arah jam, tentukan nilai magnitud daya F_3 sekiranya $F_1 = 300\text{N}$ dan $F_2 = 400\text{N}$.
(10 Markah)

S3 Paip seberat 35 kg disokong di titik A oleh sistem yang terdiri daripada 5 tali seperti yang ditunjukkan dalam Rajah S3.

- (a) Terangkan keadaan bagi keseimbangan zarah.
(2 Markah)
- (b) Lukiskan gambarajah badan bebas (GBB) bagi struktur tersebut di gegelang A dan B.
(4 Markah)
- (c) Tentukan nilai magnitud daya yang bertindak pada setiap tali AE, AB, BD dan BC dalam keadaan keseimbangan.
(14 Markah)

S4 (a) Terangkan secara ringkas "*Theorems of Pappus and Guidinus*".

(5 Markah)

- (b) Tentukan sentroid (\bar{X}, \bar{Y}) untuk luas plate pada Rajah S4(b).

(15 Markah)

- S5** Rajah S5 menunjukkan bahagian struktur dalaman bagi sebuah bumbung.
- (a) Lukiskan gambarajah badan bebas (GBB) bagi kekuda tersebut. (4 Markah)
 - (b) Dapatkan magnitud bagi daya-daya tindakbalas pada penyokong A dan I. (6 Markah)
 - (c) Dengan menggunakan kaedah keratan, tentukan daya pada anggota AD, BD and BC bagi kekuda tersebut. (10 Markah)
- S6** Rajah S6 menunjukkan tiga blok A, B dan C dengan berat $W_B = 20 \text{ N}$ dan $W_C = 80$. Bagi permukaan di antara A dan B, pekali geseran static ialah $\mu_s = 0.2$, bagi permukaan diantara B dan C, pekali geseran static ialah $\mu_s = 0.18$, manakala diantara permukaan C dan dinding, $\mu_s = 0.3$.
- (a) Lukiskan gambarajah badan bebas (GBB) bagi baji tersebut. (5 Markah)
 - (b) Hitung daya normal diantara blok AB dan BC. (10 Markah)
 - (c) Hitung magnitud daya F yang diperlukan supaya blok C dapat dinaikkan pada kadar malar. (5 Markah)
- S7** Rajah S7 menunjukkan peti A yang mempunyai berat 600N. Bagi semua permukaan, $\mu_s = 0.32$ dan $\mu_k = 0.30$ dan abaikan berat baji.
- (a) Nyatakan dua (2) aplikasi dalam kehidupan bagi geseran. (6 Markah)
 - (b) Lukiskan gambarajah badan bebas (GBB) bagi baji tersebut (4 Markah)
 - (c) Hitung magnitud daya, F yang diperlukan untuk menggerakkan peti A ke kanan pada kadar malar. (10 Markah)

SOALAN DALAM BAHASA INGGERIS

Q1 Three (3) forces act on the bracket shown in Figure Q1

- (a) Determine the magnitude of the resultant force acting on the bracket and its direction measured counterclockwise from the positive x' axis if $F_1 = 300\text{ N}$ and $\theta = 10^\circ$.
(8 Marks)
- (b) If the magnitude of the resultant force acting on the bracket is to be 800 N directed along the positive x' axis determine the magnitude of F_1 and its direction θ .
(12 Marks)

Q2 Three (3) forces act on the bracket shown in Figure Q2.

- (a) Explain the resultant moments of a system of coplanar forces.
(2 Marks)
- (b) Determine the resultant moment of the forces about point A. Take $F_1 = 250\text{ N}$, $F_2 = 300\text{ N}$ and $F_3 = 500\text{ N}$.
(8 Marks)
- (c) If the resultant moment about point A is 4800 N.m clockwise, determine the magnitude of F_3 if $F_1 = 300\text{ N}$ and $F_2 = 400\text{ N}$.
(10 Marks)

Q3 The 35 kg pipe is supported at A by a system of five cords as shown in Figure Q3.

- (a) Explain the condition for the equilibrium of a particle
(2 Marks)
- (b) Draw the free body diagram (FBD) for the structure of the ring at A and B.
(4 Marks)
- (c) Determine the force in each cord of AE, AB, BD and BC for equilibrium.
(14 Marks)

Q4 (a) Briefly explain “Theorems of Pappus and Guidinus”

(4 Marks)

- (b) Locate the centroid (\bar{X}, \bar{Y}) of the composite area at Figure Q4(b).

(16 Marks)

- Q5** Figure Q5 shows the part of a roof internal structure.
- (a) Draw a free body diagram (FBD) of the truss. (4 Marks)
 - (b) Determine the magnitude of the reaction forces at supports A and I. (6 Marks)
 - (c) Using the method of section, determine the forces in members AD, BD and BC of the truss. (10 Marks)
- Q6** Figure S6 shows three block, A, B and C with weights $W_B = 20 \text{ N}$ and $W_C = 80 \text{ N}$. Surface between A and B, $\mu_s = 0.2$ and between B and C, $\mu_s = 0.18$. Between C and the wall $\mu_s = 0.3$.
- (a) Draw a free body diagram (FBD) of the wedges. (5 Marks)
 - (b) Determine the normal force between AB and BC. (10 Marks)
 - (c) Determine the magnitude of force, F needed to raise block C at a constant rate. (5 Marks)
- Q7** Figure Q7 shows the crate A weighs 600 N. Between all contacting surfaces, $\mu_s = 0.32$ and $\mu_k = 0.30$ and neglect the weights of the wedges.
- (a) State two (2) real life applications of friction. (6 Marks)
 - (b) Draw the free body diagram (FBD) of the figure. (4 Marks)
 - (c) Determine the magnitude of force, F needed to start A moving to the right at a constant rate? (10 Marks)

End of Question

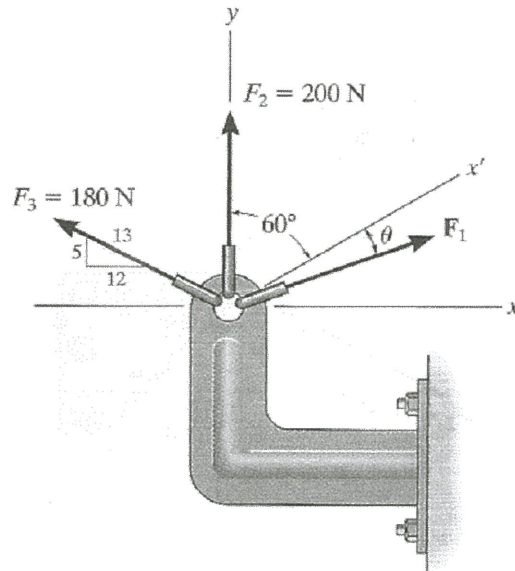
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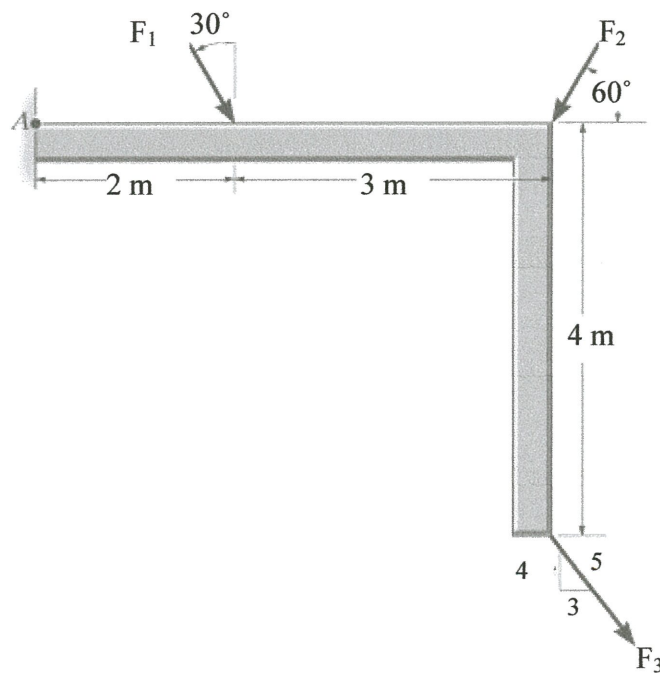
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RAJAH S1/ FIGURE Q1



RAJAH S2/ FIGURE Q2

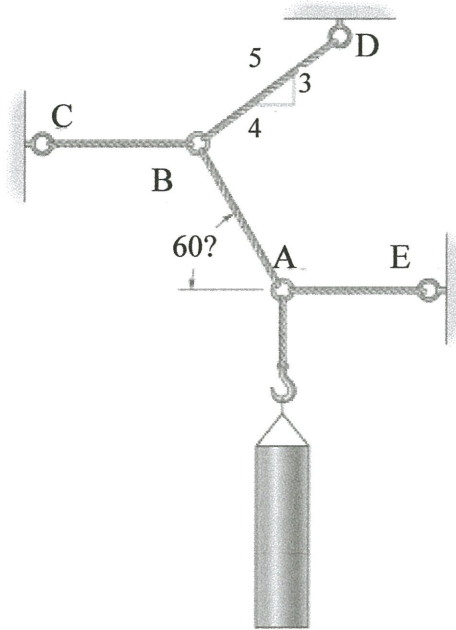
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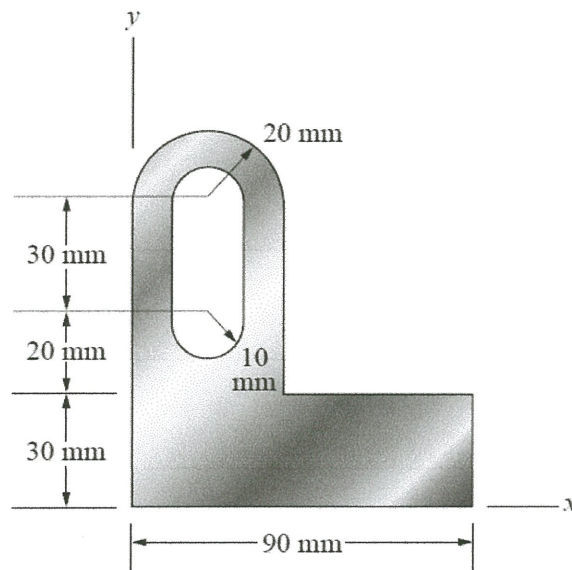
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RAJAH S3 / FIGURE Q3



RAJAH S4(b) / FIGURE Q4(b)

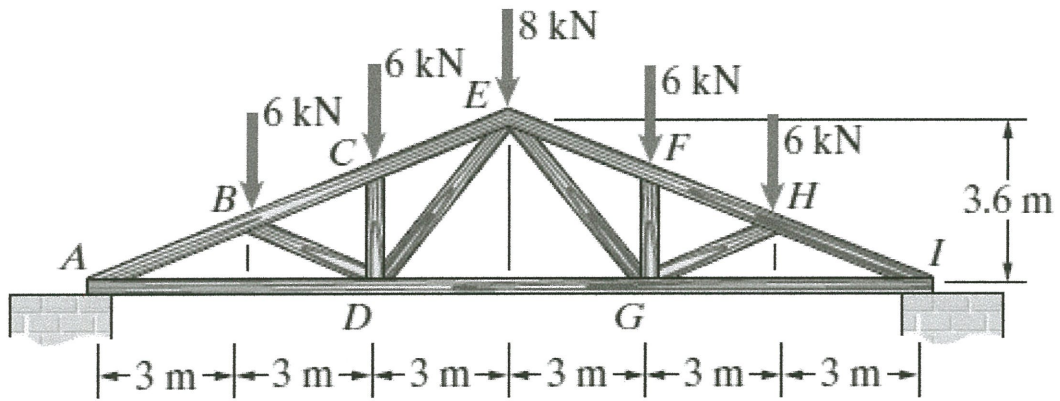
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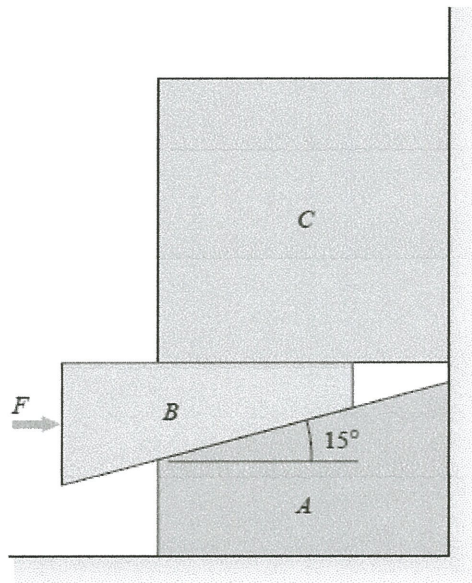
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RAJAH S5 / FIGURE Q5



RAJAH S6/ FIGURE Q6

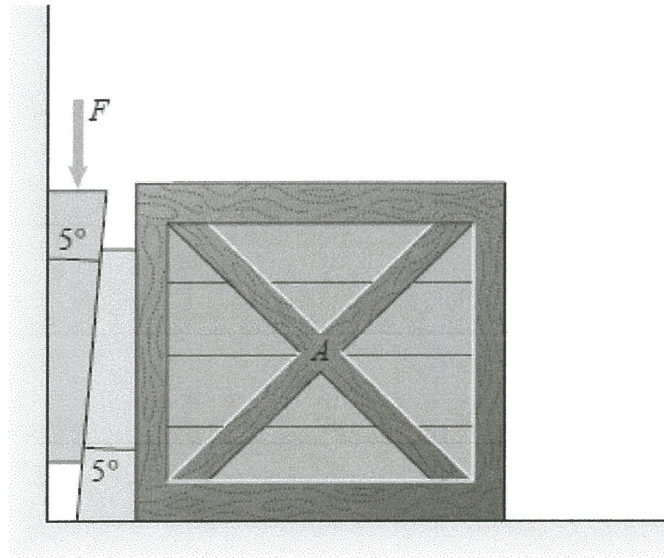
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RAJAH S7/ FIGURE Q7

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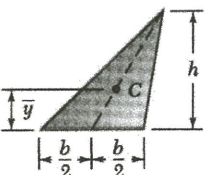
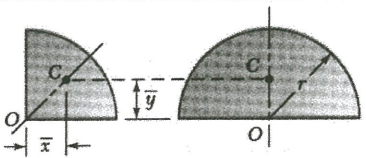
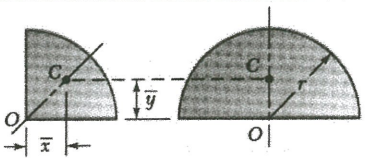
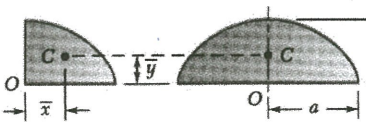
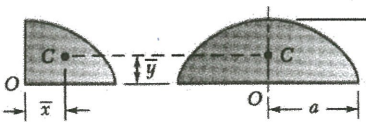
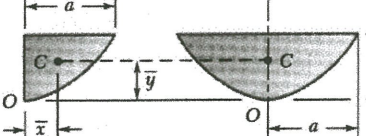
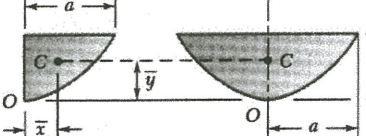
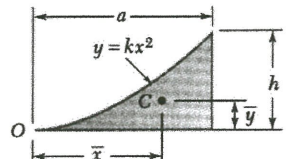
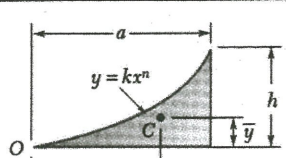
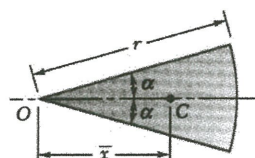
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CENTROIDS OF COMMON SHAPES OF AREAS:

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