UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2008/2009

SUBJECT	:	STATICS
SUBJECT CODE	:	BDA 1023
COURSE	:	1 BDD
EXAMINATION DATE	:	APRIL / MAY 2009
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE (5)** OUT OF **SIX (6)** QUESTIONS

THIS PAPER CONTAINS OF NINE (9) PAGES

S1 The pipe in **Figure Q1** is subjected to the force of $F = 200N$.

(a) Determine the position vector from C to D and from C to B.
(b) Formulate the unit vector along CD and CB
(c) Determine the magnitude of the projected component of the 200N force acting along the axis BC of the pipe.
(d) Determine the position vector from B to C and from B to A.
(e) Determine the angle θ between pipe segments BA and BC.

(20 Marks)

S2 The 45kg pipe is supported at A by a system of five cords as shown in **Figure Q2**.

(a) Draw the free body diagram (FBD) for the structure of the ring at A and B.
(b) Determine the force in each cord of AE, AB, BD and BC for equilibrium.

(20 Marks)

S3 The door as shown in **Figure Q3** is held open by cable CB

(a) Determine the position vector from C to B and from A to B.
(b) Determine the force vector directed along a cable CB, as a Cartesian vector.
(c) Determine the moment of force F_c about the door hinge at A. Express the result as a Cartesian vector.
(d) Determine the magnitude of moment of the force F_c about the hinged axis $a-a$ of the door.

(20 Marks)

S4 A bridge truss which is supported by a pin A and a roller I is shown in the **Figure Q4**. Five forces of magnitude 300 kN acted on the bridge truss.

(a) Draw a free body diagram (FBD) of the bridge truss.
(b) Determine the magnitude of the reaction forces at supports A and I.
(c) Using the method of section, determine the forces in members CE, CF and DF of the bridge truss.
(d) State that whether each members is in tension or compression.
(e) Indicate all zero force members of the bridge truss.

(20 Marks)

S5 **Figure Q5** shows the gravity wall made of concrete.

(a) Determine the first moment of area with respect to the x and y axis of the wall.
(b) Determine the location (x_c, y_c) of center of gravity, G for the wall.

(20 Marks)

S6 The uniform dresser as shown in **Figure Q6** has a weight of $360\text{N}(\approx 36\text{kg})$ and rests on a tile floor for which $u_s = 0.25$. The man pushes on it in the direction $\theta = 35°$. Also, the man has a weight of $650\text{N}(\approx 65\text{kg})$. Take $g = 9.81\text{ms}^{-2}$.

(i) Draw the free body diagram (FBD) of the man and the dresser.
(ii) Determine the smallest magnitude of force F needed to move the dresser.
(iii) Determine the smallest coefficient of static friction between his shoes and the floor so that he does not slip.

(20 Marks)

S1 Paip seperti ditunjukkan dalam **Figure Q1** dikenakan daya $F = 200N$.

(a) Tentukan vektor kedudukan dari titik C ke D dan dari titik C ke B.
(b) Formulakan vektor unit sepanjang CD dan CB.
(c) Tentukan nilai magnitud bagi komponen daya 200N yang selari dengan paksi BC paip tersebut.
(d) Tentukan vektor kedudukan dari titik B ke C dan B ke A.
(e) Tentukan sudut θ diantara segmen paip BA dan BC.

(20 Markah)

S2 Paip seberat 45kg disokong di titik A oleh sistem yang terdiri daripada 5 tali seperti yang ditunjukkan dalam **Figure Q2.**

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

(20 Markah)

S3 Pintu seperti ditunjukkan dalam **Figure Q3** dibuka dengan kabel CB.

(a) Tentukan vektor kedudukan dari titik C ke B dan dari titik A ke B.
(b) Tentukan vektor daya, F_c yang bertindak sepanjang kabel CB di dalam bentuk Cartesian vektor.
(c) Tentukan momen bagi daya F_c ke atas engsel pintu di titik A. Nyatakan dalam bentuk Cartesian vektor.
(d) Tentukan magnitud bagi momen daya F_c ke atas paksi sendi engsel a-a pintu tersebut.

(20 Markah)

S4 Satu kekuda jambatan yang disokong oleh pin A dan pengguling I ditunjukkan seperti dalam **Figure Q4.** Lima daya bermagnitud 300 kN ditindakkan ke atas kekuda jambatan tersebut.

(a) Lukiskan gambarajah badan bebas (GBB) bagi kekuda jambatan tersebut.
(b) Dapatkan magnitud bagi daya-daya tindakbalas pada penyokong A dan I.
(c) Dengan menggunakan kaedah keratan, tentukan daya pada anggota CE, CF dan DF bagi kekuda jambatan tersebut.
(d) Nyatakan samada anggota-anggota tersebut berada dalam keadaan tegangan atau mampatan.
(e) Nyatakan semua anggota daya sifar pada kekuda jambatan tersebut.

(20 Markah)

S5 **Figure Q5** menunjukkan sebuah dinding yang diperbuat daripada konkrit.

(a) Tentukan momen luas pertama bagi dinding tersebut merujuk kepada paksi x dan y.
(b) Tentukan kedudukan (x_c, y_c) bagi pusat graviti, G dinding tersebut.

(20 Markah)

S6 Sebuah almari baju seperti yang ditunjukkan dalam **Figure Q6** mempunyai berat $360N(\approx 36kg)$ dan berada diatas jubin lantai yang mana $u_s = 0.25$. Seorang lelaki menolaknya mengikut arah sudut $\theta = 35°$. Lelaki tersebut juga mempunyai berat $650N(\approx 65kg)$. Ambil $g = 9.81ms^{-2}$.

(a) Lukiskan gambarajah badan bebas (GBB) bagi lelaki dan almari baju tersebut.
(b) Tentukan nilai magnitud terkecil bagi daya F yang diperlukan untuk menggerakkan almari tersebut.
(c) Tentukan nilai pemalar terkecil bagi geseran statik diantara kasut lelaki itu dan lantai supaya dia tidak tergelincir.

(20 Markah)

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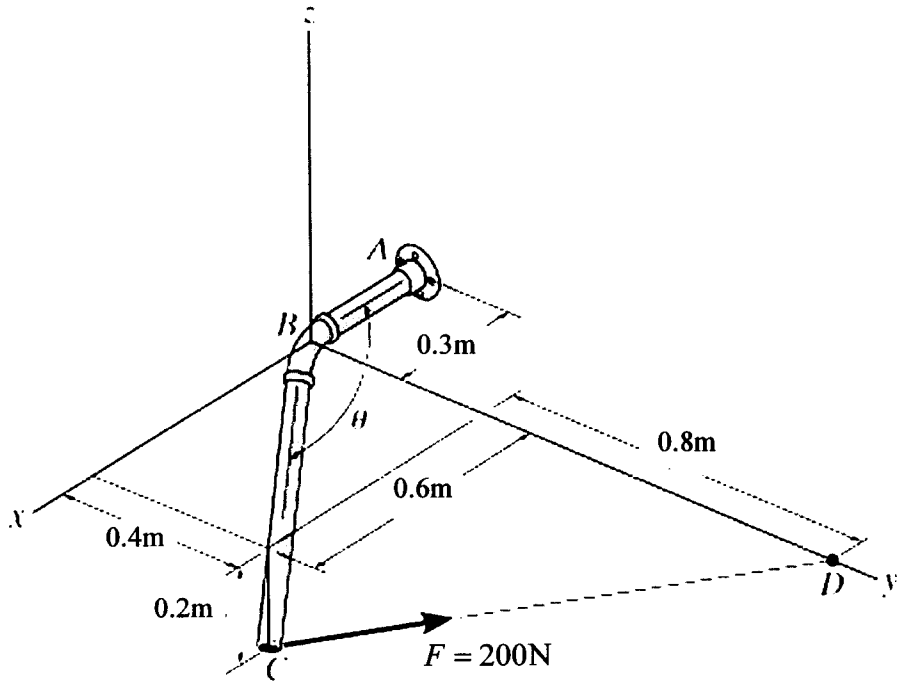

Figure Q1

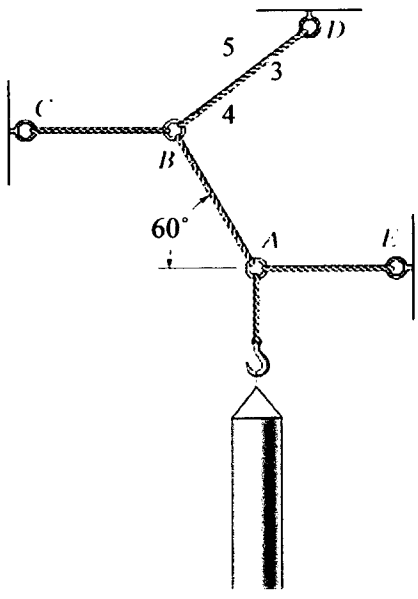

Figure Q2

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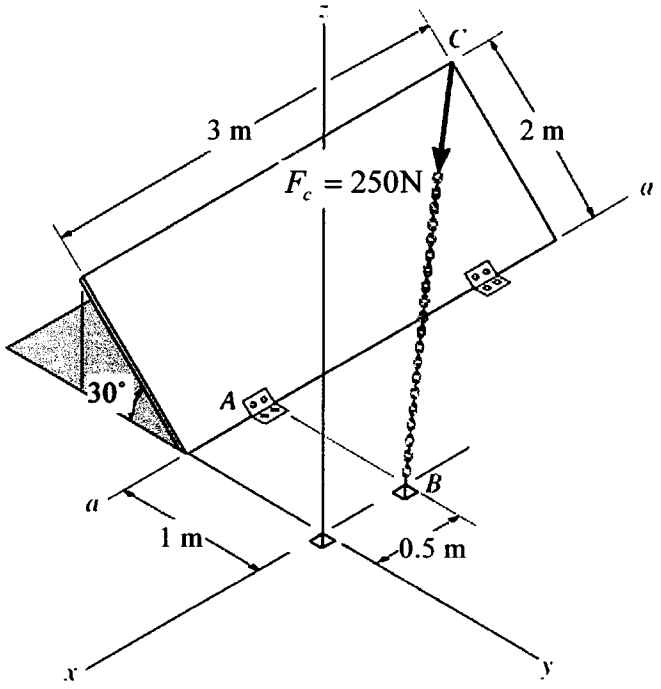

Figure Q3

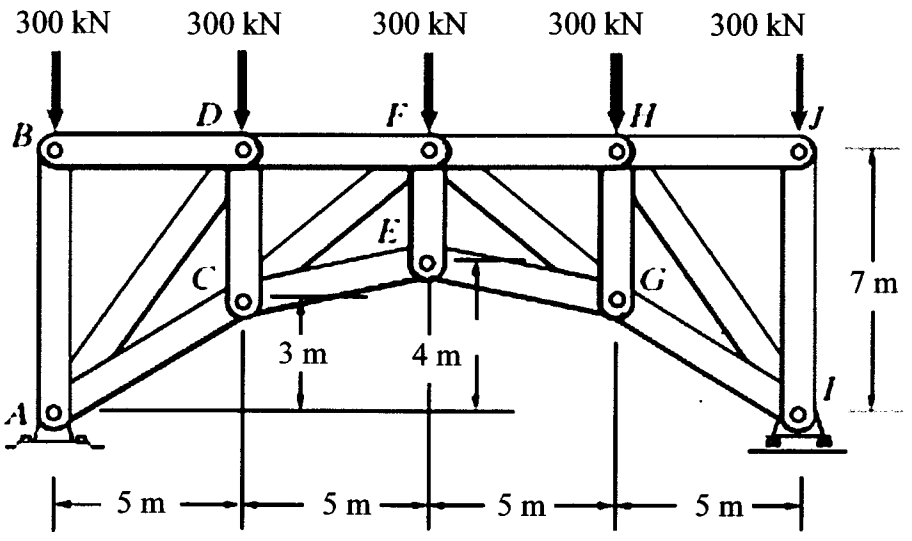

Figure Q4

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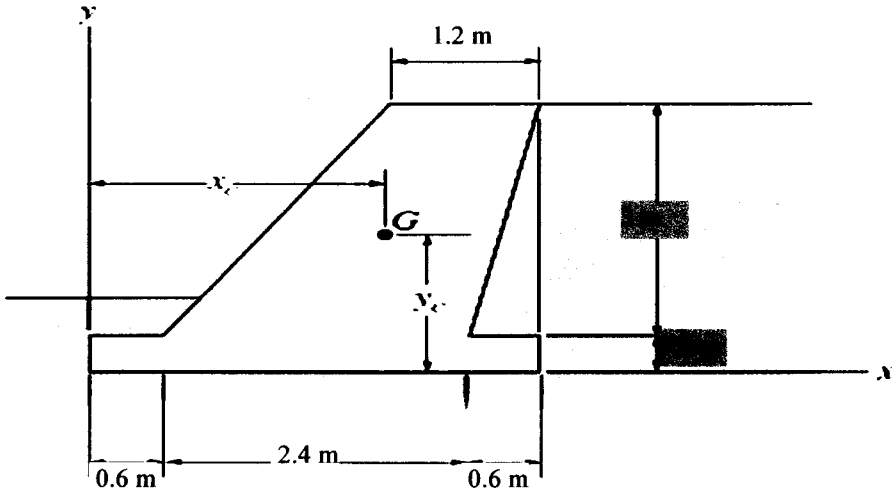

Figure Q5

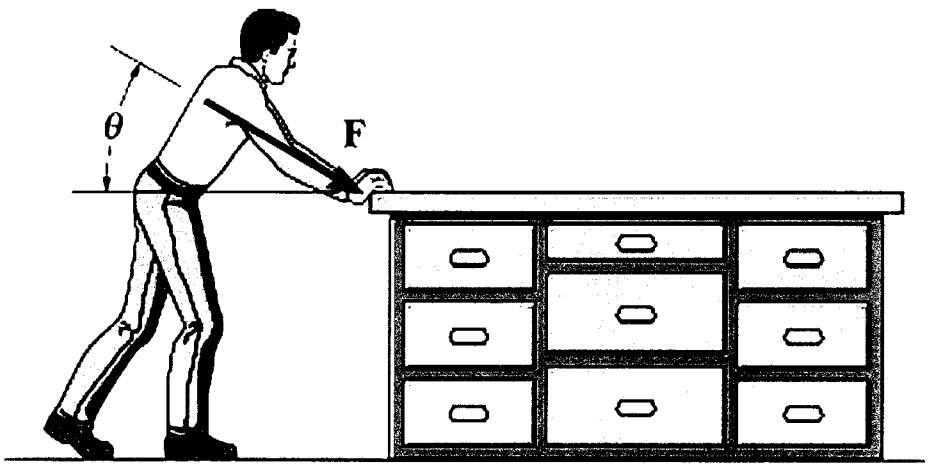

Figure Q6

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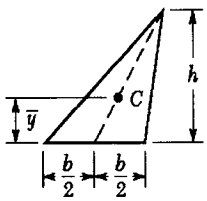
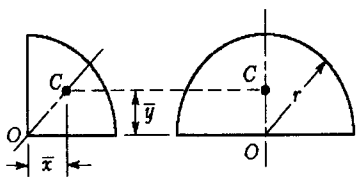
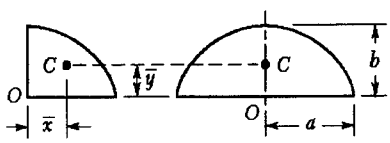
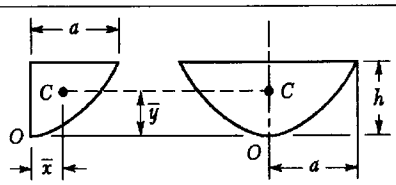
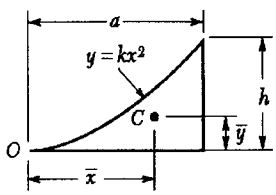
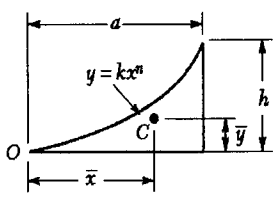
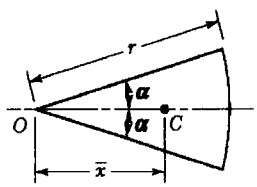
CENTROIDS OF COMMON SHAPES OF AREAS :

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