



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017**

COURSE NAME : STATIC & DYNAMIC
COURSE CODE : DAJ 21003
PROGRAMME CODE : DAJ
EXAMINATION DATE : JUNE 2017
DURATION : 3 HOURS
INSTRUCTION : PART A
ANSWER **THREE (3)**
QUESTIONS ONLY
PART B
ANSWER IN **TWO (2)**
QUESTIONS ONLY.

TERBUKA

THIS QUESTION PAPER CONSISTS OF TEN (10) PAGES

SULIT**BAHASA MELAYU****BAHAGIAN A**

- S1** (a) Jelaskan ciri-ciri 'keseimbangan zarah'.
(4 markah)
- (b) **Rajah S1(b)** menunjukkan sebiji bebola berjisim 80 kg disokong oleh beberapa sambungan tali yang di ikat pada permukaan dinding. Kirakan ketegangan yang terdapat di dalam setiap tali tersebut supaya bebola berada dalam keadaan keseimbangan.
(16 markah)
- S2** (a) Jelaskan maksud bagi 'Pusat Graviti' dan 'Sentroid'.
(4 markah)
- (b) Kirakan sentroid (\bar{X}, \bar{Y}) bagi kawasan yang digelapkan pada **Rajah S2(b)** dengan menggunakan kaedah kamiran.
(16 markah)
- S3** Kekuda jambatan Howe dikenakan beban seperti yang ditunjukkan di dalam **Rajah S3**,
- (a) Lakarkan gambarajah badan bebas (GBB) bagi keseluruhan kekuda jambatan tersebut.
(3 markah)
- (b) Dapatkan magnitud bagi daya-daya tindak balas pada penyokong A dan E.
(7 markah)
- (c) Kirakan daya pada anggota HI, BH and BC bagi kekuda jambatan tersebut dan tentukan samada anggota tersebut dalam keadaan tegangan atau mampatan.
(10 markah)

TERBUKA**SULIT**

S4 Rajah S4 menunjukkan satu keratan rentas sebuah objek homogen,

(a) Kirakan sentroid (\bar{X}, \bar{Y}) bagi luas keratan rentas objek tersebut dengan merujuk kepada centroid bagi luas bentuk umum seperti dalam lampiran yang diberikan.

(16 markah)

(b) Cari isipadu bagi objek tersebut dengan menggunakan teorem Pappus-Guldinus berdasarkan pusingan pada paksi x .

(4 markah)

BAHAGIAN B

S5 (a) Terangkan Hukum Gerakan Newton yang pertama.

(3 markah)

(b) **Rajah S5(b)** menunjukkan sebiji bola yang awalnya ditendang dengan kelajuan $v_a = 10 \text{ m/s}$ pada satu sudut $\theta_A = 40^\circ$ pada satah mendatar. Kirakan masa dan jumlah ketinggian h ketika bola tersebut mencapai satu tahap ketinggian maximum pada titik B. Kemudian tentukan jarak mendatar R iaitu dari jarak titik permulaan hingga ke titik dimana bola tersebut jatuh ke tanah.

(17 markah)

S6 Rajah S6 menunjukkan seorang lelaki menolak di peti 140 N dengan satu daya F. Daya tersebut sentiasa diarahkan ke bawah 30° dari paksi, dan magnitudnya bertambah sehingga peti itu mula menggelongsor. Jika pekali geseran statik adalah $\mu_s = 0.6$ dan pekali geseran kinetik adalah $\mu_k = 0.3$,

(a) Lukiskan gambarajah badan bebas (GBB) bagi peti sebelum ia bergerak (dalam keadaan static) dan ketika ia sedang bergerak (dalam keadaan kinetic).

(6 markah)

(b) Kirakan pecutan awal peti tersebut.

(14 markah)

TERBUKA

SULIT

SULIT

- S7 (a) Terangkan perbezaan maksud diantara 'Kedudukan' dan 'Anjakan' bagi zarah dalam satu gerakan garis lurus.

(6 Markah)

- (b) **Rajah S7(b)** menunjukkan bongkah berjisim 15 kg yang dipasang pada sebuah pegas berada dalam keadaan rehat di atas permukaan satah condong bersudut 20° . Jika kedudukan awal pegas tersebut adalah 1 m, tentukan jumlah kerja bagi keseluruhan daya yang bertindak ke atas bongkah dimana satu daya ufuk $P = 500 \text{ N}$ menolak ke atas bongkah tersebut pada jarak $s = 3 \text{ m}$. Diberi keanjalan pegas ialah $k = 30 \text{ N/m}$.

(14 Markah)

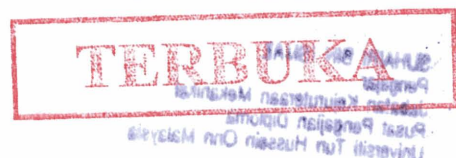
SOALAN TAMAT

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SULIT

CONFIDENTIAL**ENGLISH****PART A**

- Q1** (a) Describe the condition of 'equilibrium' of a particle. (4 marks)
- (b) **Figure Q1(b)** shows a ball with a mass of 80 kg is supported by some extension of ropes that tied to the wall. Calculate the tension in each rope which the ball in equilibrium. (16 marks)
- Q2** (a) Describe the meaning of 'Center of Gravity' and 'Centroid'. (4 marks)
- (b) Calculate the centroid (\bar{X}, \bar{Y}) of the shaded area shown in **Figure Q2(b)** by using Integration method. (16 marks)
- Q3** The Howe bridge truss is subjected to the loading as shown in **Figure Q3**.
- (a) Sketch a free body diagram (FBD) of the entire bridge truss. (3 marks)
- (b) Find the magnitude of the reaction forces at supports A and E. (7 marks)
- (c) Calculate the forces in members HI, BH and BC of the bridge truss, and determine whether the members are in tension or compression. (10 marks)
- Q4** **Figure Q4** shows a cross-sectional area of a homogeneous object.
- (b) Calculate the centroid (\bar{X}, \bar{Y}) of the cross-sectional area by refer to centroids of common shapes of areas from given appendix. (16 marks)
- (c) Find the volume of the object by applying the theorems of Pappus-Guldinus with rotation about the x axis. (4 marks)



CONFIDENTIAL**PART B**

- Q5** (a) Explain about Newton's First Law (3marks)
- (b) **Figure Q5(b)** shows a ball was kicked with an initial speed $v_a = 10 \text{ m/s}$ at angle $\theta_A = 40^\circ$ from horizontal plane. Calculate the time and height h when the ball reaches the maximum height at point B. Then, determine the horizontal range R or the horizontal distance from starting point to the point at which the ball hits the ground. (17 marks)
- Q6** **Figure Q6** shows a man pushes on 140 N crate with a force F . The force is always directed down at 30° from the horizontal, and its magnitude is increase until the crate begins to slide. If the coefficient of static is $\mu_s = 0.6$ and coefficient of kinetic is $\mu_k = 0.3$,
- (a) Draw free body diagram (FBD) of the crate before it moves (static condition) and during it is moving (kinetic condition) (6 marks)
- (b) Calculate the crate's initial of acceleration (14 marks)
- Q7** (a) Explain the differences between 'Position' and 'Displacement' of particle in a linear motion. (4 marks)
- (b) **Figure Q7(b)** shows the 15 kg block attached at a spring which it is in rests on the smooth incline plane 20° . If the initial position of spring is 1 m, determine the total work done by all the forces acting on the block when a horizontal force $P = 500 \text{ N}$ pushes the block up the plane $s = 3 \text{ m}$. Given the spring stiffness is $k = 30 \text{ N/m}$. (16 marks)

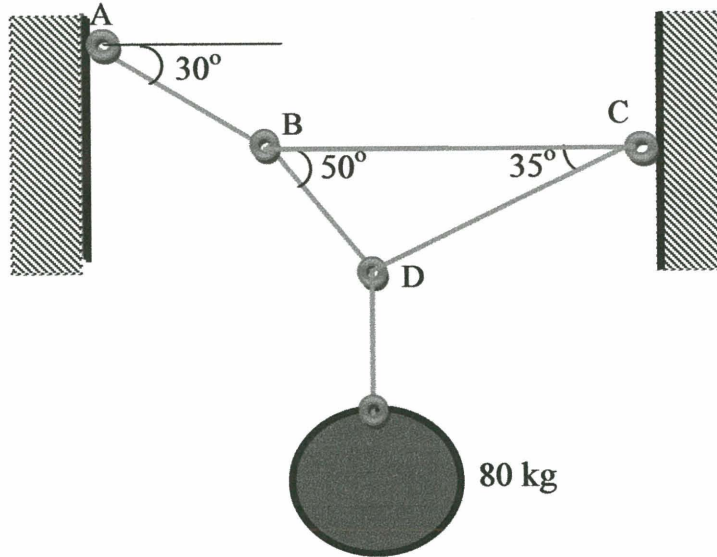
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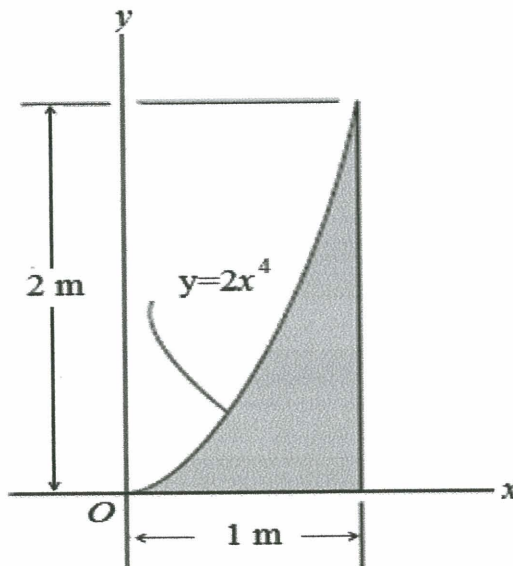
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Rajah S1(b) / Figure Q1(b)



Rajah S2(b)/ Figure Q2(b)

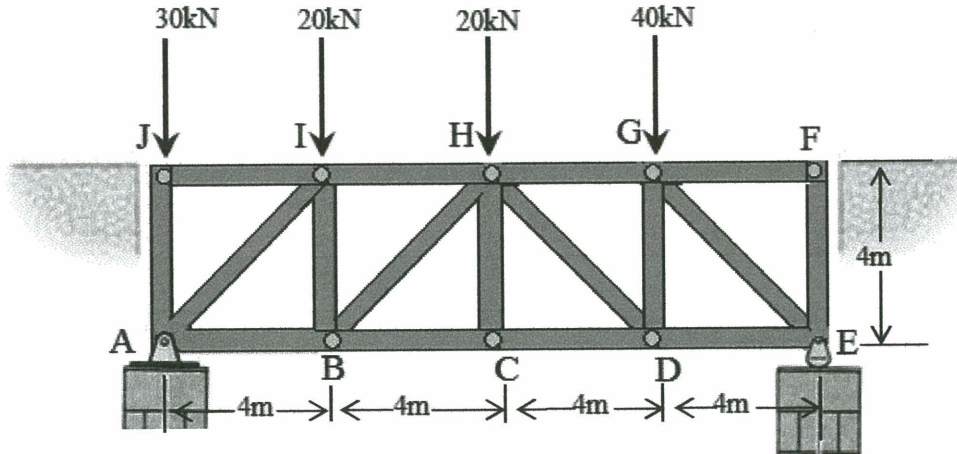
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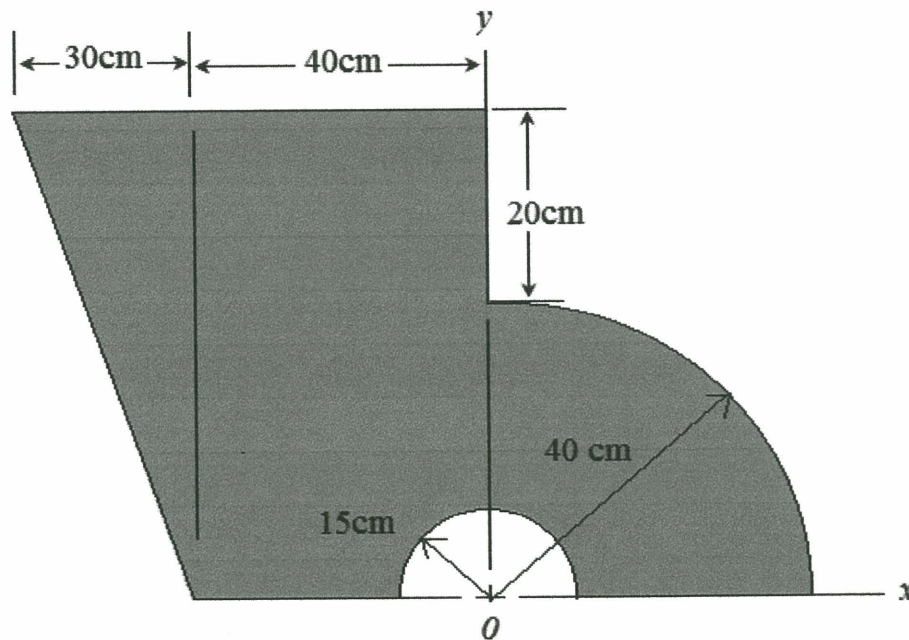
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Rajah S3/ Figure Q3

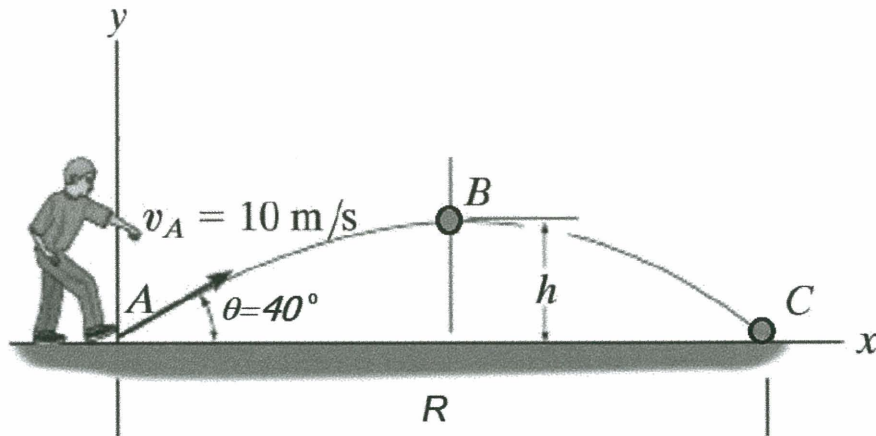


Rajah S4 / Figure Q4

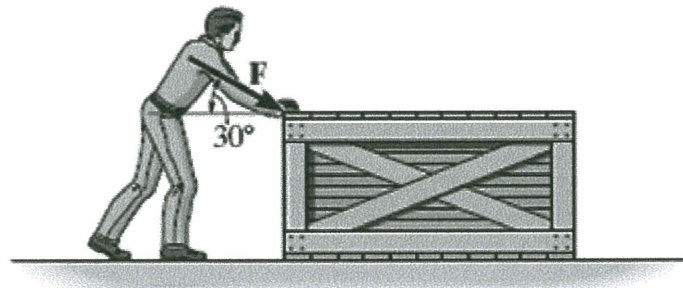
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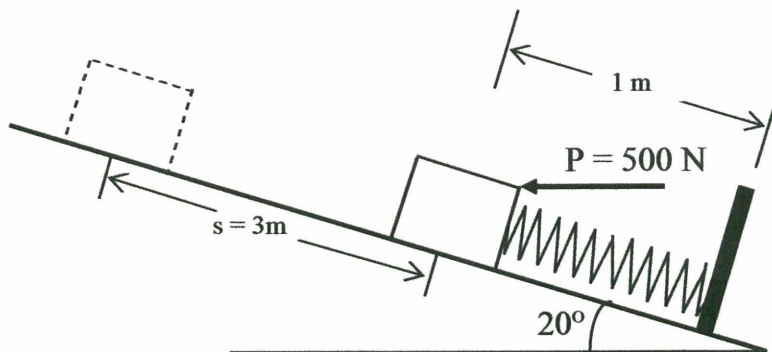
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Rajah S5(b) / Figure Q5(b)



Rajah S6 / Figure Q6



Rajah S7(b) / Figure Q7(b)

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**PEPERIKSAAAN AKHIR
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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

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