KOLEJ UNIVERSITI TEKNOLOGI TUN HUSSEIN ONN

PEPERIKSAAN AKHIR
SEMESTER I
SESI 2006/2007

NAMA MATAPELAJARAN	:	STATIK DAN DINAMIK
KOD MATA PELAJARAN	:	BFC 1022
KURSUS	:	1 BFP/1 BFB
TARIKH PEPERIKSAAN	:	NOVEMBER 2006
JANGKA MASA	:	2 1/2 JAM
ARAHAN	:	JAWAB **TIGA (3)** SOALAN DARIPADA BAHAGIAN **A** DAN **SATU(1)** SOALAN DARIPADA BAHAGIAN **B**

KERTAS SOALAN INI MENGANDUNGI 23 MUKA SURAT

BAHAGIAN A

S1 (a) Terangkan dengan ringkas berserta lakaran gambarajah;

(i) Perbezaan di antara skala kuantiti dan kuantiti vektor.

(ii) Prinsip kebolehpindahan bagi daya yang bertindak pada sesuatu jasad.

(iii) Daya ganding.

(8 markah)

(b) Satu bahagian rasuk dikenakan daya pada titik A, B dan C seperti yang ditunjukkan dalam Rajah **S1(b).**

(i) Huraikan daya pada titik A dan C kepada dua komponen x dan komponen y.

(ii) Kira momen yang dihasilkan oleh daya ganding.

(iii) Kira momen pada titik D.

(7 markah)

(c) Mata skru yang ditunjukkan dalam Rajah **S1(c)** ditindaki daya F1 dan F2 iaitu 100N dan 150N masing-masing. Menggunakan kaedah yang sesuai, tentukan magnitud dan arah bagi daya paduan yang terhasil.

(10 markah)

S2 (a) Lukis gambarajah jasad bebas yang lengkap bagi setiap struktur dalam Rajah **S2(a) – S2(e).** Berat sendiri jasad (m) perlu diambil kira kecuali jika diberitahu.

(10 markah)

(b) Merujuk kepada Rajah **S2(f)**,

(i) Senaraikan semua persamaan keseimbangan yang boleh digunakan bagi daya didalam tiga dimensi.

(3 markah)

(ii) Tentukan nilai daya paduan,R pada kedudukan (5,0,5) m.

(2 markah)

(iii) Tentukan kedudukan daya 100 N pada arah ke bawah.

(10 markah)

S3 (a) Takrifkan pusat graviti dan sentroid.

(4 markah)

(b) Senaraikan langkah-langkah untuk mengenalpasti kedudukan sentroid untuk Rajah **S3(b).**

(4 markah)

(c) Untuk luas yang sama seperti Rajah **S3(b)** tetapi dengan separuh bulatan pada bahagian atas dan bawah. Kenalpasti titik sentroid untuk luas yang berlorek seperti yang ditunjukkan pada Rajah **S3(c)** dengan paksi rujukan telah dikenalpasti untuk anda.

(15 markah)

(d) Daripada pemahaman anda, apakah tujuan titik sentroid dalam struktur analisis?

(2 markah)

S4 (a) Berpandukan Rajah **S4(a)** buktikan bahawa momen sifat tekun terhadap paksi *x* dan *y* bagi segitiga tersebut ialah

$$I_x = bh^3/36$$
$$I_y = hb^3/36$$

(10 markah)

(b) Tentukan momen sifat tekun bagi keratan rentas rasuk terhadap paksi-*x* sentroid berdasarkan Rajah **S4(b)**

(7 markah)

(c) Tentukan jejari legaran bagi Rajah **S4(c)** terhadap paksi *x*

(8 markah)

BAHAGIAN B

S5. (a) Terangkan dengan ringkas Hukum Pergerakan Newton beserta lakaran gambarajah. (10 markah)

(b) Berpandukan Rajah **S5 (b)**, tentukan jarak jisim B yang akan bergerak dalam masa 5 saat. Abaikan sifat tekun takal dan pada permulaan sistem berada dalam keadaan rehat.

(15 markah)

S6. (a) Sebuah ladung mudah dengan tali yang panjangnya 2.0 meter di dalam keadaan $\theta = 30^0$ ditunjukkan di dalam Rajah **S6 (a)**. Ketegangan tali tersebut adalah 2.5 kali daripada berat ladung tersebut. Dengan menggunakan Hukum Kedua Newton, tentukan:

(i) Pecutan bandul dalam keadaan tersebut.

(ii) Sekiranya pecutan, a_n, yang dikenakan ialah 9.0 m/s, dapatkan tegangan dalam tali terhadap berat ladung tersebut.

(10 markah)

(b) Blok yang ditunjukkan di dalam Rajah **S6 (b)** berjisim 6 kg. Blok ini disambung kepada kord dan dililit di sekeliling cakera seberat 20 kg dengan momen inertia $I_A = 0.40$ kg.m^2. Sekiranya blok ini bergerak menghala ke bawah dengan halaju 2 m/s, tentukan halaju blok dalam masa 3 *s*. Abaikan jisim kord di dalam pengiraan.

(15 markah)

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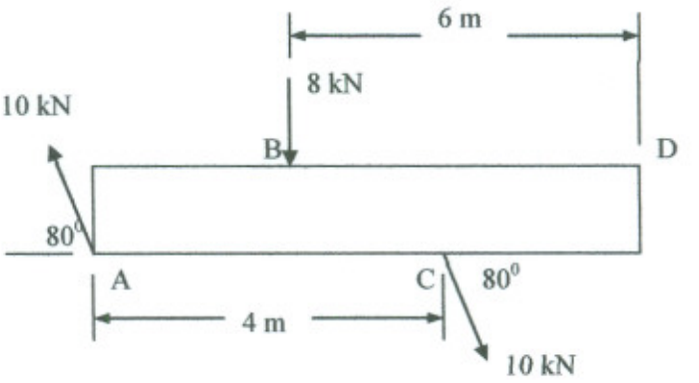
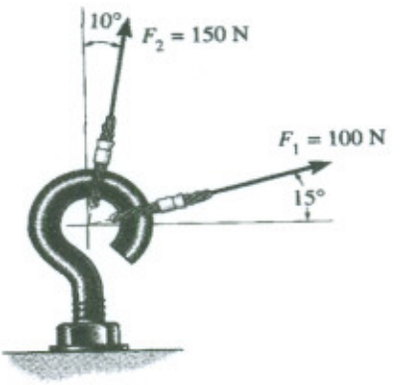


Rajah S1(b)



Rajah S1(c)

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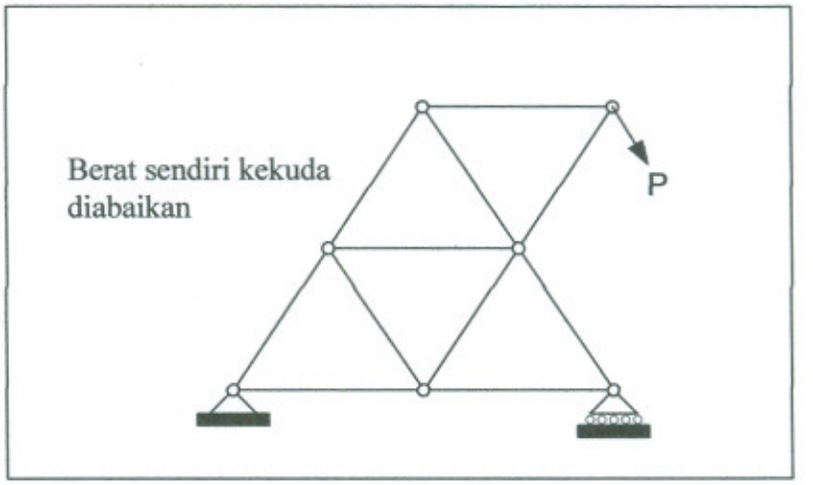
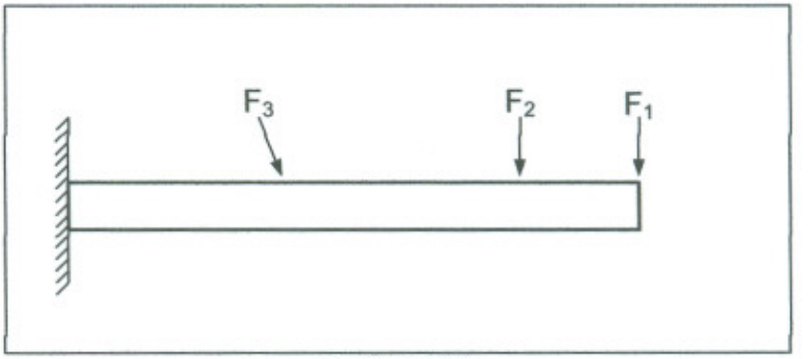


Rajah S2(a)



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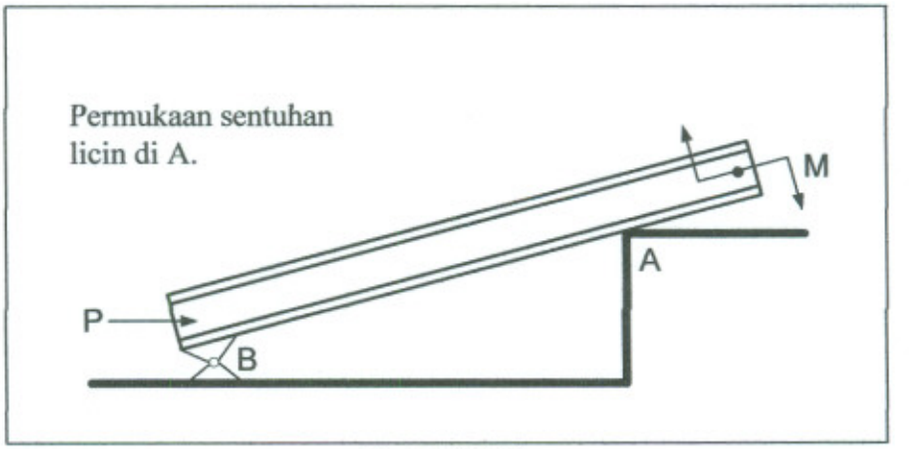

Rajah S2(c)

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KURSUS : 1BFP/ 1 BFB
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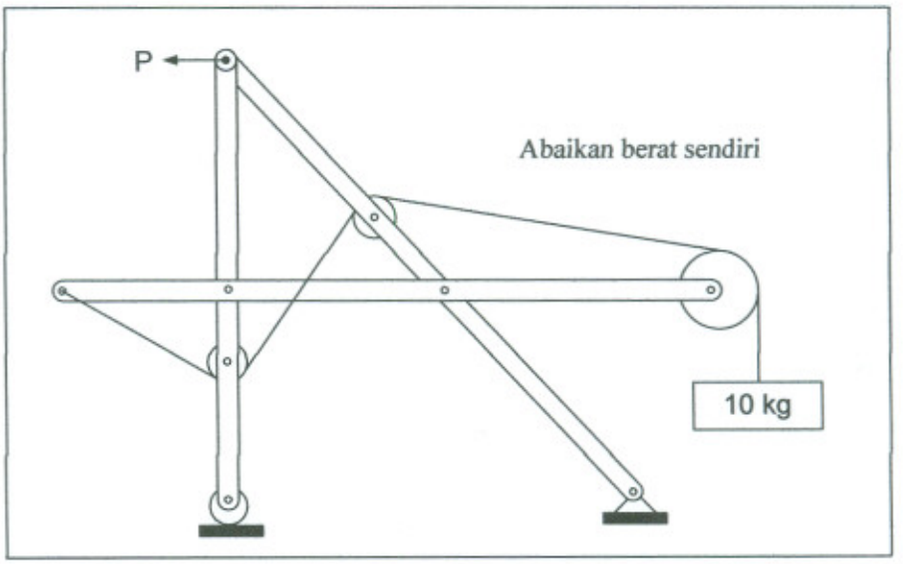
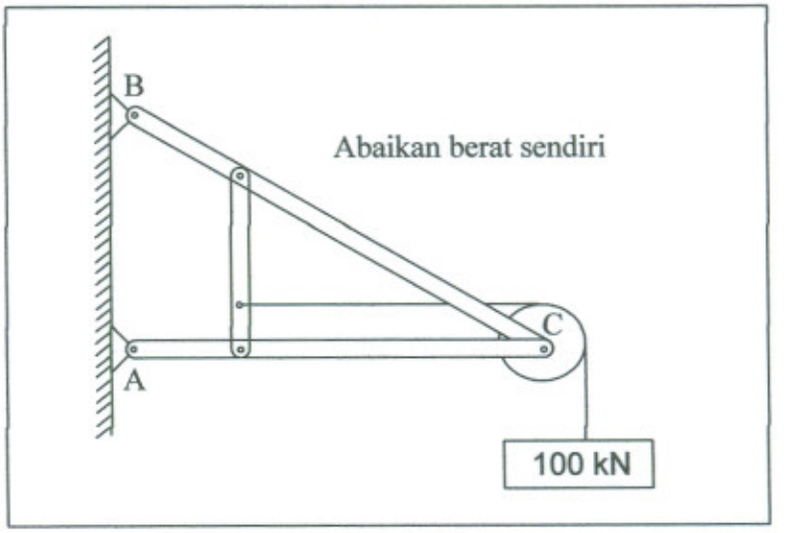


Rajah S2(d)



Rajah S2(e)

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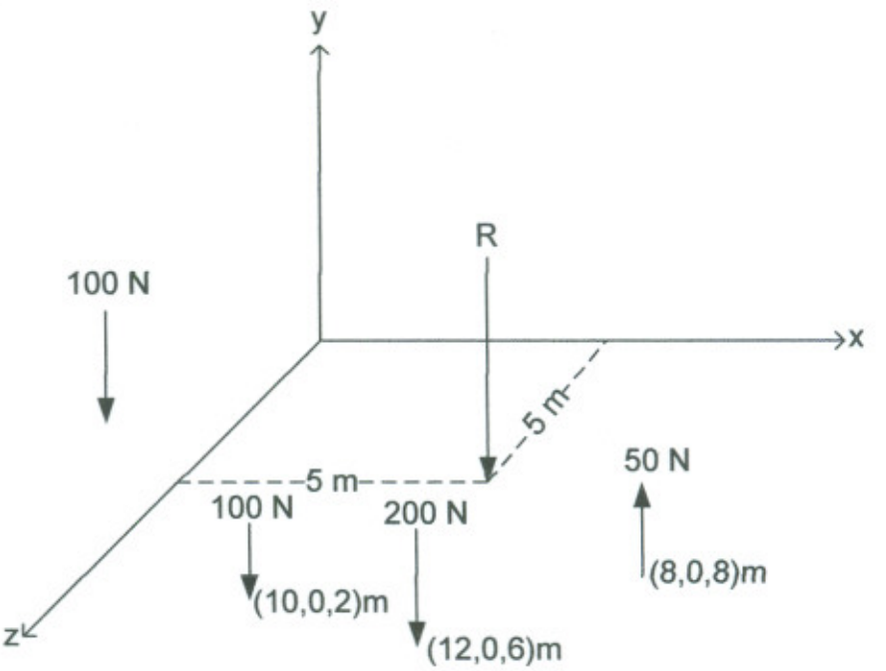
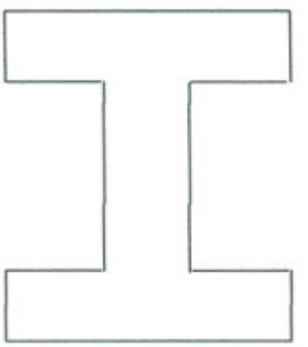
SEMESTER/SESSI : *SEMESTER I/2006/2007* *KURSUS* : *1 BFP/ 1 BFB*
M/PELAJARAN : STATIK DAN DINAMIK KOD MATAPELAJARAN : BFC 1022



Rajah S2(f)



Rajah S3(b)

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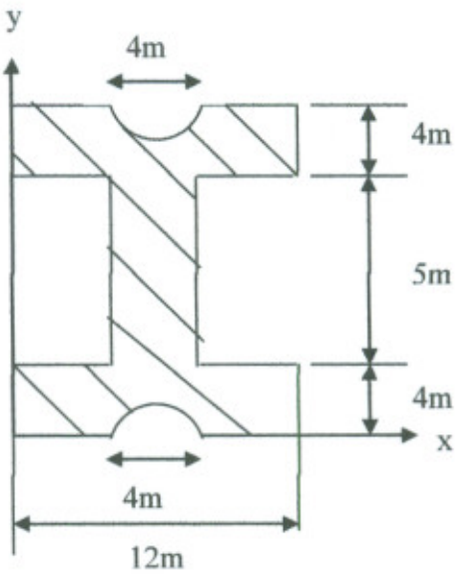
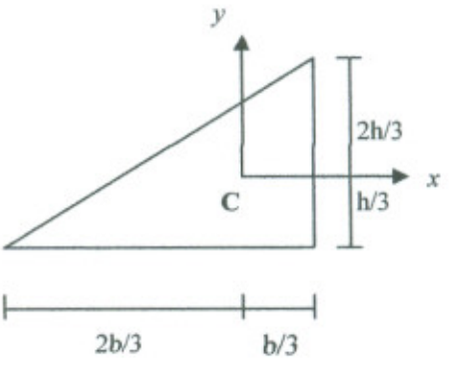


2-dimensi

Rajah S3(c)



Rajah S4(a)

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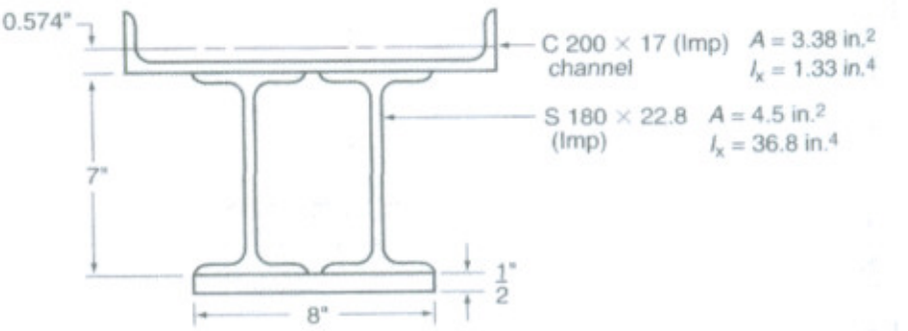

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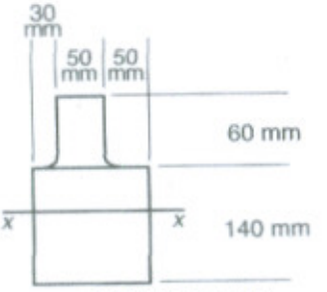

Rajah S4(c)

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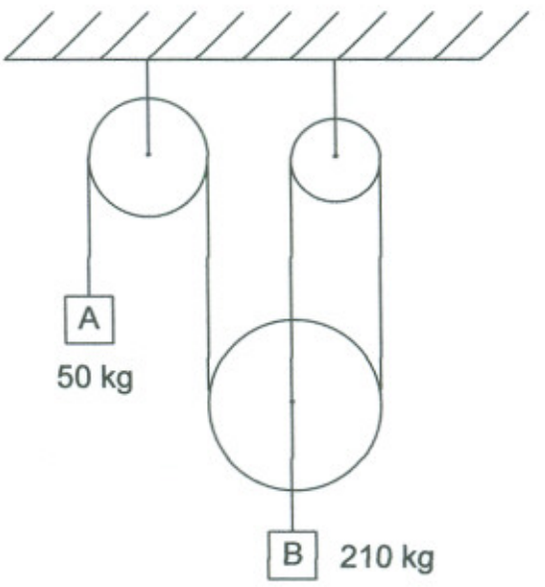
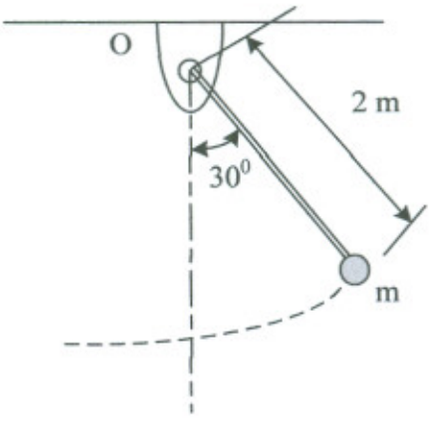


Rajah S5(b)



Rajah S6 (a)

PEPERIKSAAN AKHIR

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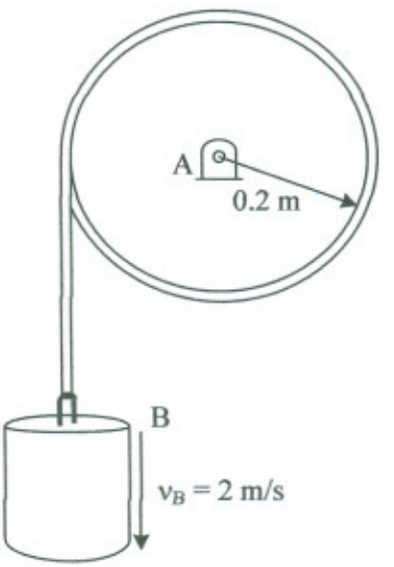

Rajah S6 (b)

PART A

Q1 (a) Briefly explain with sketches:

(i) Difference between quantity scalar and vector quantity.

(ii) Principal of transmissibility of forces acting on the body.

(iii) Couple forces.

(8 marks)

(b) A part of the beam is subjected to a force at point A, B and C as shown in Figure **Q1 (b).**

(i) Resolve each force at point A and C into x and y component.

(ii) Calculate moment due to couple forces.

(iii) Summing the moments of all forces component about point D.

(7 marks)

(c) The screw eye in Figure **Q1(c)** is subjected to two forces, F1 and F2 which are 100N and 150N respectively. Using suitable method, determine the magnitude and direction of the resultant force.

(10 marks)

Q2 (a) Draw complete free-body diagram for a body in Figure **Q2(a) – Q2(e)**. The weight of bodies are included unless otherwise indicated.

(10 marks)

(b) Refer to Figure **Q2(f)**,

(i) List all the equilibrium equations can be used for force in three dimension,

(3 marks)

(ii) Define the resultant force, R at position (5,0,5)m,

(2 marks)

(iii) Define the position 100 N force in downward direction.

(10 marks)

Q3 (a) Give the definition of the centre of gravity and centroid.

(4 marks)

(b) List the procedures/steps in order to determine the location of the centroid, $\bar{x}$ and $\bar{y}$ for the area as shown in Figure **Q3(b).**

(4 marks)

(c) For the same area as Figure **Q3(b)** but with semicircle at top and bottom of flange. Find the centroid for the shaded area as shown in Figure **Q3(c)** with the reference axis that already stated for you.

(15 marks)

(d) From your understanding, what is the purpose of the centroid in structural analysis?

(2 marks)

Q4 a) According to Figure **Q4(a),** approve that moment of inertia of triangle with respects to the *x* and *y*-axis are

$$I_x = bh^3/36$$
$$I_y = hb^3/36$$

(10 marks)

(b) Determine the moment of inertia about the centroidal *x*-axis of the cross-sectional area of the fabricated beam shown in Figure **Q4(b)**

(7 marks)

(c) Determine the radius of gyration of the area shown in Figure **Q4(c)** with respect to the *x*-axis

(8 marks)

PART B

Q5. (a) With aid of sketches, briefly discuss Newton's Law of Mortion.

(10 marks)

(b) Determine the distance that mass B in Figure **Q5 (b)** will move in 5 seconds. Neglect pulley inertia and the system initially at rest.

(15 marks)

Q6. (a) The bob of a 2 meters pendulum describes as arc of a circle in the vertical plane in the $\theta = 30^0$. If the tension in the cord is 2.5 times weight of the weight of the bob for the position shown in Figure **Q6** (a), using the Newton's second Law, determine:

(i) The acceleration of the bob in the position

(ii) If the acceleration, a_n, is 9.0 m/s, determine a tension in the cord over the weight of bob.

(10 marks)

(b) The block shown in Figure **Q6 (b)** has a mass of 6 kg. It is attached to a cord which is wrapped around the periphery of a 20 kg disk that has a moment of inertia $I_A = 0.40$ kg.m^2. If the block is initially moving downward with a speed of 2 m/s, determine its speed in 3 *s*. Neglect the mass of the cord in the calculation.

(15 marks)

FINAL EXAM

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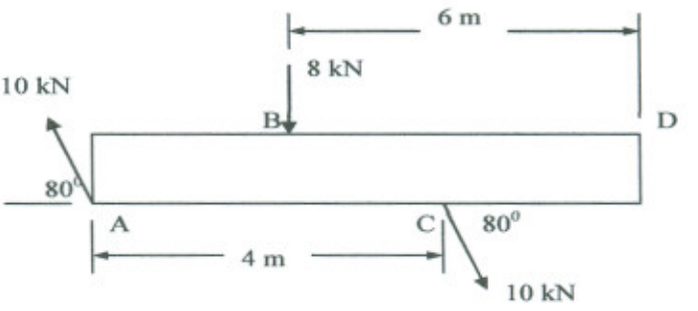

Figure Q1(b)

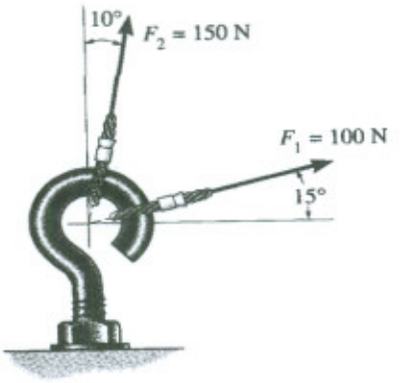

Figure Q2(c)

FINAL EXAM

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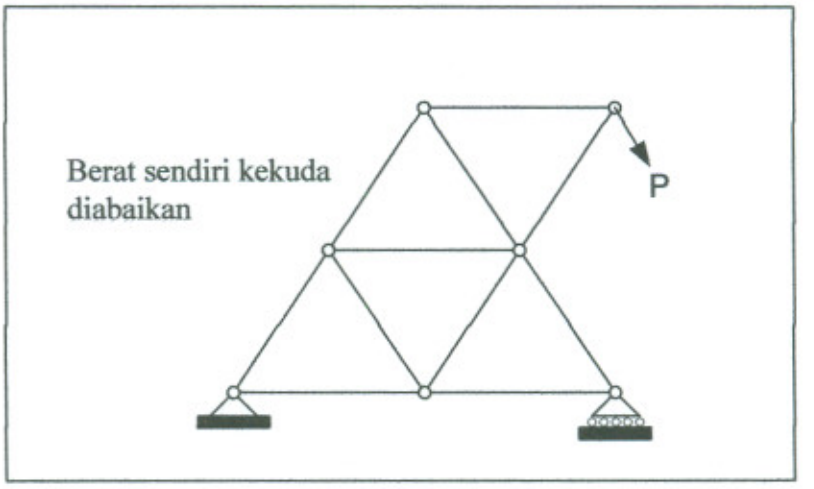

Figure Q2(a)

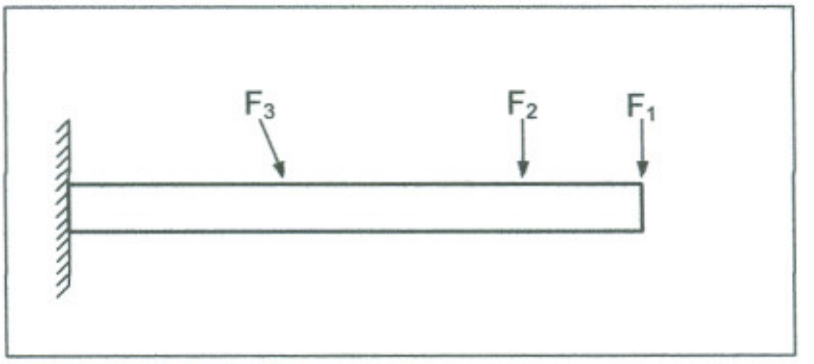

Figure Q2(b)

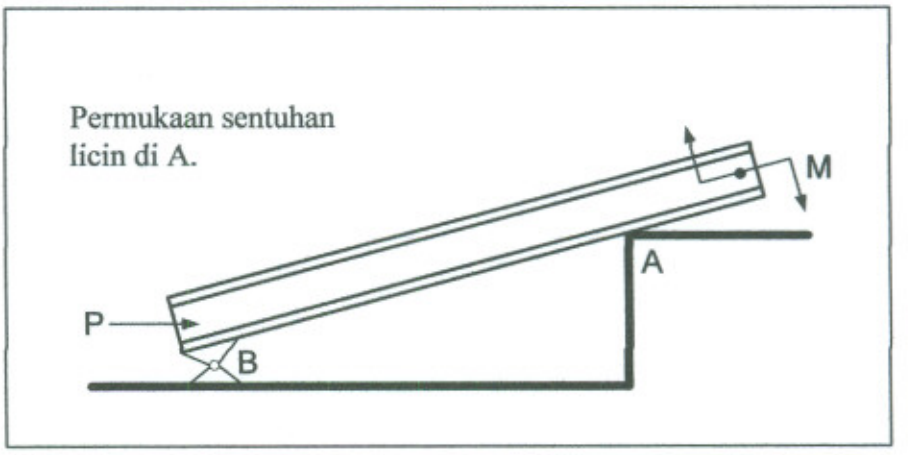

Figure Q2(c)

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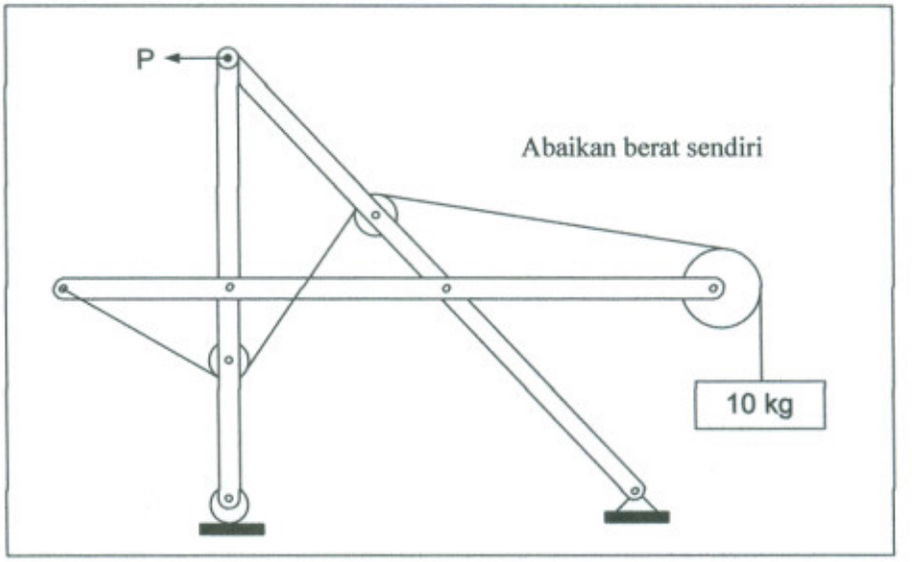

Figure Q2(d)

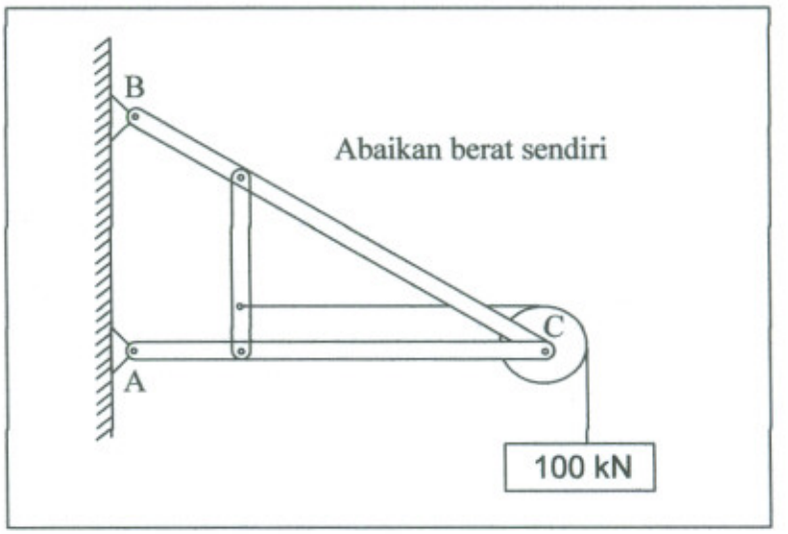

Figure Q2(e)

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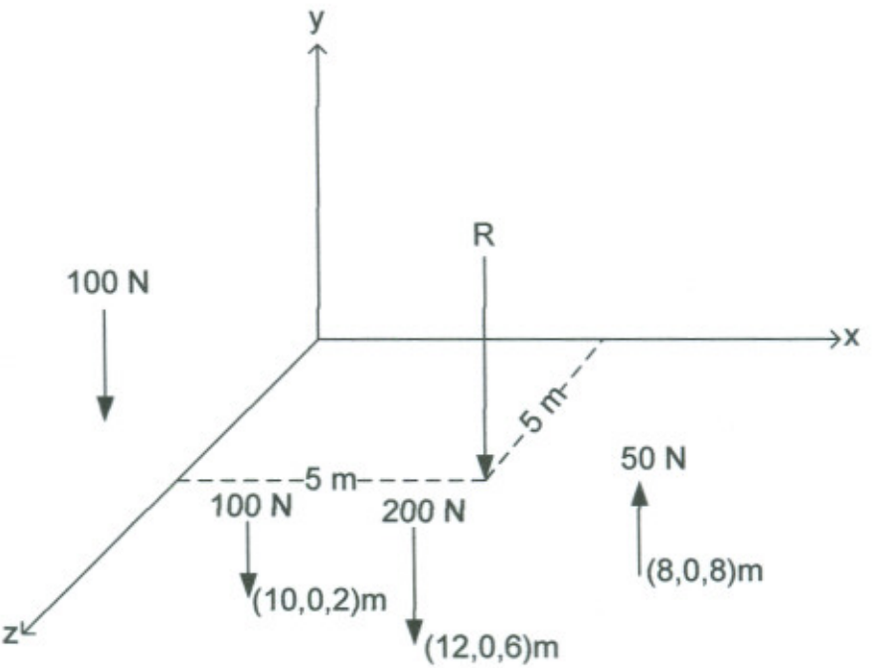

Figure Q2(f)

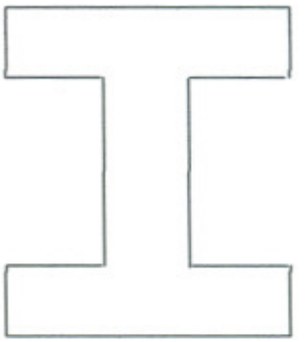

Figure Q3(b)

FINAL EXAM

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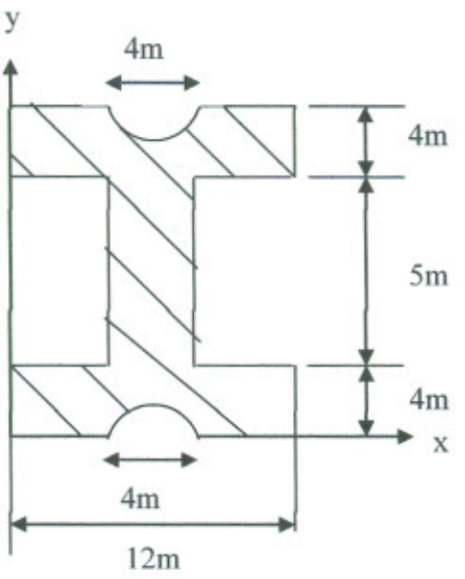

Figure Q3(c)

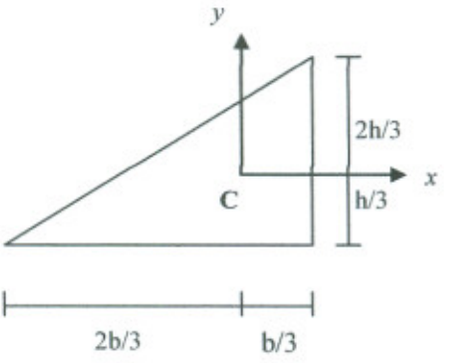

Figure Q4(a)

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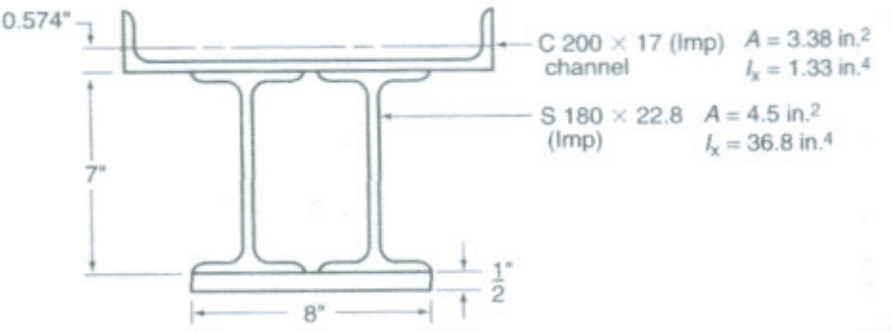

Figure Q4(b)

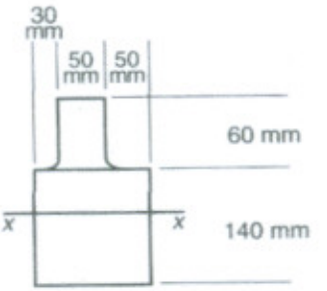

Figure Q4(c)

FINAL EXAM

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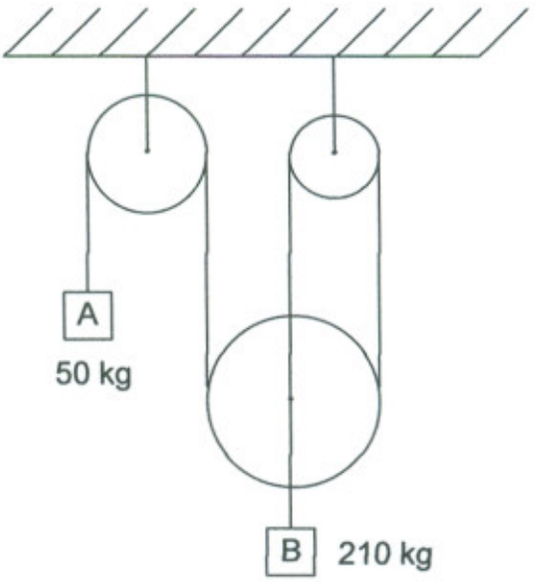

Figure Q5 (b)

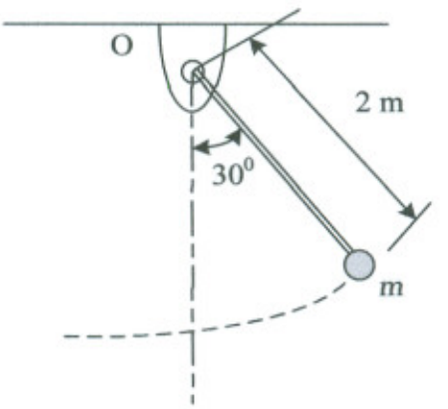

Figure Q6 (a)

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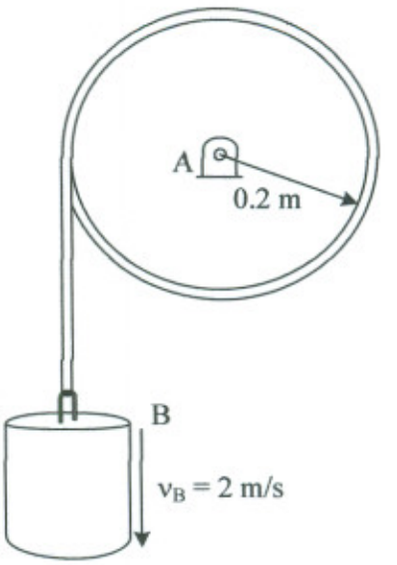

Figure Q6 (b)