

Pekeliling Peperiksaan 15/2017  
Peperiksaan Semester Pertama, Sidang Akademik 2017/2018

USM/PTJNC/BPA-PEP/PK01/L03

**LAMPIRAN D3**



**PENYEMAKAN KERTAS SOALAN PEPERIKSAAN**

*(Proof-reading of Examination Question Paper)*

Untuk kegunaan pejabat Seksyen Peperiksaan & Pengijazahan	
Nombor Sampul	
Tarikh Peperiksaan	
Sesi Peperiksaan	PAGI / PETANG

Gunakan satu proforma untuk satu kertas soalan peperiksaan.

*( Use separate form for each question paper )*

Kepada : Timbalan Pendaftar  
Seksyen Peperiksaan dan Pengijazahan, BPA, Jabatan Pendaftar

**SAYA/KAMI TELAH MENYEMAK SALINAN-SALINAN KERTAS SOALAN PEPERIKSAAN BERTAIP YANG DISEBUTKAN DI BAWAH INI :**

*[ I/We have checked the typed copies of the Examination Paper stated below :*

Kod Kursus : EBP 105 Tajuk Kursus : INTRODUCTION TO STATICS AND  
*(Course Code)* *(Course Title)* DYNAMICS

Jangka Masa Peperiksaan : 3 Jam Bilangan Muka Surat Bertaip : 11 Muka Surat Bilangan Soalan Yang Perlu Dijawab : 5 Soalan  
*(Duration of Examination)* *(Hours)* *(Number of Typed: Pages)* *(Pages)* *(Number of questions required to be answered)* *(Questions)*

Soalan-soalan dijawab atas : <i>(Questions to be answered in)</i>	BUKU JAWAPAN <i>(Answer Book)</i>	OMR <i>(OMR Form)</i>	JAWAB DALAM KERTAS SOALAN <i>(Answer In Question Paper)</i>
Sila (✓) <i>[Please (✓)]</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**DENGAN INI DISAHKAN BAHAWA KERTAS SOALAN PEPERIKSAAN INI ADALAH TERATUR, BETUL DAN SEDIA UNTUK DICETAK.**

*(Certified that this question paper is in order, correct and ready for printing)*

Nama Pemeriksa : PROF. MADYA DR. YEOW Tandatangan : [Signature] Tarikh : 16/11/17  
*[Name of Examiner(s)]* *(Signature)* *(Date)*  
• Huruf Besar  
*(In Block Capitals)*  
FEI YEE  
DR. MUHAMMAD KHALIL  
ABDULLAH @ HARUN

Tandatangan dan Cop Rasmi : [Signature] Tarikh : 16.11.17  
**DEKAN/PENGARAH** **PROFESOR DR. ZUHAILAWATI HUSSAIN** *(Date)*  
*(Signature and Official Stamp)* **Dekan**  
**Dean/Director** **P. Peng. Kej. Bahan & Sumber Mineral**  
**Kampus Kejuruteraan**  
**Universiti Sains Malaysia**

**NOTA :** Pemeriksa-pemeriksa yang menyediakan kertas soalan peperiksaan adalah bertanggungjawab atas ketepatan isi kandungan kertas soalan peperiksaan berkenaan.

*(NOTE :* Accuracy of the contents of the question paper is the responsibility of the Examiner(s) who set the question paper)

**SULIT**



First Semester Examination  
2017/2018 Academic Session

January 2018

**EBP 105/3 – Introduction To Statics And Dynamics**  
**[Pengenalan Kepada Statik Dan Dinamik]**

Duration : 3 hours  
[Masa : 3 jam]

Please ensure that this examination paper contains ELEVEN printed pages before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi SEBELAS muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

This paper consists of SEVEN questions. ONE question from PART A, THREE questions from PART B and THREE questions from PART C.

*[Kertas soalan ini mengandungi TUJUH soalan. SATU soalan dari BAHAGIAN A, TIGA soalan dari BAHAGIAN B dan TIGA soalan dari BAHAGIAN C].*

**Instruction:** Answer FIVE questions. Answer ALL questions from PART A, TWO questions from PART B and TWO questions from PART C. If a candidate answers more than five questions only the first five questions answered in the answer script would be examined.

**[Arahan:** Jawab LIMA soalan. Jawab SEMUA soalan dari BAHAGIAN A, DUA soalan dari BAHAGIAN B dan DUA soalan dari BAHAGIAN C. Jika calon menjawab lebih daripada lima soalan hanya lima soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.]

The answers to all questions must start on a new page.

*[Mulakan jawapan anda untuk semua soalan pada muka surat yang baru.]*

You may answer a question either in Bahasa Malaysia or in English.

*[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]*

In the event of any discrepancies in the examination questions, the English version shall be used.

*[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunapakai.]*

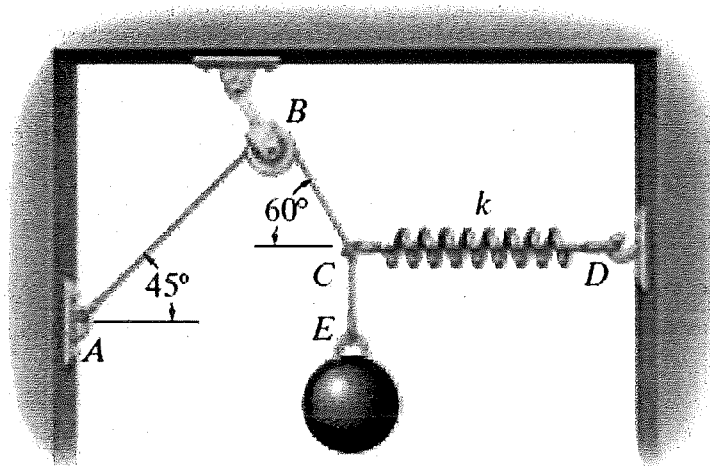
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**SULIT**

**PART A/ BAHAGIAN A**

1. (a). The sphere has a mass of 6 kg and is supported. Draw a free-body diagram of the knot at C.

*Sfera tersebut mempunyai jisim 6 kg dan disokong. Lukiskan gambarajah jasad bebas simpul di C.*



(50 marks/markah)

- (b). A particle starts from  $s = 0$  and travels along a straight line with a velocity  $v = (t^2 - 4t + 3)$  m/s, where  $t$  is in seconds. Construct the  $v$ - $t$  and  $a$ - $t$  graphs for the time interval  $0 \leq t \leq 4$  s.

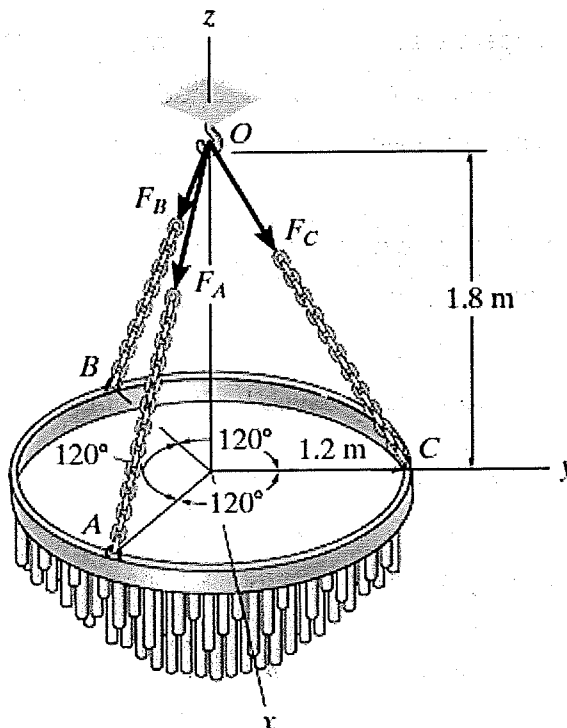
*Zarah bermula dari  $s = 0$  dan bergerak sepanjang garis lurus dengan halaju  $v = (t^2 - 4t + 3)$  m/s, di mana  $t$  dalam saat. Binakan graf  $v$ - $t$  dan  $a$ - $t$  untuk selang masa  $0 \leq t \leq 4$  s.*

(50 marks/markah)

**PART B/ BAHAGIAN B**

2. (a). (i). Describe Scalar Notation with an example.  
*Terangkan notasi Scalar dgn memberi satu contoh.*  
 (10 marks/markah)
- (ii). Describe Cartesian Vector Notation with an example.  
*Terangkan notasi Vektor dgn memberi satu contoh.*  
 (15 marks/markah)
- (b). The chandelier is supported by three chains which are concurrent at point  $O$ . If the force in each chain has a magnitude of 300 N, express each force as a Cartesian vector and determine the magnitude and coordinate direction angles of the resultant force.

*Lampu hiasan di bawah disokong oleh tiga rantai yang bertemu di titik  $O$ . Jika daya setiap rantai mempunyai magnitude 300 N, ungkapkan setiap daya tersebut dalam vector Cartesian dan hitungkan magnitud dan sudut arah koordinat daya paduannya.*



(75 marks/markah)

...4/

3. (a). Determine the resultant moment of the four forces acting on the rod shown in Figure 1 about point O.

*Kirakan momen paduan bagi empat daya yang bertindak terhadap rod dalam Rajah 1 pada titik O.*

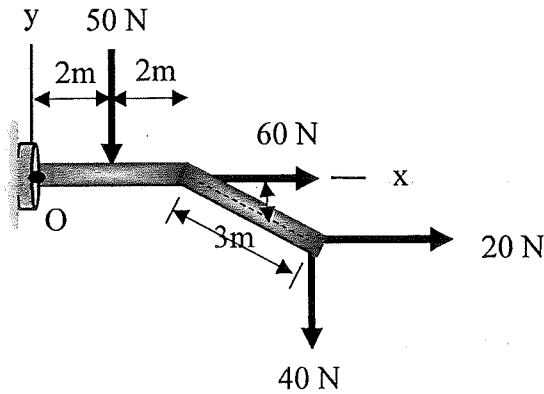


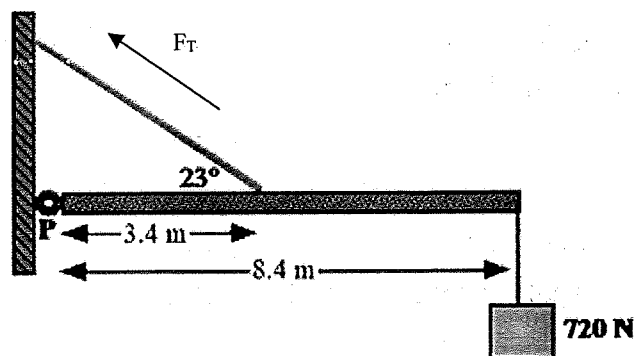
Figure 1

Rajah 1

(40 marks/markah)

- (b). The diagram below shows a uniform beam hinged at P. The weight of the beam is 425 N. Find the tension of the cable. Assuming static equilibrium is achieved.

Gambarajah di bawah menunjukkan rasuk seragam dipasangkan di P. Berat rasuk adalah 425 N. Hitungkan tegangan kabel tersebut. Andaikan keseimbangan statik tercapai.



(60 marks/markah)

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4. (a). What is a Free Body Diagram?  
*Apakah gambarajah jasad bebas?*

(20 marks/markah)

- (b). Identify the centroid of the area shown in Fig. 2.  
*Kenalpastikan sentroid bagi kawasan dalam Rajah 2.*

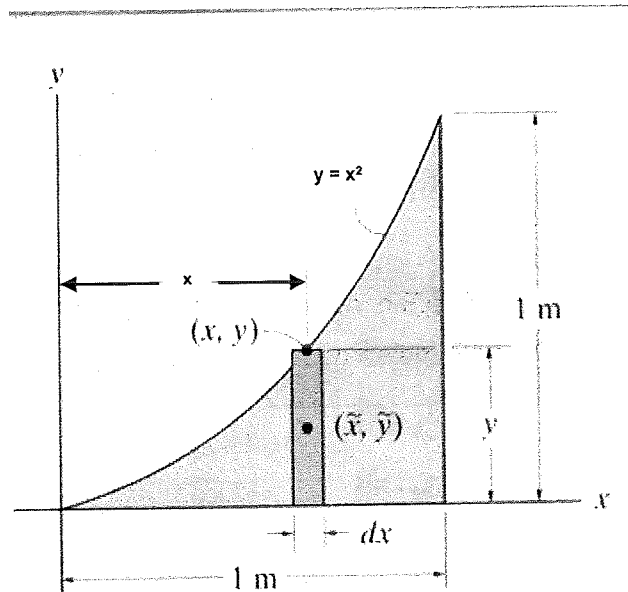


Figure 2 / Rajah 2

(80 marks/markah)

**PART C/ BAHAGIAN C**

5. (a). A particle travels along straight line with a velocity of  $v = (4t - 3t^2)$  m/s, where  $t$  is in seconds. Determine the position of the particle when  $t = 4$  s. Given  $s = 0$  and  $t = 0$ .

*Suatu partikel bergerak di sepanjang garis lurus dengan halaju  $v = (4t - 3t^2)$  m/s, di mana  $t$  dalam saat. Tentukan kedudukan zarah apabila  $t = 4$  s. Diberi  $s = 0$  dan  $t = 0$ .*

(20 marks/markah)

- (b). A car traveling along the straight portions of the road has the velocities indicated in the Figure 3 when it arrives at points A, B, and C. If it takes 3 s to go from A to B, and then 5 s to go from B to C, determine the average acceleration between points A and B and between points A and C.

*Sebuah kereta yang bergerak di sepanjang bahagian jalan lurus mempunyai halaju yang ditunjukkan dalam Rajah 3 apabila ia tiba di titik A, B, dan C. Jika diperlukan 3 s pergi dari A ke B, dan kemudian 5 s pergi dari B ke C, tentukan pecutan purata di antara titik A dan B dan antara titik A dan C.*

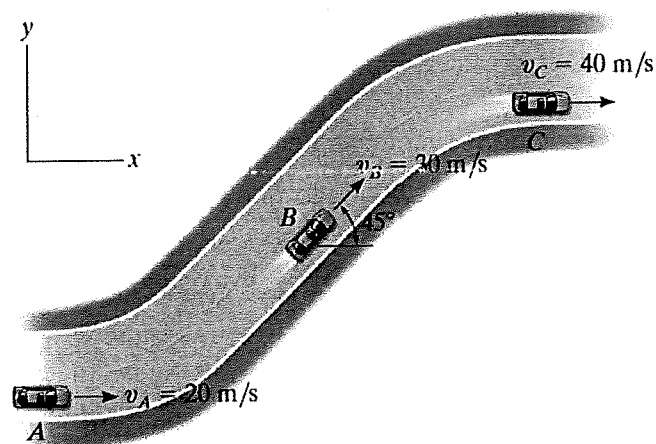


Figure 3 / Rajah 3

(40 marks/markah)

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- (c). A toboggan is traveling down along a curve which can be approximated by the parabola  $y = 0.01x^2$  as shown in Figure 4. Determine the magnitude of its acceleration when it reaches point A, where its speed is  $v_A = 10 \text{ m/s}$ , and it is increasing at the rate of  $\dot{v}_A = 3 \text{ m/s}^2$ .

*Toboggan bergerak di sepanjang lengkung yang boleh dianggarkan oleh parabola  $y = 0.01x^2$  seperti yang ditunjukkan dalam Rajah 4. Tentukan magnitud pecutannya apabila ia mencapai titik A, di mana kelajuannya adalah  $v_A = 10 \text{ m/s}$ , dan ia meningkat pada kadar  $\dot{v}_A = 3 \text{ m/s}^2$ .*

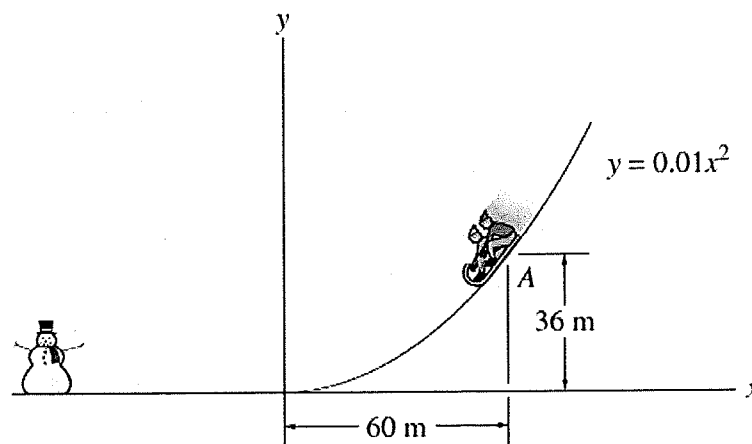


Figure 4 / Rajah 4

(40 marks/markah)



6. (a). The 2-Mg car is being towed by a winch as in Figure 5. If the winch exerts a force of  $T = 100(s + 1)$  N on the cable, where  $s$  is the displacement of the car in meters, determine the speed of the car when  $s = 10$  m, starting from rest. Neglect rolling resistance of the car.

*Sebuah Kereta dengan jisim 2-Mg sedang ditarik oleh mesin derek seperti yang ditunjukkan dalam Rajah 5. Jika mesin derek dengan kekuatan daya  $T = 100 (s + 1)$  N pada kabel, di mana  $s$  ialah anjakan kereta dalam meter, tentukan kelajuan kereta apabila  $s = 10$  m, ia bermula dari keadaan rehat. Abaikan rintangan roda kereta.*



Figure 5 / Rajah 5

(20 marks/markah)

- (b). Figure 6 shows the crate has been pulled by force  $P$  at certain angle. If the coefficient of kinetic friction between the 50-kg crate and the ground is  $\mu_k = 0.3$ , determine the distance the crate travels and its velocity when  $t = 3$  s. The crate starts from rest, and  $P = 200$  N.

*Rajah 6 menunjukkan sebuah peti telah ditarik dengan daya  $P$  pada sudut tertentu. Sekiranya pekali geseran kinetik di antara peti berjisim 50 kg dan tanah ialah  $\mu_k = 0.3$ , tentukan jarak dan halaju peti yang bergerak pada  $t = 3$  s. Kotak bermula dari rehat, dan  $P = 200$  N.*

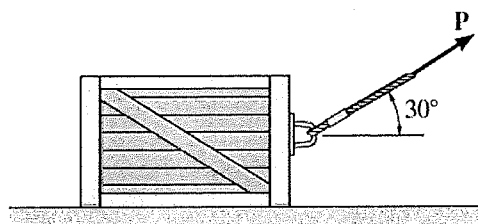


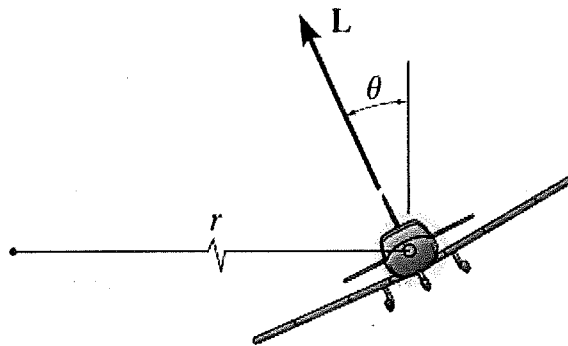
Figure 6 / Rajah 6

(40 marks/markah)

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- (c). A 5-Mg airplane is flying at a constant speed of 350 km/h along a horizontal circular path. If the banking angle  $\theta = 15^\circ$ , determine the uplift force  $L$  acting on the airplane and the radius  $r$  of the circular path. Neglect the size of the airplane.

*Pesawat dengan jisim 5-Mg terbang pada kelajuan 350 km/j sepanjang laluan melingkar mendatar. Jika sudut genting  $\theta = 15^\circ$ , tentukan daya angkat  $L$  yang bertindak di atas kapal terbang dan jejari 'r' dari laluan bulat. Abaikan saiz kapal terbang.*



(40 marks/markah)

7. (a). The 1.8 Mg dragster is traveling at 125 m/s when the engine is shut off and the parachute is released. If the drag force of the parachute can be approximated by the Figure 7, determine the speed of the dragster when it has travel 400 m.

*Sebuah 'dragster' berjirim 1.8 Mg bergerak pada 125 m/s apabila enjin dimatikan dan payung terjun dilepaskan. Sekiranya daya seret payung terjun boleh dianggarkan dengan graf seperti Rajah 7, tentukan kelajuan 'dragster' apabila ia mempunyai perjalanan 400 m.*

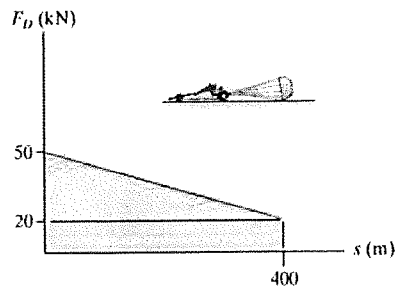


Figure 7 / Rajah 7

(20 marks/markah)

- (b). The 2-kg collar as shown in Figure 8 is attached to a spring that has an unstretched length of 2 m. If the collar is drawn to point B and released from rest, determine its speed when it arrives at point A.

*Kolar 2 kg seperti dalam Rajah 8 dilampirkan pada spring yang mempunyai panjang tidak terulur 2 m. Sekiranya kolar ditarik ke titik B dan dibebaskan dari rehat, tentukan kelajuan apabila ia tiba di titik A*

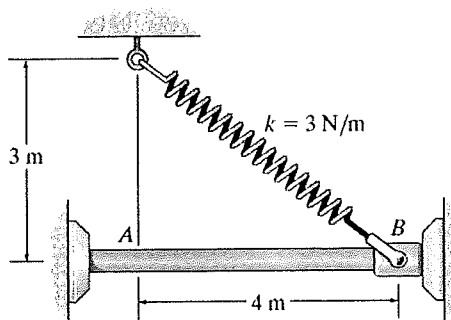


Figure 8 / Rajah 8

(30 marks/markah)

- (c). The 2.5-Mg pickup truck is towing the 1.5-Mg car using a cable as shown in Figure 9. If the car is initially at rest and the truck is coasting with a velocity of 30 km/h when the cable is slack, determine the common velocity of the truck and the car just after the cable becomes taut. Also, find the loss of energy.

*Trak pikap 2.5-Mg menunda kereta 1.5-Mg menggunakan kabel seperti yang ditunjukkan dalam Rajah 9. Sekiranya kereta pada mulanya berkeadaan rehat dan trak itu bergerak dengan halaju 30 km/j apabila kabel itu lemah, tentukan halaju biasa trak dan kereta sejurus selepas kabel menjadi tegang. Juga, cari kehilangan tenaga.*

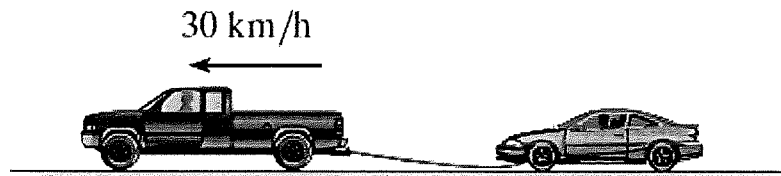


Figure 9 / Rajah 9

(50 marks/markah)

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