

**SULIT**



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN TINGGI**

**JABATAN MATEMATIK, SAINS DAN KOMPUTER**

**PEPERIKSAAN AKHIR**

**SESI DISEMBER 2015**

**DBS1012 : ENGINEERING SCIENCE**

**TARIKH : 02 APRIL 2016**

**MASA : 2.30 PM – 4.30 PM (2 JAM)**

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Kertas ini mengandungi **EMPAT BELAS (14)** halaman bercetak.  
Bahagian A: Struktur (6 soalan)

Dokumen sokongan yang disertakan : Formula

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**

**SECTION A : 100 MARKS*****BAHAGIAN A : 100 MARKAH*****INSTRUCTION:**

This section consists of **SIX (6)** structured questions. Answer **FOUR (4)** questions only.

***ARAHAN :***

*Bahagian ini mengandungi ENAM (6) soalan subjektif. Jawab EMPAT (4) soalan sahaja.*

**QUESTION 1*****SOALAN 1***

- CLO1  
C1 (a) Define scalar and vector quantity with examples.  
*Takrifkan kuantiti skalar dan vector beserta contoh setiap satu.*
- [4 marks]  
[4 markah]
- CLO1  
C2 (b) Describe the differences between base quantity and derived quantity with **TWO (2)** examples.  
*Jelaskan perbezaan antara kuantiti asas dan terbitan beserta DUA (2) contoh setiap satu.*
- [6 marks]  
[6 markah]
- CLO3  
C3 (c) Convert the following units:  
*Tukarkan unit berikut:*
- i.  $100905 \text{ cm}^2$  to  $\text{m}^2$ .  
*100905  $\text{cm}^2$  kepada  $\text{m}^2$ .*
- [3 marks]  
[3 markah]

- ii.  $9969 \text{ kg/m}^3$  to  $\text{g/cm}^3$ .  
 $9969 \text{ kg/m}^3$  kepada  $\text{g/cm}^3$ .

[4 marks]

[4 markah]

CLO3  
C3

- (d) i. List the types of errors in measurement.  
*Senaraikan jenis ralat dalam pengukuran.*

[2 marks]

[2 markah]

- ii. Describe **THREE (3)** differences between the errors.  
*Terangkan **TIGA (3)** perbezaan antara ralat tersebut.*

[6 marks]

[6 markah]

## QUESTION 2

## SOALAN 2

CLO1  
C1

- (a) Define the following terms and state their SI unit.  
*Takrifkan setiap yang berikut dan nyatakan unit SI baginya.*

- i. Displacement  
*Sesaran*

[2 markah]

[2 marks]

- ii. Velocity  
*Halaju*

[2 marks]

[2 markah]

CLO 1  
C2

- (b) An airplane travelling at  $150\text{m/s}$  is accelerated uniformly at  $25\text{m/s}^2$ .

*Sebuah kapal terbang bergerak pada  $150\text{m/s}$  memecut secara seragam pada  $25\text{m/s}^2$ .*

- i. What is the airplane's speed after 15s?

*Berapa kelajuan kapal terbang selepas 15s?*

[2 marks]

[2 markah]

- ii. What distance has it travelled at that point of time?

*Berapa jarak dilalui pada masa tersebut?*

[4 marks]

[4 markah]

CLO 3  
C3

(c) A lorry moves from a stationary state, undergoes uniform acceleration for 200m in 5 seconds. After 5 seconds, the lorry moves at a constant velocity for half a minute. The lorry then stops in 10 seconds. Based on the given situation:  
*Sebuah lori bergerak dari keadaan pegun, memecut secara seragam sejauh 200m dalam masa 5 saat. Selepas 5 saat, lori tersebut bergerak dengan halaju seragam untuk masa setengah minit. Kemudian lori berhenti dalam masa 10 saat. Berdasarkan situasi yang diberikan:*

i. Sketch the velocity-time graph  
*Lakarkan graf halaju-masa*

[3 marks]

[3 markah]

ii. Calculate the acceleration of the lorry for the first 5 seconds  
*Pecutan lori pada masa 5 saat pertama*

[5 marks]

[5 markah]

iii. Calculate the deceleration of the lorry  
*Nyahpecutan lori*

[2 marks]

[2 markah]

iv. Calculate the total displacement of the lorry  
*Jumlah sesaran lori*

[5 marks]

[5 markah]

## QUESTION 3

## SOALAN 3

CLO1  
C1

(a) i. Define force.  
*Takrifkan daya.*

[1 mark]

[1 markah]

ii. State **THREE (3)** examples of activities that involve force in everyday life.

*Nyatakan **TIGA (3)** contoh aktiviti yang melibatkan daya dalam kehidupan seharian.*

[3 marks]

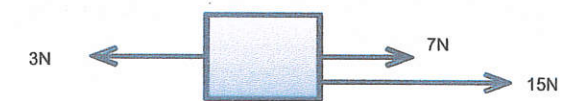
[3 markah]

CLO1  
C2

(b) Find the magnitude of the resultant force and determine its direction for each of situation below:

*Dapatkan magnitude daya paduan dan tentukan arah bagi setiap situasi di bawah:*

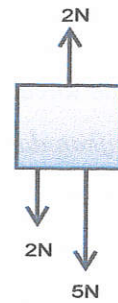
i.



[3 marks]

[3 markah]

ii.



[3 marks]

[3markah]

CLO3  
C3

- (c) Calculate the centre of gravity,  $\bar{x}$  from point A for the beam in Figure 3 (c) so that the beam remains in equilibrium by using:

*Kirakan pusat graviti,  $\bar{x}$  dari titik A bagi rasuk dalam Rajah 3 (c) supaya rasuk tersebut masih dalam keadaan seimbang menggunakan:*

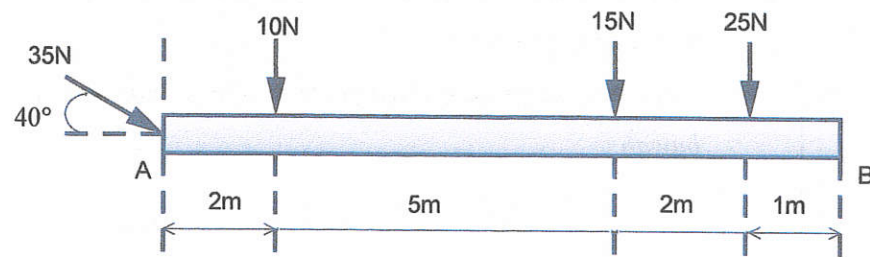


Figure 3 (c) / Rajah 3 (c)

- i. Moment of force method  
*Kaedah momen daya*
- ii. Resultant Moment of Force Method  
*Kaedah momen paduan daya*

[15 marks]

[15 markah]

## QUESTION 4

## SOALAN 4

CLO1  
C1

- (a) Define each of the following terms and state its SI unit:

*Berikan takrifan setiap yang berikut dan nyatakan unit SI baginya:*

- i. Energy  
*Tenaga*

[2 marks]

[2markah]

- ii. Power  
*Kuasa*

[2 marks]

[2markah]

CLO1  
C2

- (b) Cik Aliya with a mass of 50 kg is climbing up to the top of 20 m stairs within 1 minute. Calculate the work done and power produced by Cik Aliya to climb up the stairs.

*Cik Aliya dengan jisim 50 kg naik ke atas tangga yang berketinggian 20 m dalam masa 1 minit. Kirakan kerja dan kuasa yang dihasilkan oleh Cik Aliya untuk naik ke atas.*

[6 marks]

[6 markah]

CLO3  
C3

- (c) A coconut with a mass of 1 kg falls from a tree which is 15 m high from the ground. Calculate :

*Sebiji kelapa dengan jisim 1 kg gugur dari pokok yang berketinggian 15 m dari tanah. Kirakan :*

- i. Potential energy while the coconut is still on the tree.  
*Tenaga keupayaan sewaktu kelapa tersebut masih berada di atas pokok.*
- [3 marks]  
[3 markah]

- ii. Potential energy and kinetic energy when the coconut falls 10 m from the tree.  
*Tenaga keupayaan dan tenaga kinetik apabila kelapa tersebut gugur bebas sejauh 10 m.*
- [5marks]  
[5markah]

- iii. Velocity of the coconut just before it touches the ground.  
*Halaju kelapa tersebut sebelum mencecah tanah.*
- [3 marks]  
[3 markah]

CLO3  
C3

- (d) A motor is used to pump water from a river with a depth of 5 m at a rate of 30N per minute. Calculate the power of the pump.

*Sebuah motor digunakan untuk mengepam air dari sungai pada kedalaman 5 m pada kadar 30 N seminit. Kirakan kuasa pam tersebut.*

[4 marks]  
[4 markah]

## QUESTION 5

## SOALAN 5

CLO 1  
C1

- (a) Define each of the following terms and state its SI unit:  
*Takrifkan setiap yang berikut dan nyatakan unit SI baginya:*

- i. Density  
*Ketumpatan*
- [2marks]  
[2markah]

- ii. Relative Density  
*Ketumpatan Bandingan*
- [2marks]  
[2markah]

CLO 1  
C2

- (b) Calculate the density and relative density of a block with the following measurements:

*Kirakan ketumpatan dan ketumpatan bandingan bagi sebuah blok dengan pengukuran seperti berikut:*

Mass / <i>Jisim</i> : 7.5 kg	Width / <i>Lebar</i> : 0.15 m
Length / <i>Panjang</i> : 0.20 m	Height / <i>Tinggi</i> : 0.10 m

[6marks]  
[6markah]

CLO 3  
C3

- (c) An ice cube which measures 350 cm x 350 cm x 350 cm is floating on the water surface.

Seketul kiub ais dengan pengukuran 350 cm x 350 cm x 350 cm terapung di atas permukaan air.

- i. Calculate the mass of the ice cube if the given density of the ice cube is  $0.917 \text{ g/cm}^3$ .

Kirakan jisim bagi kiub ais jika diberi ketumpatan bagi kiub ais adalah  $0.917 \text{ g/cm}^3$ .

[8marks]

[8markah]

- ii. Calculate the mass of water displaced by the ice cube.

Kirakan jisim air yang disesarkan oleh kiub ais.

[4marks]

[4markah]

- iii. Calculate the buoyant force exerted.

Kirakan daya apungan yang terhasil.

[3marks]

[3markah]

## QUESTION 6

## SOALAN 6

CLO 1  
C1

- (a) Define each of the following terms and state its SI unit:

*Berikan takrifan setiap yang berikut dan nyatakan unit SI baginya:*

- i. Heat

*Haba*

[2 marks]

[2markah]

- ii. Temperature

*Suhu*

[2 marks]

[2markah]

CLO 1  
C2

- (b) Explain **TWO (2)** ways of heat transfer with examples.

*Terangkan DUA (2) kaedah pemindahan haba beserta contoh.*

[6marks]

[6markah]

CLO 3  
C3

- (c) A butcher puts 13 kg of beef into a freezer. The initial temperature of the beef is  $27^\circ\text{C}$ . After an hour, the temperature drops to  $x^\circ\text{C}$ . The amount of heat lost is  $-705.7 \text{ J}$ . Given the specific heat capacity of the beef is  $2.81 \text{ J/kg}^\circ\text{C}$ . Find the value of  $x^\circ\text{C}$ .

*Seorang pemotong daging meletakkan 13 kg daging ke dalam peti sejuk. Suhu awal daging tersebut ialah  $27^\circ\text{C}$ . Selepas sejam, suhu daging tersebut menurun kepada  $x^\circ\text{C}$ . Kuantiti haba yang hilang ialah sebanyak  $-705.7 \text{ J}$ . Diberi muatan haba tentu daging tersebut ialah  $2.81 \text{ J/kg}^\circ\text{C}$ . Kira nilai  $x^\circ\text{C}$ .*

[5marks]

[5markah]

- (d) Mr. Gold is hiding a 1355 g of gold bar with a temperature of 35 °C inside a tank full of water with a temperature of 97 °C. If the mass of the water is 25 kg, calculate the final temperature of the gold bar. (Specific Heat Capacity of gold is 129 J/kg°C, water is 4200 J/kg°C)

*Mr. Gold menyembunyikan 1355 g jongkong emas dengan suhu 35 °C ke dalam tangki dipenuhi air dengan suhu 97 °C. Jika jisim air tersebut ialah 25 kg, kira suhu akhir jongkong emas tersebut. (Muatan Haba Tentu jongkong emas 129 J/kg°C, air 4200 J/kg°C)*

[10marks]

[10markah]

SOALAN TAMAT

**FORMULA DBS1012**  
**ENGINEERING SCIENCE**

$$g = 9.81 \text{ m/s}^2$$

$$W = mg$$

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$s = \frac{1}{2}(u + v)t$$

$$v^2 = u^2 + 2as$$

$$F = mg$$

$$F = ma$$

$$F = mg \sin\theta$$

$$F_x = F \cos\theta$$

$$F_y = F \sin\theta$$

$$F_R = \sqrt{(\sum F_x)^2 + (\sum F_y)^2}$$

$$\theta = \tan^{-1}\left(\frac{F_y}{F_x}\right)$$

$$M = Fd$$

$$E_p = mgh$$

$$E_k = \frac{1}{2}mv^2$$

$$W = Fs$$

$$W = F \cos\theta$$

$$P = \frac{W}{t}$$

$$P = Fv$$

$$\rho = \frac{m}{V}$$

$$\rho_{\text{relative}} = \frac{\rho_{\text{substance}}}{\rho_{\text{water}}}$$

$$p = \frac{F}{A}$$

$$p = \rho gh$$

Pascal's Principle,

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$F_B = \rho Vg$$

$$Q = mc\theta$$

$$C_{\text{water}} = 4,200 \text{ J/kg}^\circ\text{C}$$

$$\rho_{\text{water}} = 1,000 \text{ kg/m}^3$$