

**SULIT**



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

**JABATAN KEJURUTERAAN AWAM**

**PEPERIKSAAN AKHIR  
SESI DISEMBER 2017**

**DCW5112: WOOD MECHANIC STRUCTURE 2**

**TARIKH : 08 APRIL 2018  
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)**

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Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Bahagian A: Struktur (2 soalan)  
Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : Tiada

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**

## SECTION A : 50 MARKS

## BAHAGIAN A : 50 MARKAH

## INSTRUCTION:

This section consists of TWO (2) structured questions. Answer ALL questions.

## ARAHAN:

Bahagian ini mengandungi DUA (2) soalan berstruktur. Jawab semua soalan.

## QUESTION 1

## SOALAN 1

CLO2  
C3

- (a) Based on FIGURE A1(a) below, calculate the position of the centroid ( $\bar{x}$ ) for cross section shape referring to the YY.

Berdasarkan RAJAH A1(a) di bawah, kira kedudukan pusat sentroid ( $\bar{x}$ ) bagi bentuk keratan merujuk pada YY.

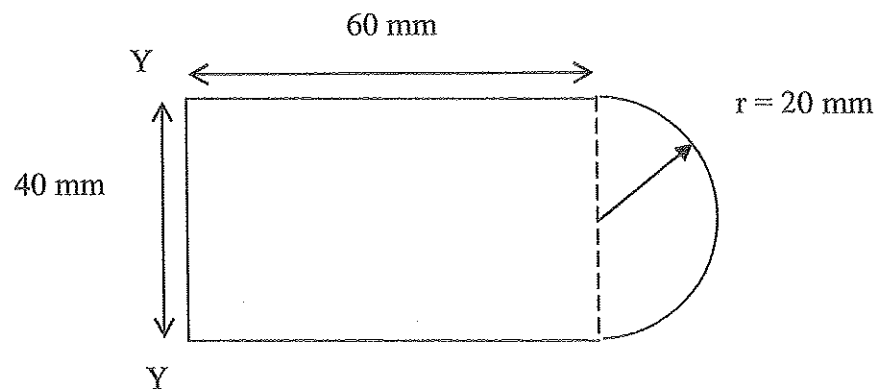


FIGURE A1(a) /RAJAH A1(a)

[10 marks]  
[10 markah]

CLO2  
C4

- (b) Calculate the value of second moment area for the shape in FIGURE A1(b).  
*Kira nilai luas momen kedua bagi bentuk di dalam RAJAH A1(b).*

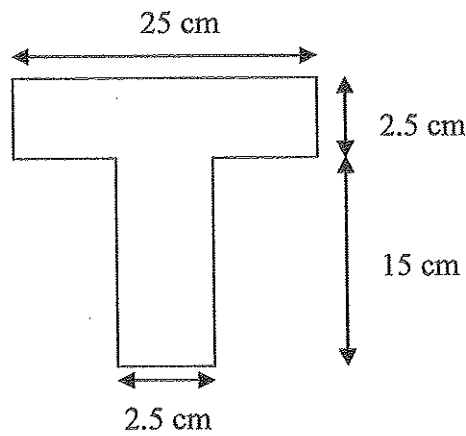


FIGURE A1(b) / RAJAH A1(b)

[15 marks]  
[15 markah]

## QUESTION 2

## SOALAN 2

CLO2  
C3

FIGURE A2(a) / RAJAH A2(a)

CLO 2  
C3

- (a) Based on the simply supported beam in FIGURE A2(a),  
*Berdasarkan Rasuk Sokong mudah dalam RAJAH A2(a),*
- calculate the reaction at both supports.  
*kira tindakbalas pada kedua-dua penyokong.*
  - draw the moment bending diagram using moment area method.  
*lukis rajah momen lentur menggunakan kaedah momen luas.*

[10 marks]  
[10 markah]

CLO 2  
C4

- (b) An 8m tall column is subjected to 600kN of compression load. Buckling occurs around the main axis with  $I_{xx}$  value =  $4.87 \times 10^6 \text{ mm}^4$  and the value of  $E = 200 \text{ MN/m}^2$ . Calculate the critical load which can be supported by the column if both ends are pinned and both end are fixed.

*Sebatang tiang setinggi 8m menanggung beban mampatan sebanyak 600kN.*

*Lengkakan terjadi di sekeliling paksi utama dengan nilai  $I_{xx} = 4.87 \times 10^6 \text{ mm}^4$  dan nilai  $E=200 \text{ MN/m}^2$ . Kirakan beban kritikal yang boleh ditanggung oleh tiang tersebut jika tiang di pin di kedua-dua hujungnya dan di ikat tegar di kedua-dua hujungnya.*

[15 marks]

[15 markah]

SECTION B : 50 MARKS

BAHAGIAN B : 50 MARKAH

## INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **TWO (2)** questions only.

## ARAHAN:

Bahagian ini mengandungi **EMPAT (4)** soalan struktur. Jawab **DUA (2)** soalan sahaja.

## QUESTION 1

## SOALAN 1

CLO1  
C3

- (a) A simply supported beam is subjected with point load as shown in **FIGURE B1(a)** below. Calculate  $b$  value if the maximum bending stress is limited to  $60 \text{ kN/m}^2$ .  
*Sebatang rasuk yang disokong mudah dikenakan beban tumpu seperti RAJAH B1(a) di bawah. Kira nilai  $b$  jika tegasan lentur maksima dihadkan kepada  $60 \text{ kN/m}^2$ .*

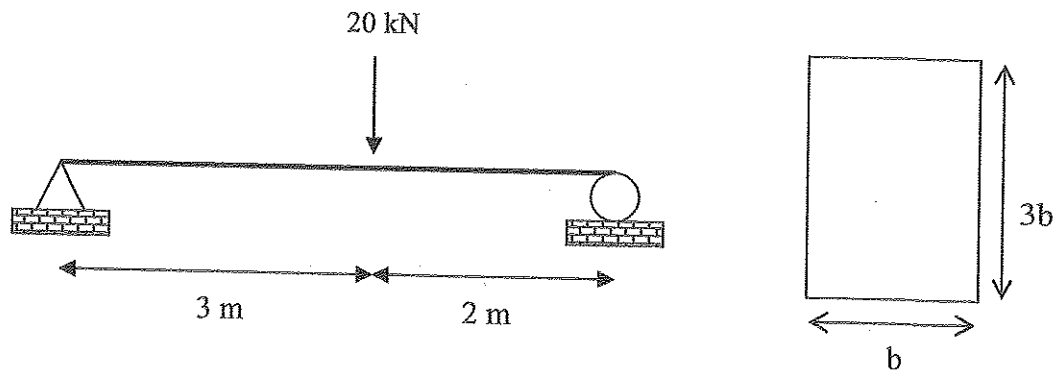


FIGURE B1(a)/RAJAH B1(a)

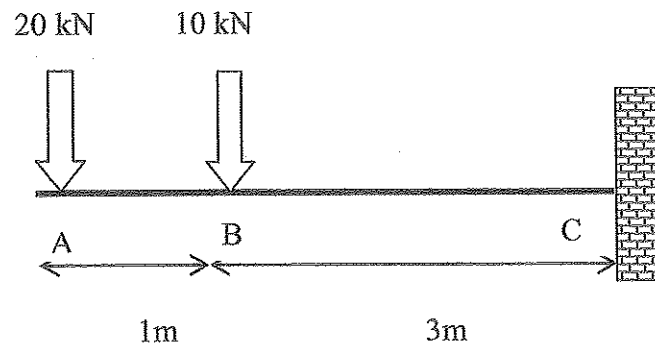
[10 marks]

[10 markah]

CLO1  
C3

- (b) A cantilever beam shown in **FIGURE B1(b)** is subjected with 2 point loads. Calculate the value of gradient and deflection at end of cantilever beam using Macaulay's Method. [Given  $E = 200 \text{ kN/mm}^2$  and  $I = 1 \times 10^8 \text{ mm}^4$ ].

*Satu rasuk julur seperti di dalam RAJAH B1(b) dikenakan 2 beban tumpu. Kira kecerunan dan pesongan pada hujung bebas rasuk julur dengan menggunakan Kaedah Macaulay. [Diberi  $E = 200 \text{ kN/mm}^2$  dan  $I = 1 \times 10^8 \text{ mm}^4$ ].*



**FIGURE B1(b)/RAJAH B1(b)**

[15 Marks]

[15 Markah]

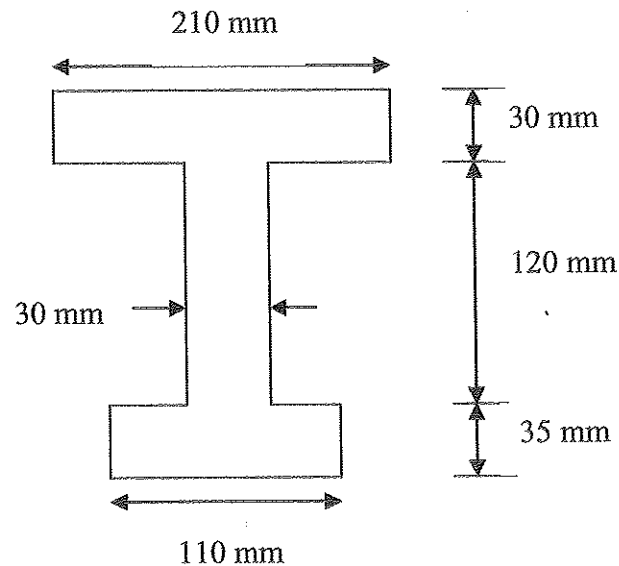
## QUESTION 2

## SOALAN 2

CLO1  
C3

- (a) A cross section beam as shown in **FIGURE B2(a)** is simply supported beam of 6 metres. The beam was carried a uniformly distributed load. Calculate maximum moment value if bending stress allowable was  $270 \text{ N/mm}^2$ . Given  $y_c = 77.34 \text{ mm}$ ,  $y_t = 107.66 \text{ mm}$  and  $I_{xx} = 61.57 \times 10^6 \text{ mm}^4$ .

*Satu keratan rentas rasuk di dalam RAJAH B2(a) ialah rasuk tupang mudah sepanjang 6 meter. Rasuk membawa beban teragih seragam. Kira nilai momen maksimum jika tegasan lentur dibenarkan ialah  $270 \text{ N/mm}^2$ . Diberi  $y_c = 77.34 \text{ mm}$ ,  $y_t = 107.66 \text{ mm}$  dan  $I_{xx} = 61.57 \times 10^6 \text{ mm}^4$ .*



**FIGURE B2(a) / RAJAH B2(a)**

[10 marks]

[10 markah]

CLO1  
C3

(b) A simply supported beam as shown in FIGURE B2(b) is subjected with point load and moment. By using Moment Area Method,  
*Satu rasuk tumpang mudah seperti di dalam Rajah B2(b) dikenakan beban tumpu dan momen. Dengan menggunakan Kaedah Momen Luas,*

- (i) calculate the deflection at B point in EI term.  
*kira pesongan pada titik B dalam sebutan EI.*
- (ii) calculate the gradient at B point in EI term  
*kira kecerunan pada titik B dalam sebutan EI.*

Given  $R_A = 8.75 \text{ kN}$  and  $R_D = 1.25 \text{ kN}$ .

*Diberi  $R_A = 8.75 \text{ kN}$  dan  $R_D = 1.25 \text{ kN}$ .*

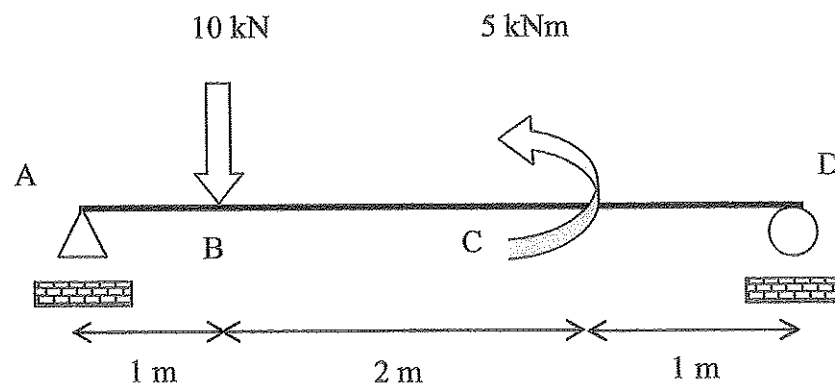


FIGURE B2(b)/RAJAH B2(b)

[15 marks]

[15 markah]



## QUESTION 3

## SOALAN 3

- CLO 1  
C2
- (a) Identify **FIVE (5)** assumptions in Euler's theory for column.  
*Kenalpasti LIMA (5) andaian dalam teori Euler .*
- [10 marks]  
[10 markah]
- CLO 1  
C3
- (b) A 3m tall column with a cross section size of 40mm wide x 80mm depth at pinned are both ends. Given  $E = 210\text{kN/mm}^2$ , calculate:
- i) slenderness ratio  
ii) critical load
- Tiang 3m tinggi dengan saiz keratan rentas 40mm lebar x 80mm dalam dipinkan pada kedua-dua hujung. Diberikan  $E = 210 \text{ kN / mm}^2$ , kira:*
- i) nisbah kelangsingan  
ii) beban kritikal
- [15 marks]  
[15 markah]

## QUESTION 4

## SOALAN 4

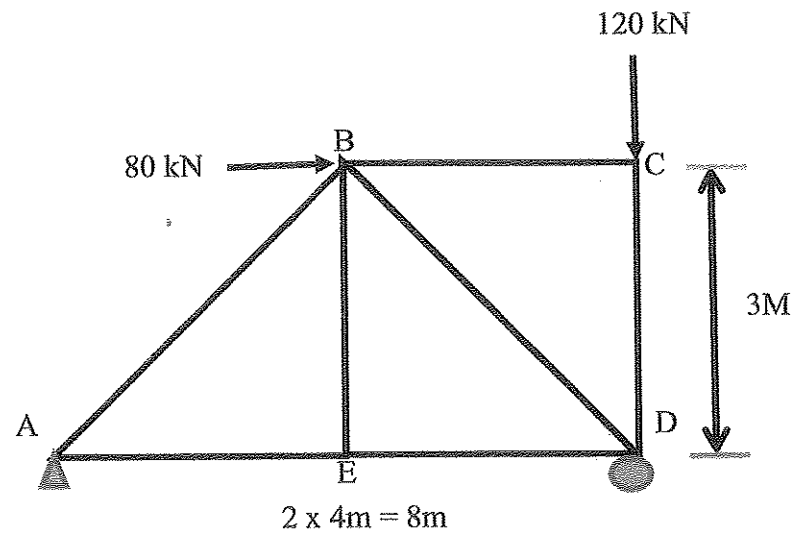
CLO 1  
C2

- (a) A structure frame with a span of 16 m is subjected to point load as shown in **FIGURE B4(a)**, calculate the reactions at the support.

*Kerangka struktur yang mempunyai rentang 16 m adalah dikenakan beban titik seperti pada RAJAH B4(a), kirakan tindakbalas di penyokong.*

[10 marks]

[10 markah]



**FIGURE B4(a)/ RAJAH B4(a)**

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CLO 1  
C3

- (b) Using the method of joint, calculate the internal forces for all members of the structure frame in **FIGURE B4(b)**. Interpret if the member is in tension or compression.

*Dengan menggunakan kaedah sendi, kirakan daya dalaman bagi setiap anggota kerangka dalam RAJAH B4(b). Tafsirkan sekiranya anggota mengalami tegangan atau mampatan.*

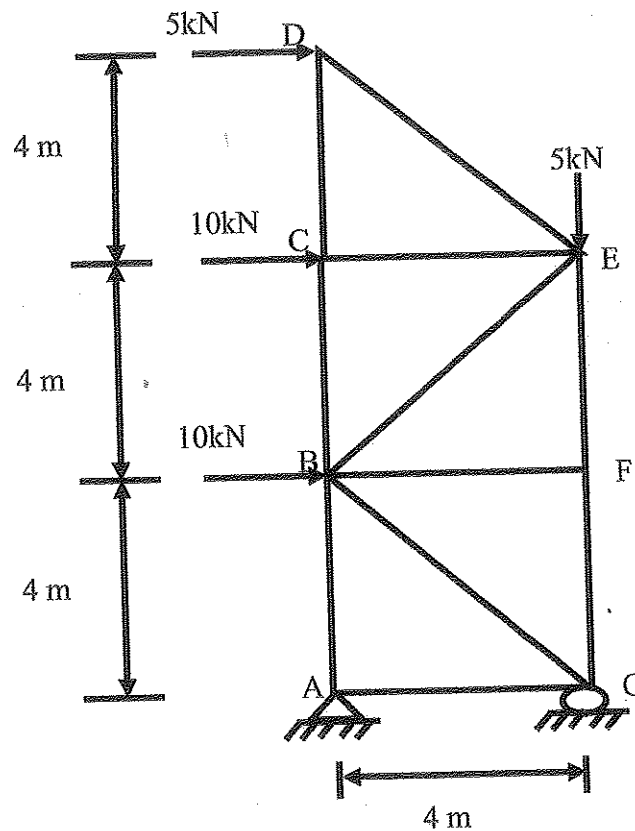


FIGURE B4(a) / RAJAH B4(b)

[15 marks]

[15 markah]

SOALAN TAMAT