

**SULIT**



**KEMENTERIAN PENDIDIKAN TINGGI  
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI**

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

**JABATAN KEJURUTERAAN AWAM**

**PEPERIKSAAN AKHIR**

**SESI I : 2025/2026**

**DCW30402: WOOD MECHANIC STRUCTURE 2**

**TARIKH : 01 DISEMBER 2025**

**MASA : 2.30 PETANG – 4.30 PETANG (2 JAM)**

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Kertas soalan ini mengandungi **TUJUH (7)** halaman bercetak.

Soalan Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**

**INSTRUCTION:**

This section consists of **FOUR (4)** questions. Answers **ALL** questions.

**ARAHAN:**

*Bahagian ini mengandungi EMPAT (4) soalan. Jawab SEMUA soalan*

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

- CLO 1 (a) Describe the meaning of centroid.  
*Terangkan maksud centroid.*

[5 marks]  
[5 markah]

- CLO 1 (b) Based on Figure 1(b) below, determine the position of centroid  $x$  and  $y$  axis.  
*Berdasarkan Rajah 1(b) di bawah, tentukan kedudukan pusat sentroid paksi  $x$  dan  $y$ .*

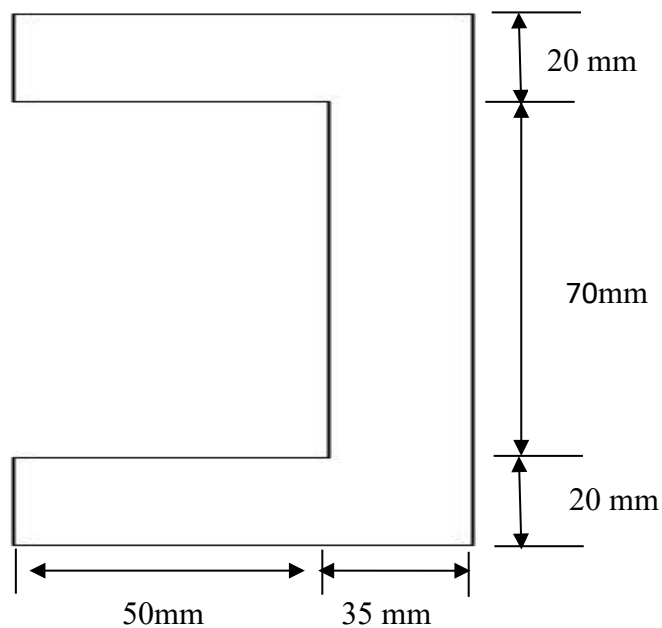


Figure 1(b)/ *Rajah 1(b)*

[10 marks]  
[10 markah]

CLO 1

(c) Based on the Figure 1(c) below, Determine:

*Berdasarkan Rajah 1(c) di bawah, Tentukan:*

- i. Centroid and Second Moment of Area around the neutral axis of the circle  
*Centroid dan Momen Luas Kedua sekitar paksi neutral bagi bulatan tersebut*

[4 marks]

[4 Markah]

- ii. Maximum bending moment  
*Momen lentur maksimum.*

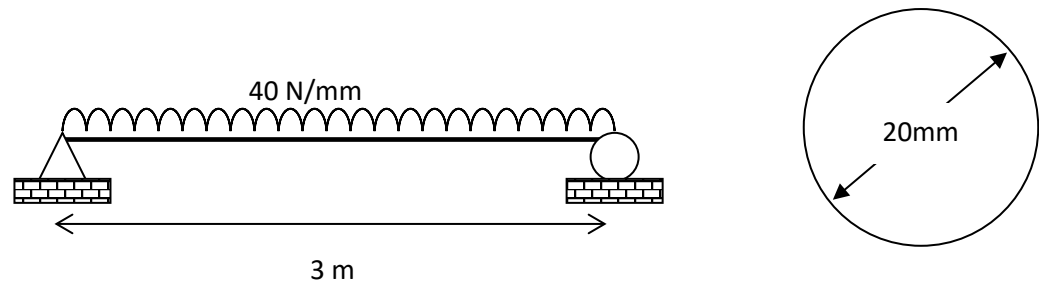
[3 marks]

[3 Markah]

- iii. Flexible stress for compression and tension.  
*Tegasan lentur mampatan dan tegangan.*

[3 marks]

[3 Markah]

Figure 1(c)/ *Rajah 1(c)*

**QUESTION 2****SOALAN 2**CLO  
1

From Figure 2 below, given  $R_A = 21.67 \text{ kN}$

*Daripada Rajah 2 di bawah, diberi  $R_A = 21.67 \text{ kN}$*

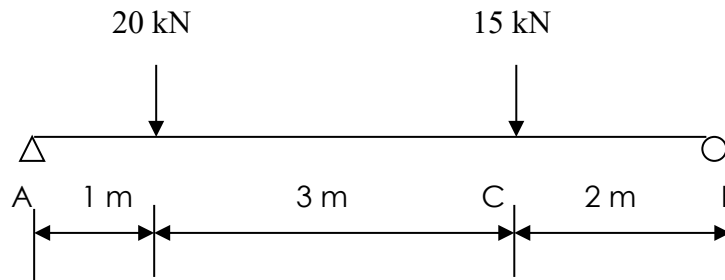


Figure 2 / Rajah 2

- (a) Sketch a bending moment diagram for each force and load in Figure 2.  
*Lakarkan gambarajah momen lentur untuk setiap daya dan juga beban pada Rajah 2.*

[5 marks]

[5 markah]

CLO 1

- (b) From Figure 2, using Moment Area Method determine slope at point C.  
*Berdasarkan Rajah 2, dengan menggunakan Kaedah Momen Luas tentukan kecerunan pada titik C.*

[10 marks]

[10 markah]

CLO 1

- (c) To use this Moment Area Method, it is important that you have skills in finding the area and centroid distance of the moment diagram shapes drawn. Explain the formula for commonly drawn moment shapes.

*Untuk menggunakan Kaedah Momen Luas ini, adalah penting anda mempunyai kemahiran dalam mencari luas dan jarak sentroid bagi bentuk-bentuk gambarajah momen yang dilukis. Terangkan formula bagi bentuk-bentuk momen yang biasa dilukis*

[10 marks]

[10 markah]

**QUESTION 3****(SOALAN 3)**

- CLO 2 (a) Explain **TWO (2)** types of column failure that may occur under axial loading.  
*Terangkan DUA (2) jenis kegagalan tiang yang mungkin berlaku dibawah beban paksi.*
- [10 marks]  
[10 markah]
- CLO 2 (b) Illustrate **TWO (2)** types of column end.  
*Gambarkan DUA (2) jenis hujung tiang.*
- [5 marks]  
[5 markah]
- CLO 2 (c) Calculate the slenderness ratio and critical load for a 3 m tall column with a cross section 50 mm diameter circle. The column of both ends are pinned.  
Given  $E = 210 \text{ kN/mm}^2$ .  
*Kira nisbah kelangsingan dan beban kritikal bagi tiang 3 m tinggi dengan saiz keratan rentas 50 mm diameter bulatan. Tiang adalah dipinkan pada kedua-dua hujung. Diberikan  $E = 210 \text{ kN/mm}^2$ .*
- [10 marks]  
[10 markah]

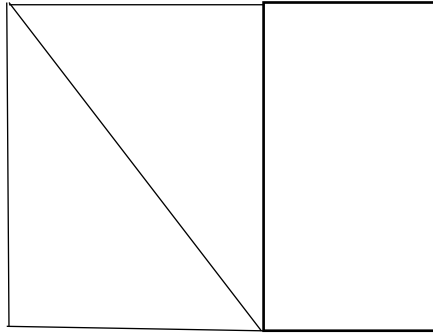
**QUESTION 4****SOALAN 4**

CLO 2

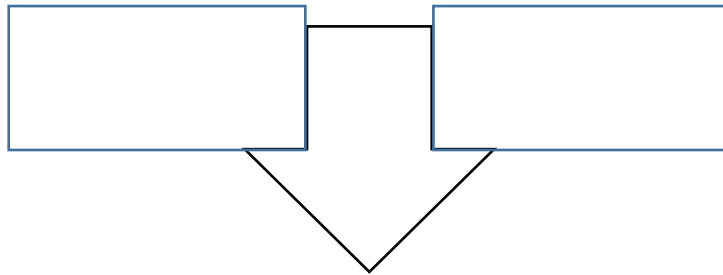
(a) Categorize the types of frame below.

*Kategorikan jenis kerangka di bawah*

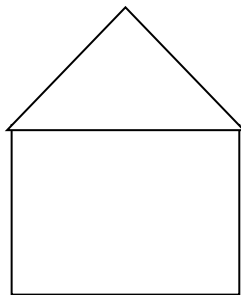
i)



ii)



iii.



[10 marks]

[10 markah]

From Figure 4 below Calculate.

*Dariapda Rajah 4 di bawah Kirakan.*

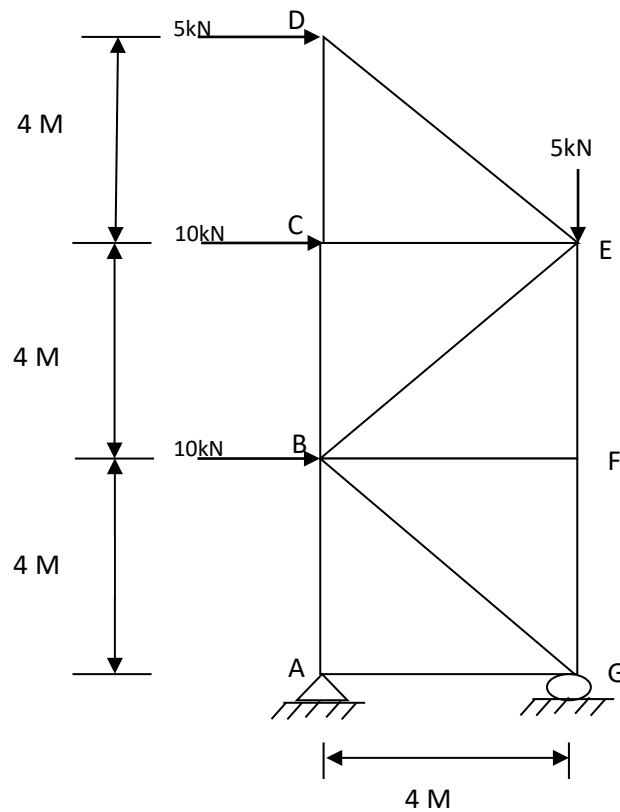


Figure 4/ *Rajah 4*

CLO 2

(b) Reaction at support A dan G

*Tindakbalas pada penyokong A dan G*

[5 marks]  
[5 markah]

CLO 2

(c) Internal forces for all members of the structure frame.

*daya dalaman bagi setiap anggota kerangka dalam.*

[10 marks]  
[10 markah]

**SOALAN TAMAT**

FORMULA DCW 30402

CENTROID AND SECOND MOMENT OF AREA

$$\bar{x} = \frac{\sum A\bar{x}}{\sum A}$$

$$\bar{y} = \frac{\sum Ay}{\sum A}$$

$$I_x = I_{pg} + Ad^2$$

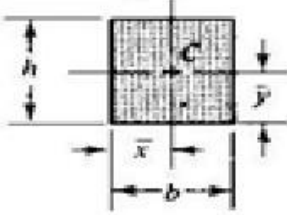
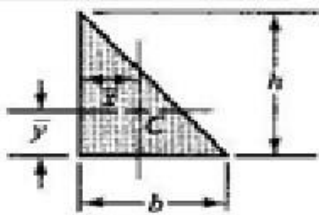
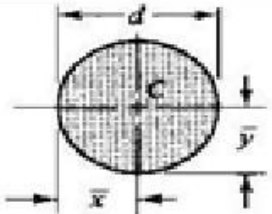
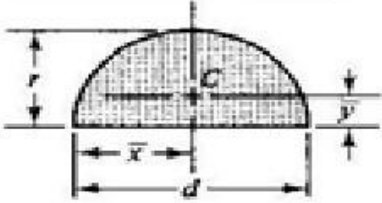
Shapes		Area	$\bar{x}$	$\bar{y}$
Rectangle		bh	$\frac{b}{2}$	$\frac{h}{2}$
Triangle		$\frac{bh}{2}$	$\frac{b}{3}$	$\frac{h}{3}$
Circle		$\frac{\pi d^2}{4}$	$\frac{d}{2}$	$\frac{d}{2}$
Semi-circle		$\frac{\pi d^2}{8}$	$\frac{d}{2}$	$\frac{4r}{3\pi}$

TABLE 1: Centroid of Simple Geometric Shape

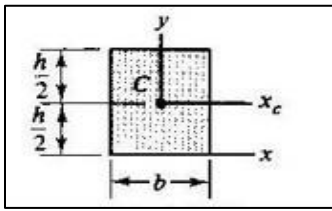
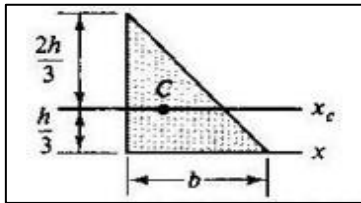
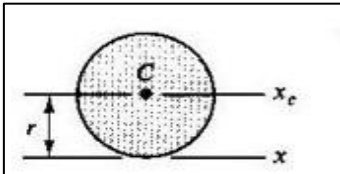
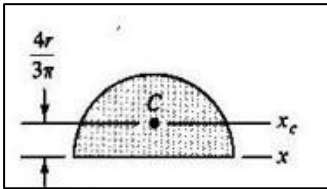
Shape		$I_{xx}$	$I_{yy}$
Rectangle		$\frac{bh^3}{12}$	$\frac{hb^3}{12}$
Triangle		$\frac{bh^3}{36}$	$\frac{hb^3}{36}$
Circle		$\frac{\pi d^4}{64}$	$\frac{\pi d^4}{64}$
Semicircle		$0.11r^4$	$0.11r^4$

TABLE 2: Moments of Inertia of Simple Shapes

BENDING STRESS

$$\frac{M}{I} = \frac{E}{R} = \frac{\sigma}{y}$$

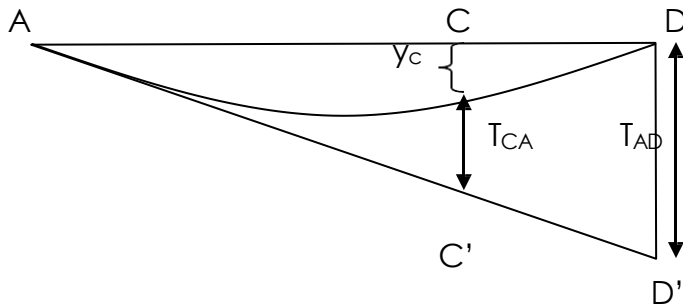
$$Z = \frac{I}{y_{max}}$$

$$M_{mak} = \frac{wL^2}{8}$$

$$M_{mak} = - \frac{wl^2}{2}$$

$$M_{mak} = \frac{wab}{L}$$

### SLOPE AND DEFLECTION OF BEAM



$$T_{DA} = \Sigma \frac{A\bar{x}}{EI} = \frac{1}{EI} \Sigma A\bar{x}$$

$$\theta_{AC} = \frac{\Sigma \text{luas } G.M.L_{AC}}{EI}$$

$$\theta_C = \theta_{AC} - \theta_A$$

$$y_c = CC' - T_{CA}$$

### COLUMN STABILITY AND SUPPORT

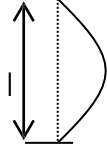
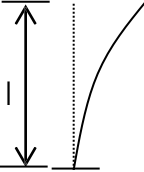

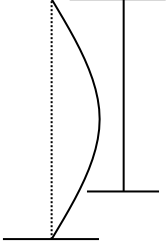
$$E = \frac{PL}{Ae}$$

$$r = \sqrt{\frac{I}{A}}$$

$$\lambda = \frac{L}{r}$$

$$\text{Beban Selamat} = \frac{\text{Bebankritikal(Euler)}}{\text{Faktorkeselamatan}}$$

$$P_{Cr} = \frac{\Pi^2 EI}{L^2}$$

Kes	Bentuk	Panjang berkesan	Beban Genting
4.4.1		$L = l$	$P_E = \frac{\pi^2 EI}{L^2}$
4.4.2		$L = 2l$	$P_E = \frac{\pi^2 EI}{L^2}$
4.4.3		$L = \frac{l}{2}$	$P_E = \frac{\pi^2 EI}{L^2}$
4.4.4		$L = \frac{l}{\sqrt{2}}$	$P_E = \frac{\pi^2 EI}{L^2}$

**TABLE 3: Effective Length and Critical**

**TWO DIMENSION STRUCTURE FRAMES**

$$m = 2n - 3$$

$$\curvearrowright + \sum M = 0$$

$$m > 2n - 3$$

$$\uparrow + \sum F_y = 0$$

$$m < 2n - 3$$

$$\rightarrow + \sum F_x = 0$$