

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 II : 2025/2026

DCC30373: STRUCTURAL MECHANICS

TARIKH : 09 MEI 2026

MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1**SOALAN 1**

- CLO1 (a) Explain **TWO (2)** types of support with the aid of diagrams including symbols and number of reactions.
- Terangkan DUA (2) jenis penyokong dengan bantuan gambar rajah termasuk simbol dan bilangan tindak balas.*

[8 marks]

[8 markah]

- CLO1 (b) A shaft component shown in Figure 1(b) is subjected to a tensile load of 300kN. Determine the total elongation of the shaft if the Modulus of Elasticity is 220GPa.
- Komponen aci yang ditunjukkan dalam Rajah 1(b) dikenakan beban tegangan sebanyak 300kN. Tentukan jumlah pemanjangan aci jika Modulus Keanjalan ialah 220GPa.*

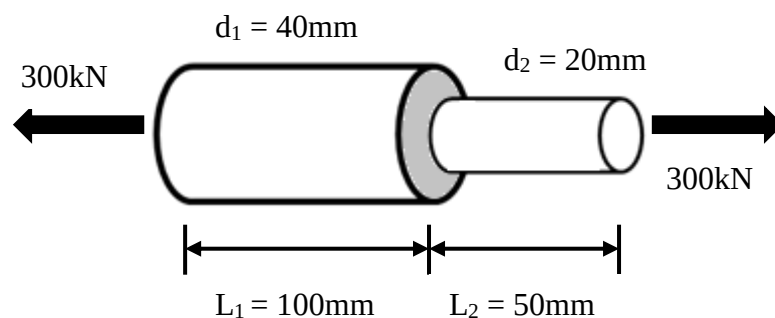


Figure 1(b) / Rajah 1(b)

[10 marks]

[10 markah]

- CLO1 (c) A 9m long cantilever beam is subjected to a point load, uniformly distributed load and moment as shown in Figure 1(c). Calculate the reaction forces at point E.

Satu rasuk julur sepanjang 9m dikenakan beban titik, beban teragih seragam dan momen seperti yang ditunjukkan dalam Rajah 1(c). Kirakan daya tindak balas di titik E.

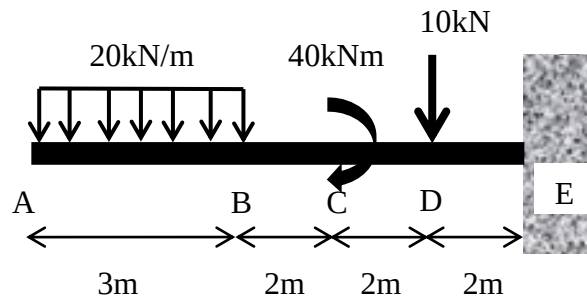


Figure 1(c) / Rajah 1(c)

[7 marks]

[7 markah]

QUESTION 2**SOALAN 2**

- CLO1 (a) Express the concept of equilibrium of forces (Static Basic Law) with the basic static equations.
Nyatakan konsep keseimbangan daya (Hukum Asas Statik) termasuk persamaan asas statik .

[5 marks]

[5 markah]

- CLO1 (b) A simply supported beam is loaded to uniformly distributed load, point load and moment as shown in Figure 2(b). Calculate the reaction force at support A and D including free body diagram.
Satu rasuk tupang mudah dikenakan kepada beban teragih seragam, beban tumpu dan momen seperti yang ditunjukkan dalam Rajah 2(b). Kirakan daya tindak balas pada penyokong A dan D termasuk gambarajah jasad bebas.

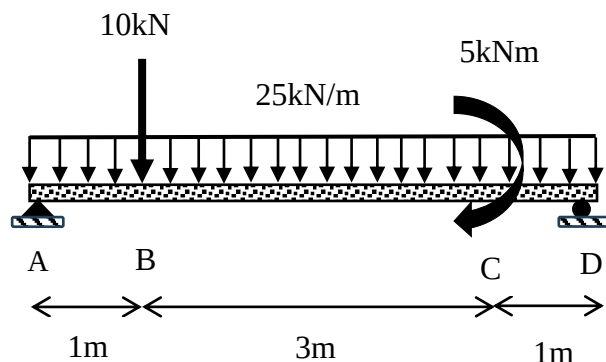


Figure 2(b) / Rajah 2(b)

[10 marks]

[10 markah]

- CLO2 (c) Based on Figure 2(b), illustrate the shear force diagram (SFD) including value at each point.
Berdasarkan Rajah 2(b), lukiskan gambar rajah daya ricih (GDR) termasuk nilai pada setiap titik.

[10 marks]

[10 markah]

QUESTION 3

SOALAN 3

- CLO2 (a) Four (4) rivets are used to connect three plates as shown in Figure 3(a). If the connection can resist 75kN of forces and shear stress in the rivet is 200MN/m^2 , determine diameter of the rivets.

Empat (4) rivet digunakan untuk menyambung tiga plat keluli seperti yang ditunjukkan Rajah 3(a). Jika sambungan boleh menahan daya sebanyak 75kN dan tegasan ricih sebanyak 200MN/m^2 , tentukan diameter rivet.

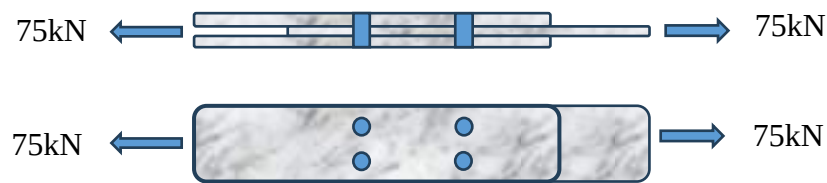


Figure 3(a) / Rajah 3(a)

[5 marks]

[5 markah]

- CLO2 (b) A T- section beams as show in Figure 3(b) subjected to bending stress. Given neutral axis distance from bottom (y_b) is 113.89mm. Calculate the second moment area at x-axis.

Satu rasuk berkeratan T seperti ditunjukkan dalam Rajah 3(b) mengalami tegasan lentur. Diberi jarak paksi neutral dari dasar (y_b) iaitu 113.89mm. Kirakan luas momen kedua pada paksi-x.

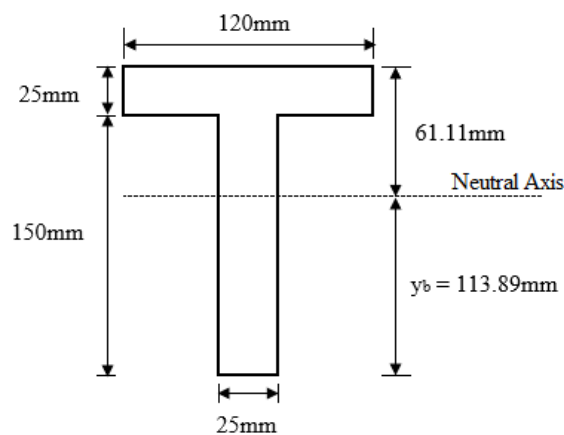


Figure 3(b) / Rajah 3(b)

[8 marks]

[8 markah]

CLO2

- (c) A simply supported beam of I-section is subjected to a uniformly distributed load as shown in Figure 3(c). Illustrate the bending stress distribution diagram and its value for the beam.

Rasuk keratan I yang disokong mudah dikenakan kepada beban teragih seragam seperti yang ditunjukkan dalam Rajah 3(c). Lakarkan rajah tegasan lentur berserta nilainya bagi rasuk berkenaan.

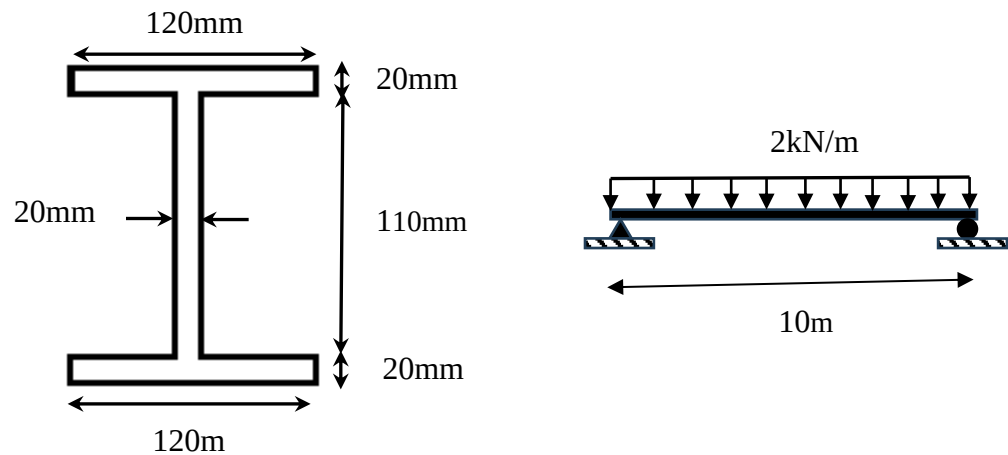


Figure 3(c) / Rajah 3(c)

[12 marks]

[12 markah]

QUESTION 4

SOALAN 4

- CLO2 (a) Part of a symmetrical I-section beam as shown in Figure 4(a) is subjected to maximum shear force of 150kN. Given second moment area (I_{xx}) is $121.15 \times 10^6 \text{ mm}^4$. Determine shear stress ($\tau_{n.a}$) at neutral axis.

Sebahagian dari rasuk simetri berkeratan I seperti yang ditunjukkan dalam Rajah 4(a) dikenakan daya ricih maksimum sebanyak 150kN. Diberi luas momen kedua (I_{xx}) $121.15 \times 10^6 \text{ mm}^4$. Tentukan tegasan ricih ($\tau_{n.a}$) pada paksi neutral.

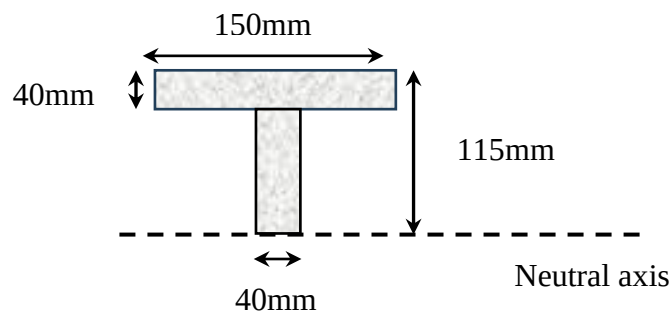


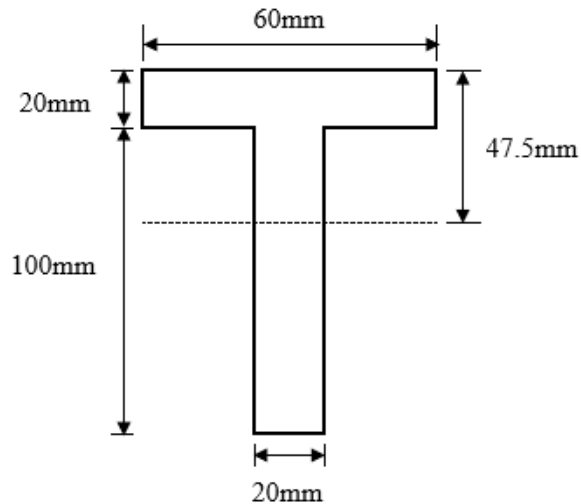
Figure 4(a) / Rajah 4(a)

[5 marks]

[5 markah]

- CLO2 (b) A T-section beam is subjected to a shear force of 80kN as shown in Figure 4(b). Given second moment area (I_{xx}) is $4.41 \times 10^6 \text{ mm}^4$. Calculate shear stress at the flange, junction of web and neutral axis.

Satu rasuk berkeratan T, dikenakan daya ricih sebanyak 80kN seperti dalam Rajah 4(b). Diberi momen luas kedua (I_{xx}) adalah $4.41 \times 10^6 \text{ mm}^4$. Kirakan tegasan ricih pada bebibir, persimpangan web dan paksi neutral.



[8 marks]

[8 markah]

- CLO2 (c) A simply supported beam is subjected to a point load and a uniformly distributed load as shown in Figure 4(c). Calculate the slope and deflection at point D by using Macaulay Method in term of EI . Given reaction at support A, $A_y = 77\text{kN}$ and reaction at support E, $E_y = 33\text{kN}$.

Satu rasuk tupang mudah dikenakan satu beban tumpu dan satu beban teragih seragam seperti dalam Rajah 4(c). Kirakan kecerunan dan pesongan rasuk pada titik D dengan menggunakan kaedah Macaulay dalam sebutan EI . Diberi tindakbalas pada penyokong A, $A_y = 77\text{kN}$ dan tindakbalas di penyokong E, $E_y = 33\text{kN}$.

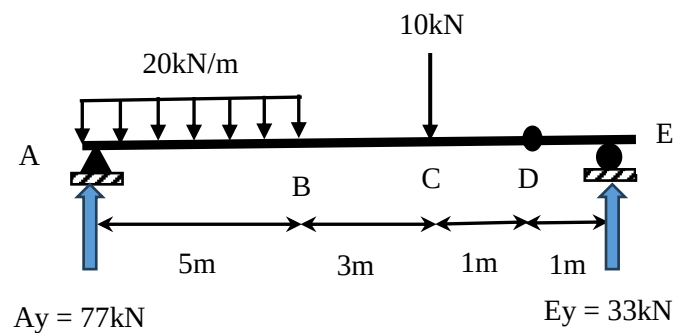


Figure 4(c) / Rajah 4(c)

[12 marks]

[12 markah]

SOALAN TAMAT

LIST OF FORMULA FOR DCC30373 STRUCTURAL MECHANICS

1.	$\sigma = \frac{P}{A}$	6.	$I_{yy} = \frac{hb^3}{12} + Ad^2$
2.	$\epsilon = \frac{\delta l}{l}$	7.	$\sigma = \frac{M}{I} \times y$
3.	$E = \frac{\sigma}{\epsilon}$	8.	$\tau = \frac{V}{A}$
4.	$E = \frac{PL}{A\delta l}$	9.	$\tau = \frac{V}{2nA}$
5.	$I_{xx} = \frac{bh^3}{12} + Ad^2$	10.	$\tau = \frac{VA\bar{y}}{I_x b}$

Table 1: MAXIMUM BENDING MOMENT FORMULA

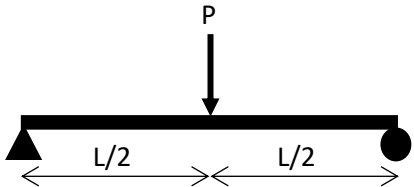
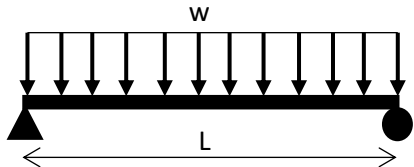
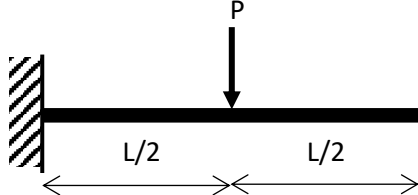
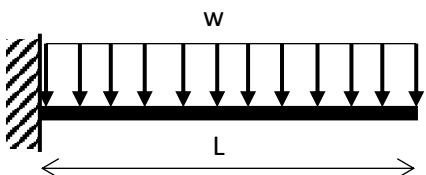
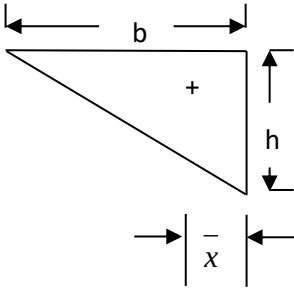
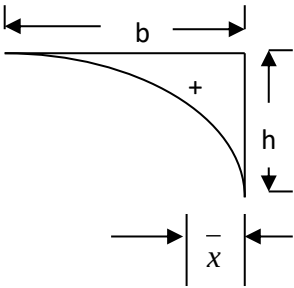
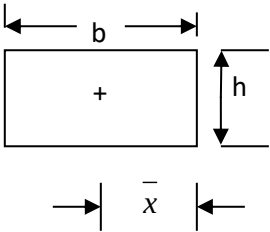
Beam with Specific Load	Maximum Moment
	$\frac{PL}{4}$
	$\frac{wL^2}{8}$
	$\frac{PL}{2}$
	$\frac{wL^2}{2}$

Table 2: GEOMETRIC PROPERTIES OF AREA

Shape	Triangle	Parabola	Rectangle
	 A right-angled triangle with a horizontal base of length b and a vertical height of length h. The area is marked with a '+' sign. The centroid is located at a distance $\bar{x}$ from the right vertical edge, indicated by a horizontal line with arrows at both ends.	 A parabolic area with a horizontal base of length b and a vertical height of length h. The area is marked with a '+' sign. The centroid is located at a distance $\bar{x}$ from the right vertical edge, indicated by a horizontal line with arrows at both ends.	 A rectangle with a horizontal base of length b and a vertical height of length h. The area is marked with a '+' sign. The centroid is located at a distance $\bar{x}$ from the right vertical edge, indicated by a horizontal line with arrows at both ends.
Area, A	$\frac{1}{2}bh$	$\frac{1}{3}bh$	bh
Centroid, $\bar{x}$	$\frac{1}{3}b$	$\frac{1}{4}b$	$\frac{1}{2}b$