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

DCW20322: WOOD MECHANIC STRUCTURE 1

TARIKH : 26 NOVEMBER 2025
MASA : 8.30 AM – 10.30 AM (2 JAM)

Kertas soalan ini mengandungi **SEMBILAN (9)** halaman bercetak.
Bahagian A: Struktur (4 soalan)
Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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

CLO1 (a) Describe the plasticity property with the aid of a diagram.
Terangkan sifat keplastikan dengan bantuan gambar rajah.

[5 marks]
[*5 markah*]

CLO1 (b) A bar with a length of 200 mm and a square cross-section with a side length of 30 mm is subjected to an axial tension of 12 kN. Given that the Modulus of Elasticity (E) is 2 x 10^4 N/mm^2, determine:
Sebuah bar sepanjang 200 mm dan keratan rentas segi empat sama dengan panjang sisi 30 mm dikenakan tegangan paksi 12 kN. Diberikan Modulus Keanjalan (E) ialah 2 x 10^4 N/mm^2, tentukan:

i) the tension stress in the bar.
tegasan tegangan dalam bar.

[5 marks]
[5 *markah*]

ii) the elongation of the bar when a load is applied.
pemanjangan bar apabila beban dikenakan.

[5 marks]
[*5 markah*]

CLO1

(c) A bar is subjected to a 20 kN tensile force at both ends. The cross-section of the bar, which includes a hollow section in the middle, is shown in Figure 1(c), given that the diameter of the hollow section is 10 mm. Calculate the tensile stress in the bar.

Sebatang bar dikenakan daya tegangan 20 kN pada kedua-dua hujung.Keratan rentas bar yang mempunyai bahagian tengah yang berongga ditunjukkan pada Rajah 1(c), diberikan diameter rongga ialah 10 mm. Kirakan tegasan tegangan dalam bar tersebut.

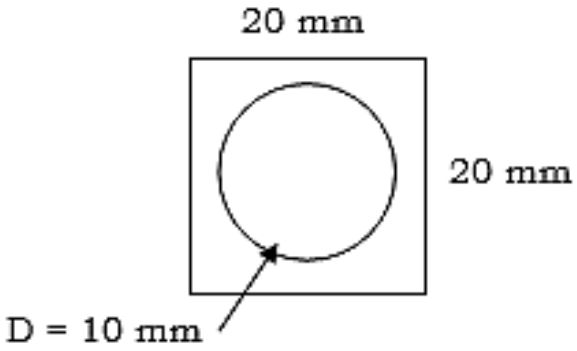

Figure 1(c)

Rajah 1 (c)

[10 marks]

[*10 markah*]

QUESTION 2

SOALAN 2

CLO1 (a) A normal stress-strain relationship is represented in the form of a stress-strain graph. Determine the proportional limit, elastic limit, and rupture strength from the stress versus strain graph sketching.

Hubungan tegasan-terikan normal dipersembahkan dalam bentuk graf tegasan-terikan. Tentukan had kekadaran, had elastik dan tegasan pecah di dalam lakaran graf tegasan melawan terikan.

[5 marks]

[*5 markah*]

CLO1 (b) In Figure 2(b), two steel plates are connected using a rivet with a diameter of 20 mm. If the tension force subjected was 32 kN, calculate:

Dalam Rajah 2(b) dua plat keluli disambungkan menggunakan rivet berdiameter 20 mm. Jika daya tegangan yang dikenakan ialah 32 kN, kirakan:

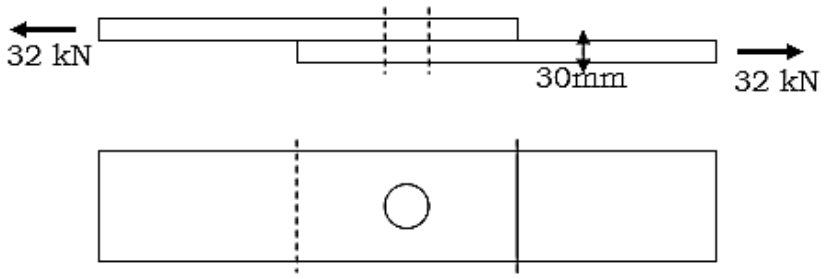

Figure 2(b)

Rajah 2(b)

i) the shear stress in rivet.

tegasan ricih dalam rivet.

[6 marks]

[*6 markah*]

ii) the shear stress in rivets, if another one steel plate is added to the connection, causing the rivets to be subjected to double shear stress.
tegasan ricih dalam rivet, sekiranya satu lagi plat keluli ditambahkan pada sambungan tersebut yang menyebabkan rivet mengalami tegasan ricih berganda.

[4 marks]
[*4 markah*]

CLO1

(c) A bar, as shown in Figure 2(c), is pulled with a force of 50 kN. Calculate:
Sebatang bar, seperti yang ditunjukan pada Rajah 2(c), ditarik dengan daya 50 kN. Kirakan:

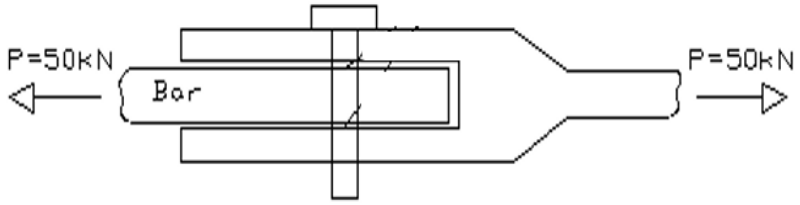

Figure 2(c)
Rajah 2(c)

i) the shear stress in the bolt if the diameter of the bolt is 19 mm.
tegasan ricih bol sekiranya diameter bol ialah 19 mm.

[4 marks]
[*4 markah*]

ii) the percentage increase in shear stress if the diameter of the bolt is reduced to 16 mm.
peratus pertambahan tegasan ricih bol sekiranya diameter bol dikurangkan kepada 16 mm.

[6 marks]
[*6 markah*]

QUESTION 3

SOALAN 3

CLO2 (a) There are various ways in which beams are loaded. Explain a uniformly distributed load with the aid of a diagram.

Terdapat pelbagai cara rasuk dibebankan. Jelaskan tentang beban teragih seragam dengan bantuan gambar rajah.

[5 marks]

[*5 markah*]

CLO2 (b) Figure 3(b) shows a 9 m long simply supported beam that is subjected to two point loads. Calculate the reaction force at support A and B.

Rajah 3(b) menunjukan rasuk disokong mudah yang mempunyai panjang 9 m dikenakan dua beban tumpu. Kirakan daya tindak balas bagi penyokong A dan B.

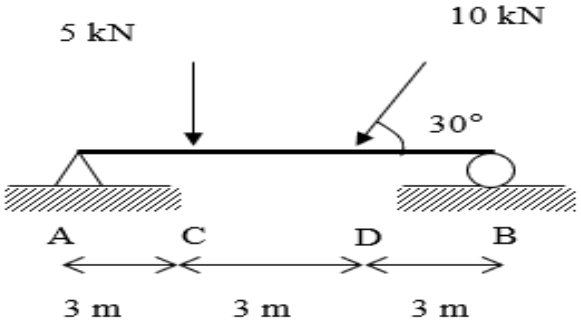

Figure 3(b)

Rajah 3(b)

[10 marks]

[*10 markah*]

CLO2 (c) Figure 3(c) shows an overhang beam subjected to a moment and a uniformly distributed load. Calculate the reaction at support A and D.

Rajah 3(c) menunjukkan rasuk hujung tergantung dikenakan momen dan beban teragih seragam. Kira daya tindakbalas bagi penyokong A dan D.

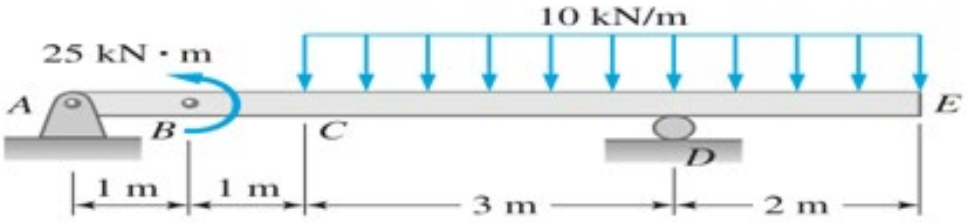

Figure 3(c)

Rajah 3(c)

[10 marks]

[*10 markah*]

QUESTION 4

SOALAN 4

CLO2 (a) Illustrate the roller and pinned supporters and the directions of the support reactions for each supporter.

Lukiskan penyokong rola dan penyokong pin serta arah-arah tindak balas bagi setiap penyokong.

[5 marks]

[*5 markah*]

CLO2 (b) An overhang beam 7.5 m in length is subjected to loads as shown in Figure 4(b). Given the reaction R_B = 46 kN and R_D = 14 kN, sketch the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) of the beam.

Sebuah rasuk hujung tergantung dengan panjang 7.5 m dikenakan beban seperti dalam Rajah 4(b). Diberikan tindak balas R_B = 46 kN dan R_D = 14 kN, lakarkan Gambar rajah Daya Ricih (GDR) dan Gambar rajah Momen Lentur (GML) rasuk tersebut.

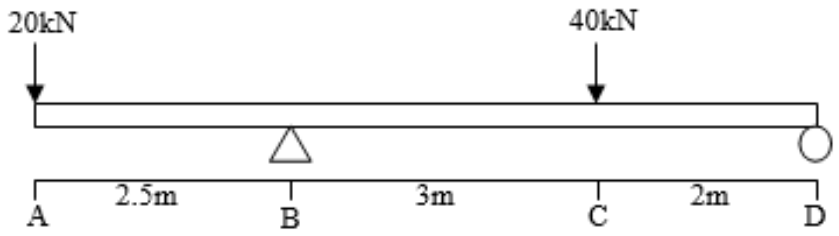

Figure 4(b)

Rajah 4(b)

[10 marks]

[*10 markah*]

CLO2

(c) A simply supported beam 8 m in length was subjected to loads as shown in Figure 4(c). If the vertical reactions at support A and E are 9 kN and 6 kN, respectively, illustrate the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) of the beam.

Satu rasuk disokong mudah dengan panjang 8 m dikenakan beban seperti dalam Rajah 4(c). Sekiranya tindak balas menegak pada penyokong A dan E ialah masing-masing 9 kN dan 6 kN, lukiskan Gambar rajah Daya Ricih (GDR) dan Gambar rajah Momen Lentur (GML) rasuk tersebut.

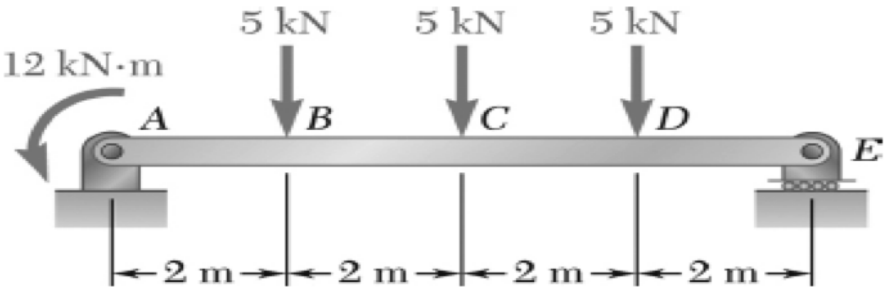

Figure 4(c)
Rajah 4(c)

[10 marks]
[*10 markah*]

SOALAN TAMAT

FORMULA DCW20322

(WOOD MECHANIC STRUCTURE 1)

NO.	FORMULA NAME	FORMULA 1	FORMULA 2
1.	DIRECT STRESS	$\sigma = \frac{P}{A}$	
2.	DIRECT STRAIN	$\varepsilon = \frac{\delta L}{L}$	
3.	MODULUS YOUNG	$E = \frac{\sigma}{\varepsilon}$	$E = \frac{PL}{A\delta L}$
4.	LENGTH CHANGE	$\delta L = \frac{PL}{AE}$	
5.	TOTAL OF LENGTH CHANGE	$\Sigma \delta L = \delta L_1 + \delta L_2$	
6.	SLOPE - LOAD VS ELONGATION GRAPH	$m = \frac{y_2 - y_1}{x_2 - x_1}$	
7.	MODULUS YOUNG - LOAD VS ELONGATION GRAPH	$E = mx\frac{L}{A}$	
8.	MODULUS YOUNG - STRESS VS STRAIN GRAPH	$E = \frac{\sigma}{\varepsilon}$	
9.	SHEAR STRESS	$\tau = \frac{V}{A}$	
10.	SHEAR STRAIN	$\gamma = \frac{\tau}{G}$	
11.	MODULUS OF RIGIDITY	$G = \frac{\tau}{\gamma}$	
12.	EQUILIBRIUM EQUATION	$\sum M \circlearrowright^{+\text{ve}} = 0$ $\sum F_y \uparrow^{+ve} = 0$ $\sum F_x \rightarrow^{+ve} = 0$	