

SULIT



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

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI I : 2022/2023

DCW20062: WOOD MECHANIC STRUCTURE 1

TARIKH : 14 DISEMBER 2022

MASA : 8.30 AM – 10.30 AM (2 JAM)

Kertas ini mengandungi **TIGA BELAS (13)** halaman bercetak.

Bahagian A: Struktur (2 soalan)

Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : Tiada

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 struktur. Jawab SEMUA soalan.

QUESTION 1***SOALAN 1***CLO1
C2

- (a) In material properties there are several types of criteria such as elastic, plastic, flexible and brittleness. Differentiate between elastic and plastic.

Di dalam sifat-sifat bahan terdapat beberapa jenis kriteria seperti elastic, plastic, fleksibel dan rapuh. Bezakan antara elastik dan plastik.

[5 marks]

[5 markah]

CLO1
C3

- (b) A rod is 2.5 m long and 1290 mm² wide cross-section with 1.5 mm elongation is subjected to tensile force of 142 kN. Calculate:

Satu rod 2.5 m panjang dan keratan rentas 1290 mm² dengan pemanjangan 1.5 mm dikenakan daya tegangan 142 kN. Kirakan:

- (i) The stress / *Tegasan*
- (ii) Strain/ *Terikan*
- (iii) Young's Modulus / *Modulus Young*
- (iv) The safety factor if the ultimate stress is 432 Mpa
Faktor keselamatan jika tegangan maksima 432 Mpa.

[10 marks]

[10 markah]

CLO1
C3

- (c) A bar copper as in Diagram A1(c) is subjected to a 30 kN load. AB and BC parts have a cross-sectional area of 900 cm^2 and 400 cm^2 . Calculate elongation in each bar. ($E_{\text{copper}} = 110 \text{ GPa}$). Give the answers in unit N and m.

Sebuah tembaga bar di dalam Rajah A1(c) mempunyai dikenakan daya 30 kN. Bahagian AB dan BC mempunyai luas keratan rentas 900 cm^2 dan 400 cm^2 . Kirakan pemanjangan dalam setiap bar. ($E_{\text{tembaga}} = 110 \text{ GPa}$). Berikan jawapan dalam unit N dan m.

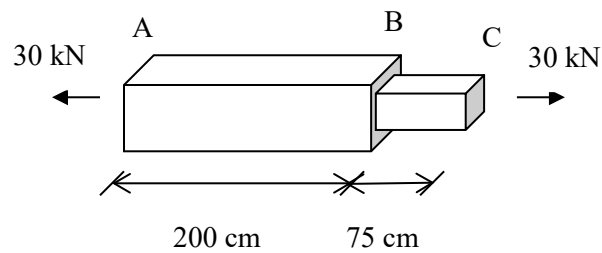


Diagram A1(c) / Rajah A1(c)

[10 marks]

[10 markah]

QUESTION 2

SOALAN 2

CLO2
C3

- (a) Illustrate wood joint connected with a screw that is subjected to a single shear stress.

Lakarkan sambungan kayu yang dihubungkan oleh skru yang mengalami tegasan ricih tunggal.

[5 marks]

[5 markah]

CLO2
C4

- (b) A simply supported beam is given as shown in Figure A2(b). Referring to the figure, calculate the reaction force at the support A and C of the beam.

Rasuk disokong mudah diberikan seperti pada Rajah A2(b). Merujuk kepada rajah tersebut, kirakan daya tindak balas bagi penyokong A dan C.

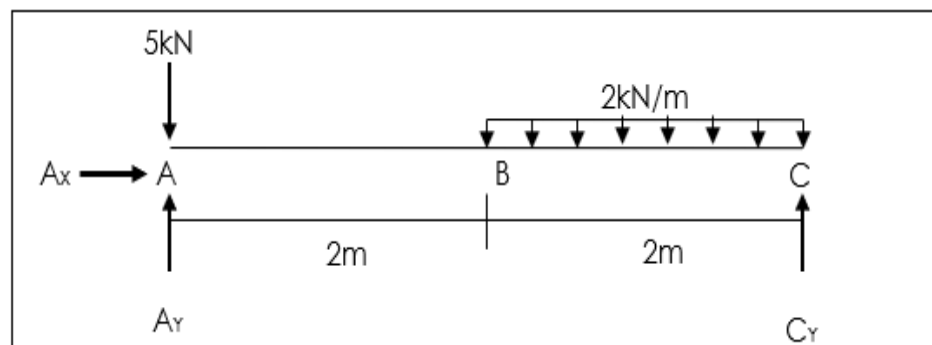


Figure A2(b) / Rajah A2(b)

[10 marks]

[10 markah]

CLO2
C3

- (c) An 8 m long simply supported beam was subjected to a load as shown in Figure A2(c). If the vertical reaction 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.

Sebuah rasuk sokong mudah dengan panjang 8 m menanggung beban seperti dalam Rajah A2(c). Sekiranya tindak balas menegak pada penyokong A dan E ialah masing-masing 9 kN dan 6 kN, lukiskan gambar rajah daya ricih dan gambar rajah momen lentur rasuk tersebut.

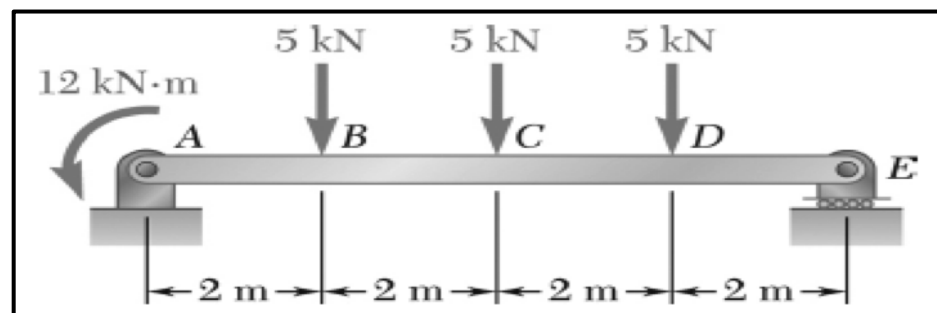


Figure A2(c) / Rajah A2(c)

[10 marks]

[10 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***CLO2
C3

- (a) A normal stress and strain relationship is represented in form of a stress versus strain graph. Determine the proportional limit, elastic limit and yield point in the stress versus strain graph.

Hubungan tegasan dan terikan normal diwakili dalam bentuk graf tegasan melawan terikan. Tentukan had kekadaran, had elastik dan takat alah di dalam graf tegasan melawan terikan.

[5 marks]

[5 markah]

CLO2
C4

- (b) A timber with 25 mm x 50 mm rectangular cross section and a length of 10 m was subjected to a tensile force of 150 kN. The tensile force causes 150 mm elongation to the timber. Calculate the tensile stress, strain and modulus of elasticity (MOE) of the timber.

Sebatang kayu balak dengan keratan rentas segi empat tepat berukuran 25 mm x 50 mm dan panjang 10 m dikenakan daya tegangan 150 kN. Daya tegangan menyebabkan 150 mm pemanjangan ke atas kayu balak tersebut. Kirakan tegasan, tegangan dan modulus keanjalan kayu balak itu.

[10 marks]

[10 markah]

CLO2
C3

- (c) Two components of wood are connected with two bolts with 15 mm diameter each. The wood is then subjected to tensile force of 30 kN. Determine the shear stress in the bolt. Give answer in N/mm^2 .

Dua komponen kayu disambungkan menggunakan dua bol berdiameter 15 mm setiapnya. Kayu tersebut dikenakan 30 kN beban tegangan. Tentukan tegasan ricih bol tersebut. Berikan jawapan dalam unit N/mm^2 .

[10 marks]

[10 markah]

QUESTION 2

SOALAN 2

CLO2
C3

- (a) Beams generally carry vertical gravitational forces but can also be used to carry horizontal loads. Interpret between statically determinate and statically indeterminate beams.

Rasuk biasanya membawa daya graviti menegak tetapi juga boleh digunakan untuk membawa beban mendatar. Tafsirkan antara rasuk boleh tentu statik dan rasuk tidak boleh tentu statik.

[5 marks]

[5 markah]

CLO2
C4

- (b) Diagram B2(b) below shows a simply supported beam. Calculate the reaction force at the support.

Rajah B2(b) di bawah menunjukkan rasuk tupang mudah. Kirakan daya tindakbalas di penyokong.

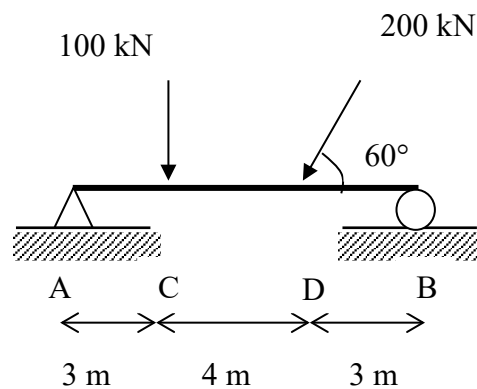


Diagram B2(b) / Rajah B2(b)

[10 marks]

[10 markah]

CLO2
C3

- (c) A 3 m long steel rod is subjected with a 20 kN load. If elongation may not exceed 0.2 mm, calculate;
- (i) Cross sectional area minimum rod
 - (ii) Tensile stress rod
 - (iii) Strain

Given $E = 206 \text{ kN} / \text{m}^2$

Satu rod keluli 3 m Panjang dikenakan beban 20 kN. Jika perubahan panjang tidak melebihi 0.2 mm, kirakan:

- (i) Keratan rentas minimum rod*
- (ii) Tegasan tegangan rod*
- (iii) Keterikan*

Diberi $E = 206 \text{ kN} / \text{m}^2$

[10 marks]

[10 markah]

QUESTION 3

SOALAN 3

CLO2
C3

- (a) Sketch the shear force diagram (SFD) and the bending moment diagram (BDM) of a simply supported beam as shown in Figure B3(a) and label the maximum bending moment.

Lakarkan gambar rajah daya ricih dan gambar rajah momen lentur bagi rasuk sokong mudah seperti yang ditunjukkan pada Rajah B3(a) dan labelkan momen lentur maksimum.

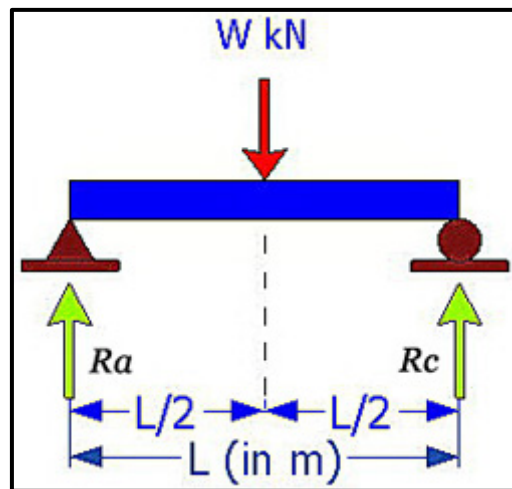


Figure B3(a) / Rajah B3(a)

[5 marks]

[5 markah]

CLO2
C4

- (b) A 5 m long cantilever beam was subjected to a load as shown in Figure B3(b). If the moment reaction (M_A) of the support is 140 kNm and the vertical reaction (A_Y) is 90 kN, calculate the Shear Force and Bending Moment for point A, B and C by using Section Method.

Sebuah rasuk julur dengan panjang 5m menanggung pembebanan seperti dalam Rajah B3(b). Sekiranya daya tindak balas momen (M_A) penyokong ialah 140kNm

dan daya tindak balas menegak (A_y) ialah 90 kN, kirakan daya ricih dan momen lentur bagi titik A, B dan C menggunakan Kaedah Keratan.

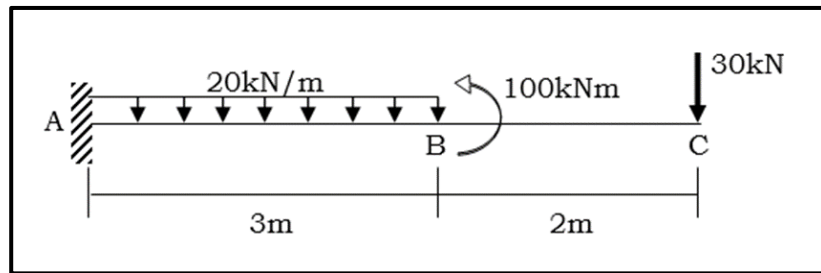


Figure B3(b) / Rajah B3(b)

[10 marks]

[10 markah]

CLO2
C3

- (c) Based on the butt joint shown in Figure B3(c), determine the diameter of the bolt, if the average shear stress in the bolts is 110.52 N/mm^2 . Write answer in integer.

Berdasarkan penyambungan temu seperti yang ditunjukkan pada Rajah B3(c), tentukan diameter bol, sekiranya tegasan ricih pada bol-bol ialah 110.52 N/mm^2 . Tulis jawapan dalam bentuk nombor bulat.

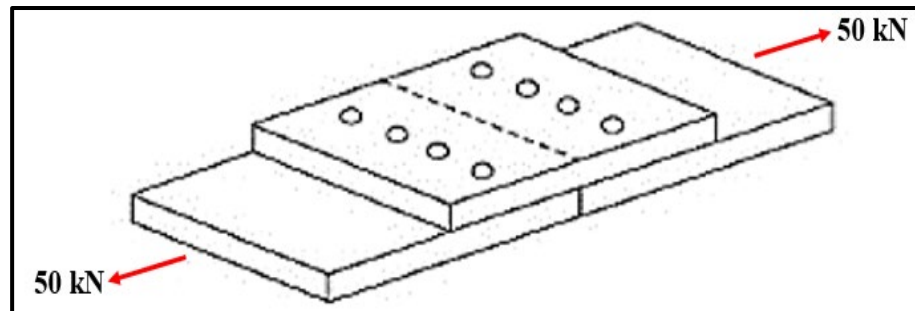


Figure B3(c) / Rajah B3(c)

[10 marks]

[10 markah]

QUESTION 4

SOALAN 4

CLO2
C3

- (a) All types of beams support have slightly different support properties and are used in different types of designs. Explain **THREE (3)** types of reaction force for each support with diagram.

Semua jenis sokongan rasuk mempunyai sifat sokongan yang sedikit berbeza dan digunakan dalam pelbagai jenis rekabentuk. Terangkan (TIGA) 3 jenis daya tindakbalas untuk setiap penyokong beserta gambar.

[5 marks]

[5 markah]

CLO2
C4

- (b) Diagram B4(b) below shows a simply supported beam subjected with moment and Uniformly Distributed Load (UDL). Calculate reaction force at the each support .

Rajah B4(b) di bawah menunjukkan rasuk tupang mudah dikenakan momen dan Beban Teragih Seragam (BTS). Kirakan daya tindakbalas pada setiap penyokong.

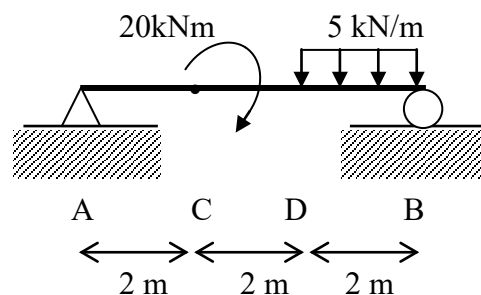


Diagram B4(b) / Rajah B4(b)

[10 marks]

[10 markah]

CLO2
C3

- (c) Sketch the shear force and bending moment diagram for the beam in Diagram B4(c) below.

Lakar gambarajah daya ricih dan gambar rajah momen lentur bagi rasuk di dalam Rajah B4(c) di bawah.

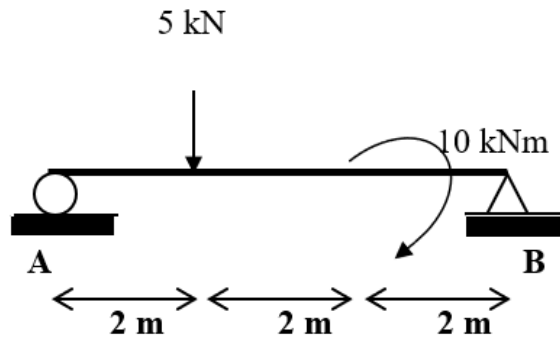


Diagram B4(c) / Rajah B4(c)

[10 marks]

[10 markah]

SOALAN TAMAT