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 : 2023/2024**

# DCW20062 : WOOD MECHANIC STRUCTURE 1

**TARIKH : 4 JANUARI 2024**
**MASA : 8.30 AM – 10.30 AM (2 JAM)**

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Kertas ini mengandungi **TIGA BELAS (13)** 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)

**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 (a) There are certain types of forces, forces that will change the total mechanical energy of the object and forces that can never change the total mechanical energy of an object. The two categories of forces are referred as internal forces and external forces. Identify **TWO (2)** types of external force.

*Terdapat jenis daya tertentu, iaitu daya yang akan mengubah jumlah tenaga mekanikal objek dan daya yang tidak boleh mengubah jumlah tenaga mekanikal objek. Dua kategori daya tersebut dirujuk sebagai daya dalaman dan daya luaran. Kenalpasti **DUA (2)** jenis daya luaran.*

[5 marks]

[*5 markah*]

CLO1 (b) A wood rod has two different parts of cross section subjected with compression load 25 N as shown in Figure A1(b). Calculate the stress for each part.

*Satu rod kayu mempunyai dua bahagian keratan rentas dikenakan beban mampatan 25 N seperti di dalam Rajah A1(b). Kirakan tegasan pada setiap bahagian.*

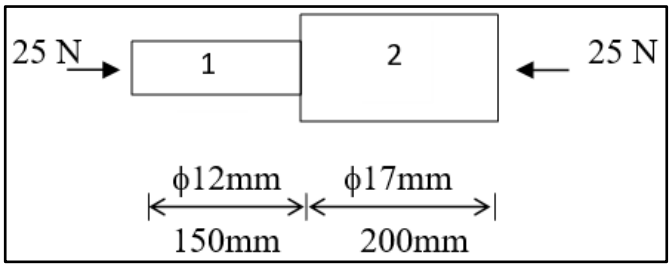


Figure A1(b)

*Rajah A1(b)*

[10 marks]

[10 *markah*]

CLO1

(c) A pair of wood as shown in Figure A1(c) was connected with 3 bolts diameter 20 mm each. The wood is then subjected to tensile force of 75 kN. Calculate the shear stress in the bolt.

*Sepasang kayu seperti pada Rajah A1(c) disambungkan menggunakan 3 bolt berdiameter 20 mm. Kayu ini kemudian dikenakan daya tegangan sebanyak 75 kN. Kira tegasan ricih dalam bolt.*

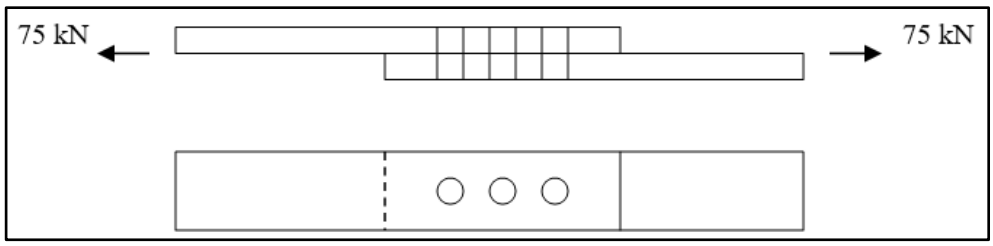


Figure A1(c)

*Rajah A1(c)*

[10 marks]

[*10 markah*]

**QUESTION 2**

***SOALAN 2***

CLO2 (a) Illustrate a cantilever beam and the directions of the support reaction of the cantilever beam when it is subjected to a load.
*Lukis rasuk julur dan arah-arah tindak balas penyokong rasuk julur tersebut apabila ia dikenakan beban.*

[5 marks]
[*5 markah*]

CLO2 (b) Figure A2(b) shows a simply supported beam subjected with point load and uniformly distributed load. Calculate the reaction at the supports.
*Rajah A2(b) menunjukkan rasuk disokong mudah dikenakan beban tumpu dan beban teragih seragam. Kira daya tindakbalas di penyokong.*

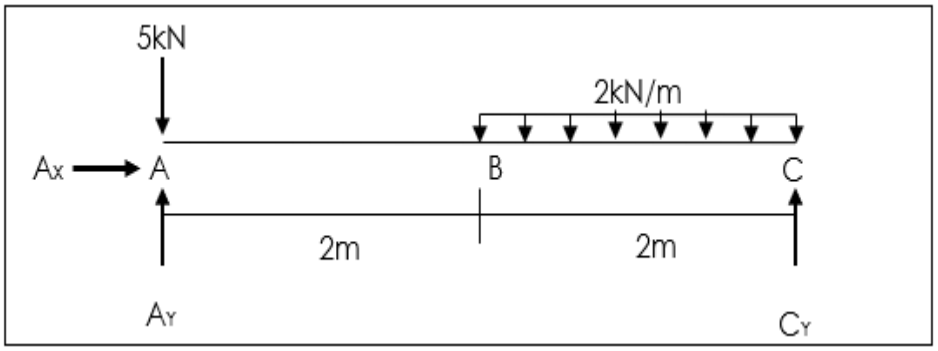


Figure A2(b)
*Rajah A2(b)*

[10 marks]
[*10 markah*]

CLO2

(c) Figure A2(c) shows simply supported beam with uniformly distributed load. The vertical reaction for support A and support B are both 100 kN. Sketch the shear force and bending moment diagrams for the beam below.

*Rajah A2(c) menunjukkan rasuk disokong mudah dengan beban teragih seragam. Tindak balas menegak bagi penyokong A dan penyokong B kedua-duanya ialah 100 kN. Lakar gambarajah daya ricih dan gambarajah momen lentur bagi rasuk di bawah.*

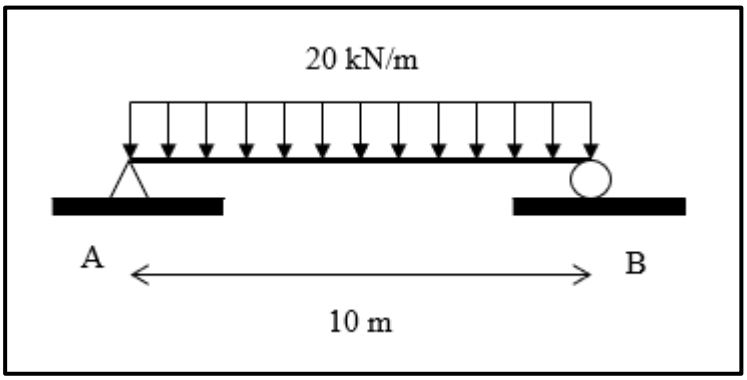


Figure A2(c)

*Rajah A2(c)*

[10 marks]

[*10 markah*]

**SECTION B: 50 MARKS**

***BAHAGIAN B :50 MARKAH***

**INSTRUCTION:**

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

***ARAHAN:***

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

**QUESTION 1**

***SOALAN 1***

CLO2

(a) A steel bar 4 m long as shown in Figure B1(a) being imposed with tension force 5 N. Calculate elongation bar if E = 2.0 x 106 N/cm$^2$.

*Sebatang bar keluli 4 m panjang seperti ditunjukkan pada Rajah B1(a) dikenakan daya tegangan 5 N. Kira pemanjangan bar sekiranya E = 2.0 x 106 N/cm$^2$.*

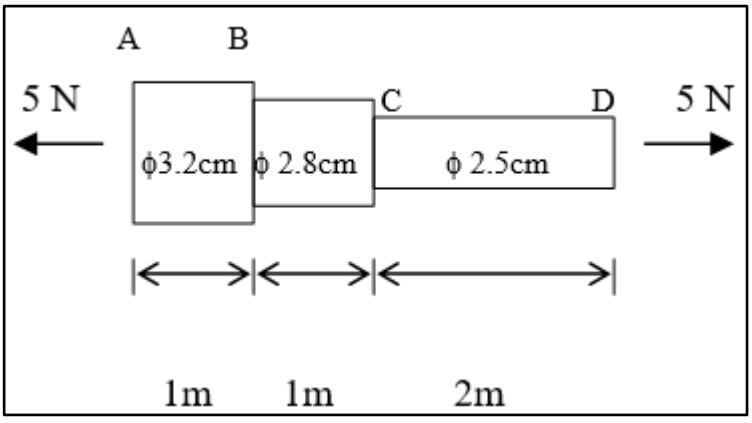


Figure B1(a)

*Rajah B1(a)*

[5 marks]

[*5 markah*]

CLO2 (b) A material with round cross section 20 mm in diameter is subjected to a tension force of 100 kN. Calculate tension stress sustained by the material.
*Satu bahan dengan luas bulatan berdiameter 20 mm dikenakan daya tegangan 100 kN. Kira tegasan tegangan yang ditanggung oleh bahan.*

[10 marks]
[*10 markah*]

CLO2 (c) A steel rod has a length of 5 m carrying 25 kN force. If the shortening of rod does not exceed 0.8 mm and modulus of elasticity is 206 kN/m$^2$, determine:
*Sebatang rod keluli mempunyai panjang 5 m membawa beban 25 kN. Jika pemendekan rod yang berlaku tidak melebihi 0.8 mm dan modulus keanjalan sebanyak 206 kN/m$^2$, tentukan:*

i. Cross section area of rod
*Luas keratan rentas rod*
ii. Compression stress of rod
*Tegasan mampatan rod*
iii. Strain of rod
*Terikan rod*

[10 marks]
[*10 markah*]

**QUESTION 2**
**SOALAN 2**

CLO2 (a) Illustrate wood joint connected with a screw which is subjected to single shear stress.
*Lukiskan sambungan kayu yang dihubungkan oleh skru yang mengalami tegasan ricih tunggal.*

[5 marks]
[*5 markah*]

CLO2 (b) A bar is connected to a tool as shown in Figure B2(b). The bar pulls with a force of 50 kN, calculate:
*Sebatang bar disambungkan pada sebuah alat seperti yang ditunjukkan pada Rajah B2(b). Bar tersebut ditarik dengan daya 50 kN, kirakan:*

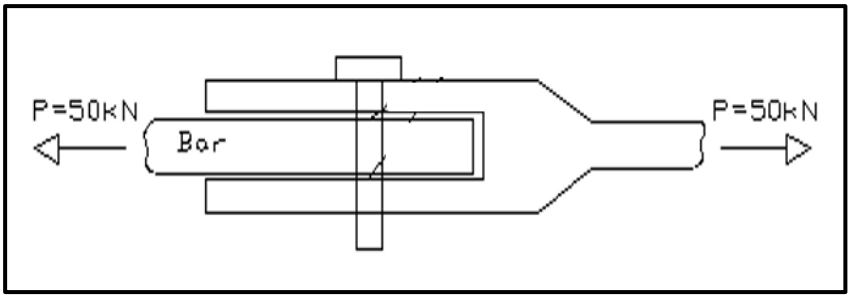


Figure B2(b)
*Rajah B2(b)*

i. the shear stress in the bolt if the bolt diameter is 19 mm.
*tegasan ricih dalam bolt sekiranya diameter bolt ialah 19 mm.*

[4 marks]
[*4 markah*]

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

[6 marks]
[*6 markah*]

CLO2

(c) Based on the butt joint as shown in Figure B2(c), determine the diameter of the bolt, if the average shear stress in the bolts is 110.52 N/mm$^2$. Give answer in integer.

*Berdasarkan penyambungan temu seperti yang ditunjukkan pada Rajah B2(c), tentukan diameter bolt, sekiranya tegasan ricih bolts ialah 110.52 N/mm$^2$. Berikan jawapan dalam bentuk nombor bulat.*

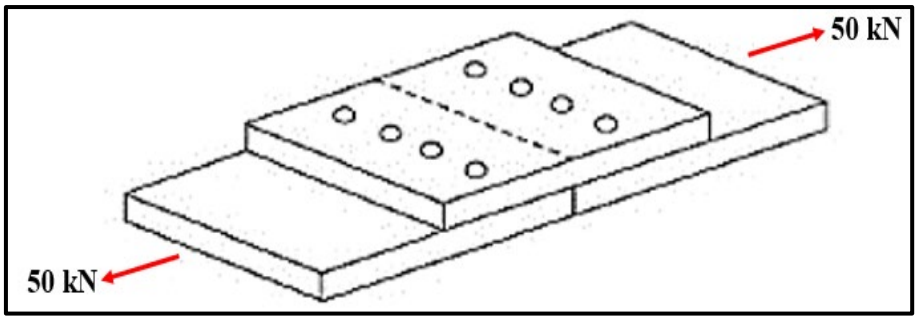


Figure B2(c)
*Rajah B2(c)*

[10 marks]
[*10 markah*]

**QUESTION 3**

***SOALAN 3***

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) Figure B3(b) shows an overhanging beam subjected with point load and uniformly distributed load. Calculate the reaction at the supports.

*Rajah* B3(b) *menunjukan rasuk tergantung dikenakan beban tumpu dan beban teragih seragam. Kira daya tindakbalas di penyokong.*

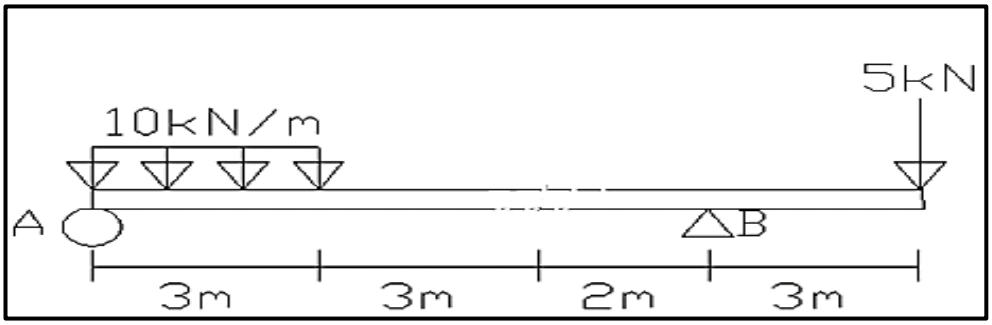


Figure B3(b)

*Rajah B3(b)*

[10 marks]

[10 *markah*]

CLO2

(c) Figure B3(c) shows a 7 m long simply supported beam that is subjected to two point loads. Calculate the reaction force at support A and D.

*Rajah B3(c) menunjukan rasuk disokong mudah yang mempunyai panjang 7 m dikenakan dua beban tumpu. Kira daya tindak balas bagi penyokong A dan D.*

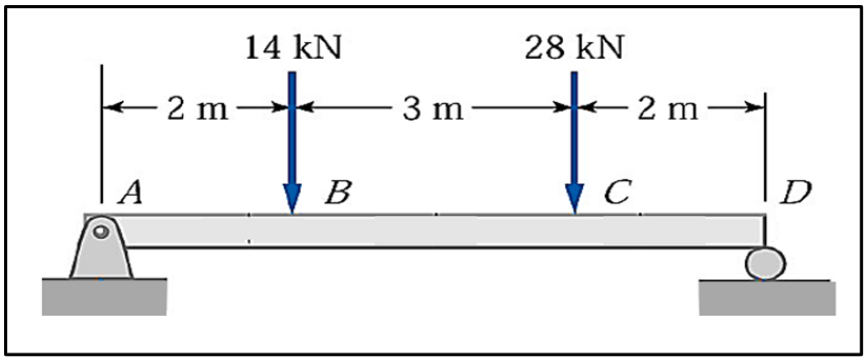


Figure B3(c)

*Rajah B3(c)*

[10 marks]

[*10 markah*]

**QUESTION 4**

**SOALAN 4**

CLO2 (a) Sketch and label the shear force diagram (SFD) and the bending moment diagram (BDM) of a simply supported beam as shown in Figure B4(a).

*Lakar dan label gambar rajah daya ricih (GDR) dan gambar rajah momen lentur (GML) bagi rasuk sokong mudah seperti yang ditunjukkan pada Rajah B4(a).*

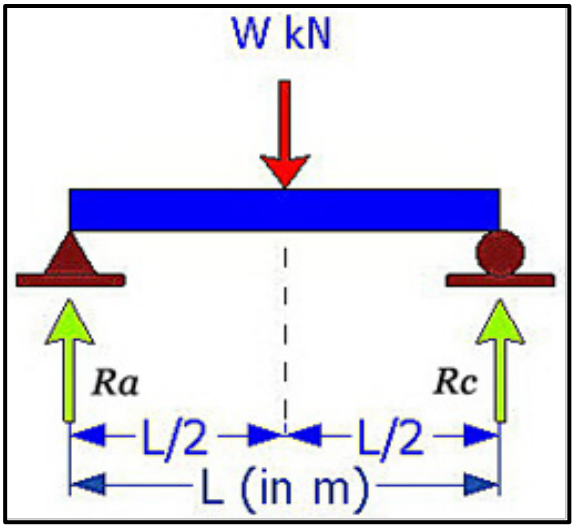


Diagram B4(a)

*Rajah B4(a)*

[5 marks]

[*5 markah*]

CLO2 (b) A simply supported beam 14 m length is subjected to a point load of 12 kN and 26 kN as shown in Figure B4(b). Illustrate the shear force diagram (SFD) and bending moment diagram (BMD) of the beam. Given the reaction A = 16 kN and reaction D = 22 kN.

*Satu rasuk disokong mudah dengan panjang 14 m dikenakan beban tumpu 12 kN dan 26 kN seperti dalam Rajah B4(b). Lukiskan gambarajah daya ricih (GDR) dan gambarajah momen lentur (GML) bagi rasuk tersebut. Diberikan tindak balas pada A = 16 kN dan tindak balas pada D = 22 kN.*

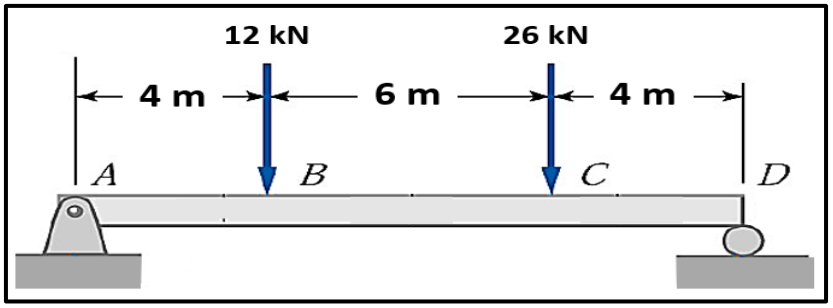


Figure B4(b)

*Rajah B4(b)*

[10 marks]

[*10 markah*]

CLO2

(c) A 5 m long cantilever beam is subjected to loading as shown in Figure B4(c). If the moment reaction ($A_M$) of the support is 140 kNm and the vertical reaction ($A_Y$) is 90 kN, determine the Shear Force and Bending Moment for point A, B and C by using Section Method.

*Sebuah rasuk julur dengan panjang 5 m menanggung pembebanan seperti dalam Rajah B4(c). Sekiranya daya tindak balas momen ($A_M$) penyokong ialah 140 kNm dan daya tindak balas menegak ($A_Y$) ialah 90 kN, tentukan daya ricih dan momen lentur bagi titik A, B dan C menggunakan Kaedah Keratan.*

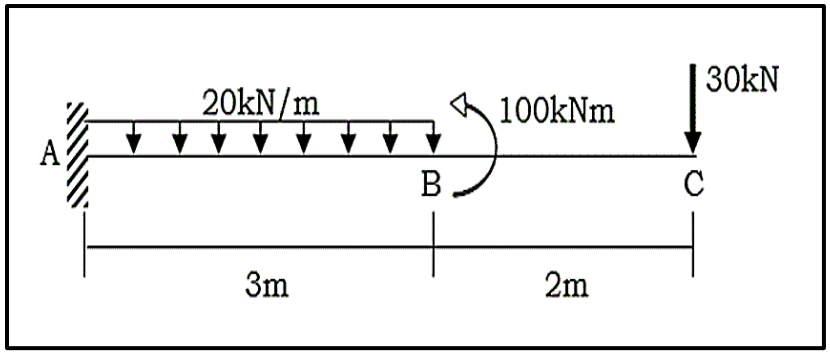


Figure B4(c)

*Rajah B4(c)*

[10 marks]

[*10 markah*]

**SOALAN TAMAT**