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 : 2024/2025

DCW20062 : WOOD MECHANIC STRUCTURE 1

TARIKH : 25 NOVEMBER 2024
MASA : 8.30 PAGI – 10.30 PAGI

Kertas ini mengandungi **EMPAT BELAS (14)** 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)

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 berstruktur. Jawab semua soalan.*

QUESTION 1

SOALAN 1

CLO1 (a) There are several types of criteria in the material properties such as elastic, plastic, flexible and brittleness. Differentiate between elastic and plastic.

Terdapat beberapa jenis ciri-ciri dalam sifat-sifat bahan seperti anjal, plastik, fleksibel dan rapuh. Bezakan antara elastik dan plastik.

[5 marks]
[*5 markah*]

CLO1 (b) A rod is 2.5 m long and 1290 mm^2 wide cross-section with 1.5 mm elongation is subjected to a tensile force of 142 kN. Calculate:

Sebuah rod 2.5 m panjang dan keratan rentas 1290 mm^2 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 tegasan maksima 432 Mpa

[10 marks]
[*10 markah*]

CLO1

(c) The lap joint as shown in Figure A1(c) is connected by four 20 mm diameter rivets. Calculate the shear stress in the rivets. Assume that the load P = 120 kN is carried equally by the four rivets.

Satu sambungan tindih seperti dalam Rajah A1(c) disambungkan menggunakan empat rivet berdiameter 20 mm. Kirakan tegasan ricih pada rivet. Anggapkan bahawa beban P = 120 kN diagih sama rata untuk empat rivet tersebut.

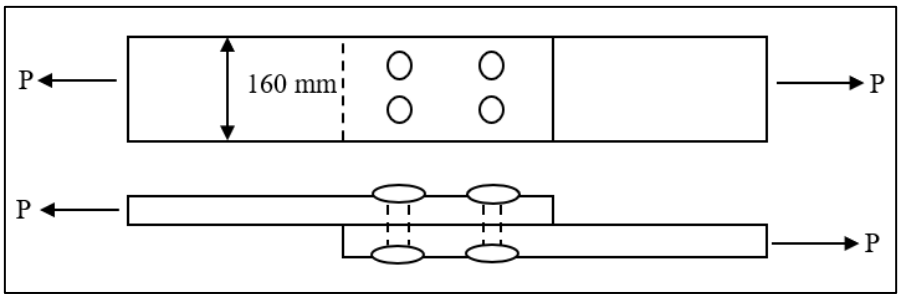


Figure A1(c)

Rajah A1(c)

[10 marks]
[*10 markah*]

QUESTION 2

SOALAN 2

CLO2 (a) Figure A2(a) shows a 24 m simply supported beam subjected to a uniform distributed load of 200 N/m and point load of 2 kN along its span. Sketch the free body diagram for the beam.

Rajah A2(a) menunjukkan rasuk sokong mudah 24 m panjang dikenakan beban teragih seragam 200 N/m dan beban tumpu 2 kN disepanjang rasuk. Lakarkan gambarajah jasad bebas bagi rasuk.

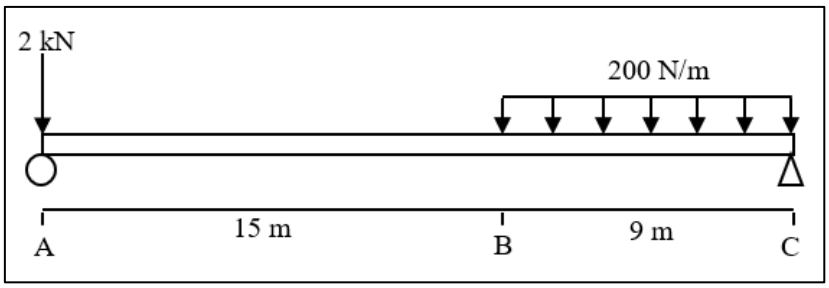


Figure A2(a)

Rajah A2(a)

[5 marks]
[*5 markah*]

CLO2 (b) Figure A2(b) shows a cantilever beam. Calculate the reaction force at the Support C.

Rajah A2(b) menunjukkan rasuk julur. Kirakan daya tindakbalas pada penyokong C.

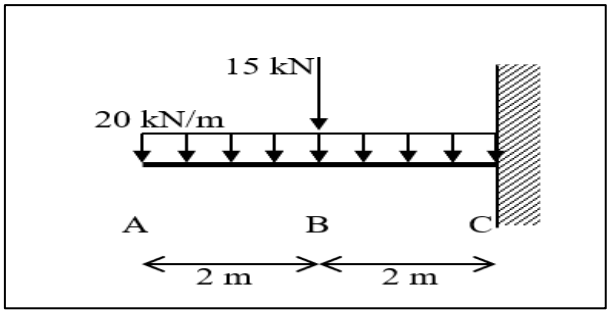


Figure A2(b)

Rajah A2(b)

[10 marks]
[*10 markah*]

CLO2

(c) The cantilever beam is subjected to a uniformly distributed load and a moment as shown in Figure A2(c). Illustrate the shear force and bending moment diagrams for the beam below.

Rasuk julur dikenakan beban teragih seragam dan momen seperti dalam Rajah A2(c). Lukis gambarajah daya ricih dan gambarajah momen lentur bagi rasuk di bawah.

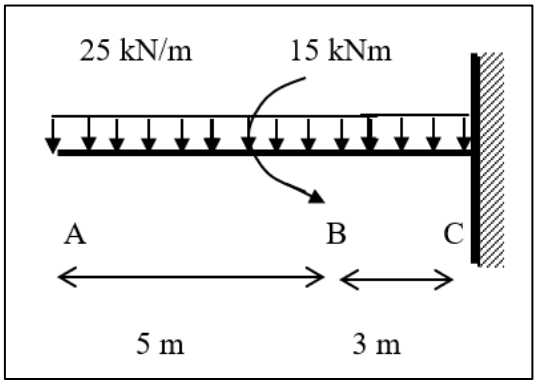


Figure A2(c)

Rajah A2(c)

[10 marks]

[*10 markah*]

SECTION B : 50 MARKS

BAHAGIAN B : 50 MARKAH

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1

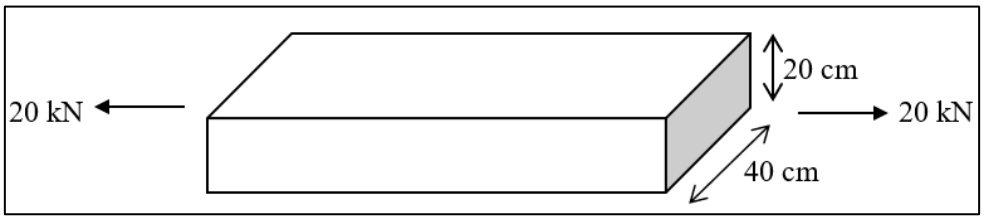
SOALAN 1

CLO2

(a) Figure B1(a) shows a bar with a cross section of 20 cm by 40 cm subjected to a tensile force of 20 kN. Determine the stress in the bar.

Rajah B1(a) menunjukkan sebatang bar berkeratan rentas 20 cm dan 40 cm dikenakan daya tegangan 20 kN. Tentukan tegasan di dalam bar tersebut.

Figure B1(a)



Rajah B1(a)

[5 marks]
[*5 markah*]

CLO2

(b) A tension test on specimen has produced results such as Table B1(b);

Ujian tegangan pada satu spesimen menghasilkan keputusan seperti Jadual B1(b);

Gauge length = 250 mm

Panjang tolok = 250 mm

Original diameter = 25 mm

Diameter asal = 25 mm

Final Diameter = 18.6 mm

Diameter Akhir = 18.6 mm

Based on the load-elongation graph, calculate:

Berdasarkan graf beban-pemanjangan, kira:

i) Modulus Young

Modulus Young

ii) Maximum stress

Tegasan maksimum

Table B1(b)

Jadual B1(b)

Load (kN)	20	60	100	140	160	170	172	176	178
Elongation X 10^{-3} mm	50	160	260	360	410	440	470	550	720

[10 marks]

[*10 markah*]

CLO2

(c) A column is 75 mm wide and it must sustain a pull of 100 kN. Calculate the required thickness of the bar if the permissible stress is 150 N/mm^2.

Sebatang tiang 75 mm lebar dan ia perlu menanggung tarikan sebanyak 100 kN. Kira ketebalan tiang yang diperlukan jika tegasan yang dibenarkan adalah 150 N/mm^2.

[10 marks]

[*10 markah*]

QUESTION 2

SOALAN 2

CLO2 (a) In structural engineering, shear strength is important for designing the dimensions and materials used in the manufacturing or construction of component. Determine **FIVE (5)** factors influencing shear strength.

*Dalam kejuruteraan struktur, kekuatan ricih adalah penting untuk merekabentuk dimensi dan bahan yang akan digunakan untuk pembuatan atau pembinaan komponen. Tentukan **LIMA (5)** faktor yang mempengaruhi kekuatan ricih.*

[5 marks]

[*5 markah*]

CLO2 (b) A punch in Figure B2(b) with a diameter of 19 mm is used to punch a hole in a 6 mm steel plate. A force of 116 kN is required. Calculate:

Penebuk seperti di dalam Rajah B2(b) dengan diameter 19 mm digunakan untuk menebuk lubang dalam plat keluli setebal 6 mm. Satu daya 116 kN diperlukan. Kira:

i. Average shear stress in the plate

Tegasan ricih purata dalam plat

ii. Average compressive stress in the punch

Purata tegasan mampatan dalam penebuk

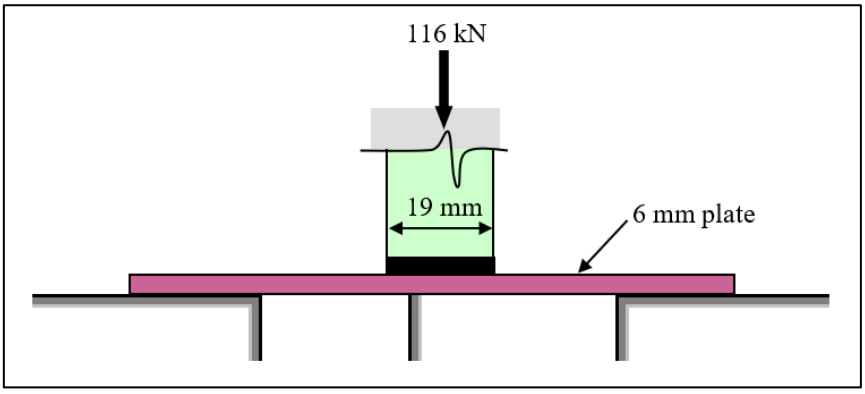


Figure B2(b)

Rajah B2(b)

[10 marks]

[*10 markah*]

CLO2

(c) Two bars of wood are connected using a bolt with a 13 mm diameter, as shown in Figure B2(c). Calculate the shear stress in the wood and the shear stress in the bolt.
Dua bar kayu disambung menggunakan bolt berdiameter 13 mm seperti Rajah B2(c). Kirakan tegasan ricih dalam kayu dan tegasan ricih dalam bolt.

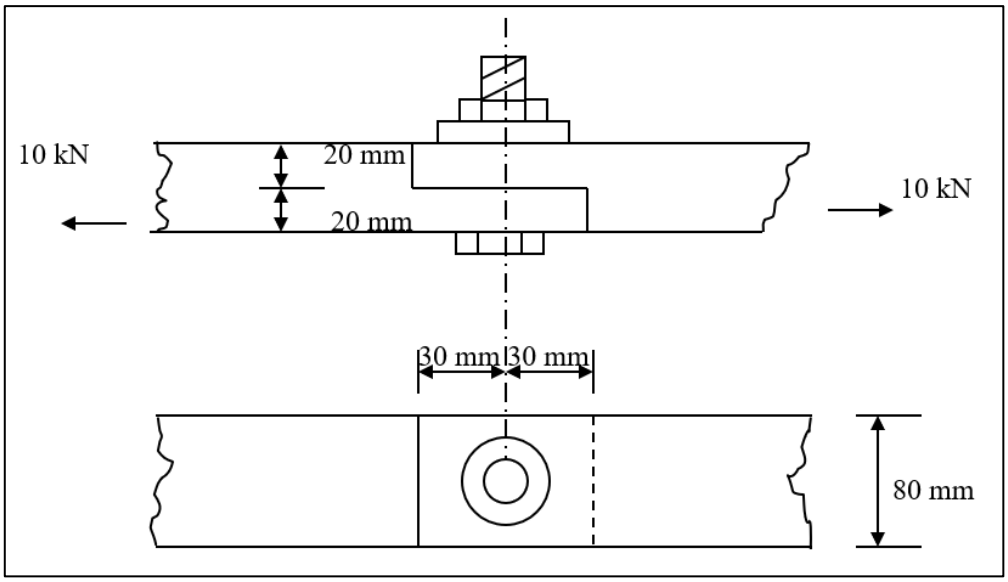


Figure B2(c)
Rajah B2(c)

[10 marks]
[*10 markah*]

QUESTION 3

SOALAN 3

CLO2 (a) All types of beams support have slightly different support properties and are used in various types of designs. Determine the reaction force for pinned and fix supports.

Semua jenis sokongan rasuk mempunyai sifat sokongan yang sedikit berbeza dan digunakan dalam pelbagai jenis rekabentuk. Tentukan daya tindakbalas penyokong pin dan penyokong hujung terikat.

[5 marks]

[*5 markah*]

CLO2 (b) Figure B3(b) show a simply supported beam subjected to moment and uniformly distributed load. Calculate reaction force for each support.

Rajah B3(b) menunjukkan rasuk tupang mudah dikenakan momen dan beban teragih seragam. Kira daya tindakbalas pada setiap penyokong.

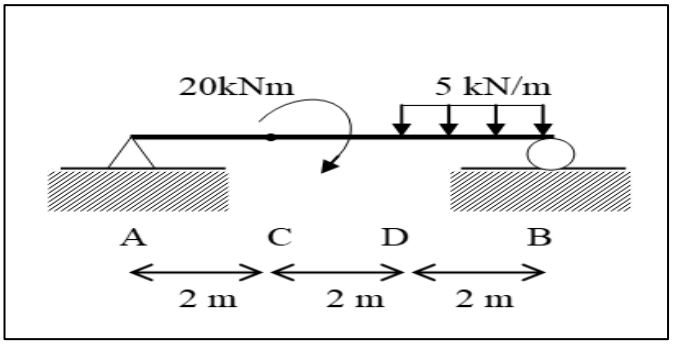


Figure B3(b)

Rajah B3(b)

[10 marks]

[10 *markah*]

CLO2

(c) Figure B3(c) shows an 8 m long overhang beam subjected to a 10 kN/m uniform distributed load and 5 kN point load. Calculate the reaction force for the support.
Rajah B3(c) menunjukkan sebuah rasuk hujung tergantung 8 m panjang yang dikenakan beban teragih seragam 10 kN/m dan beban tumpu 5 kN. Kirakan daya tindakbalas pada penyokong.

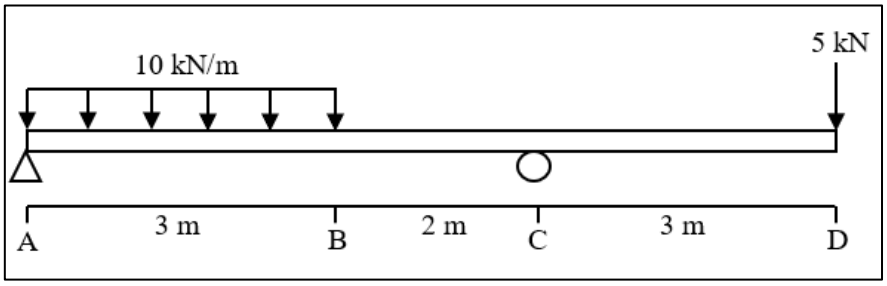


Figure B3(c)
Rajah B3(c)

[10 marks]
[*10 markah*]

QUESTION 4

SOALAN 4

CLO2

(a) A beam is a structural member with longitudinal dimension (width) is larger than the transverse dimension (depth). In beam design, information on the shear force and bending moment is required. Explain the difference between Shear Force and Bending Moment.

Rasuk ialah anggota struktur yang mempunyai dimensi membujur (lebar) adalah besar berbanding dengan dimensi melintang (kedalaman). Untuk rekabentuk rasuk, maklumat tentang daya ricih dan momen lentur diperlukan. Terangkan perbezaan antara Daya Ricih dan Momen Lentur.

[5 marks]

[*5 markah*]

CLO2

(b) Refer to Figure B4(b), calculate the bending moment maximum.

Merujuk kepada Rajah B4(b), kira momen lentur maksimum.

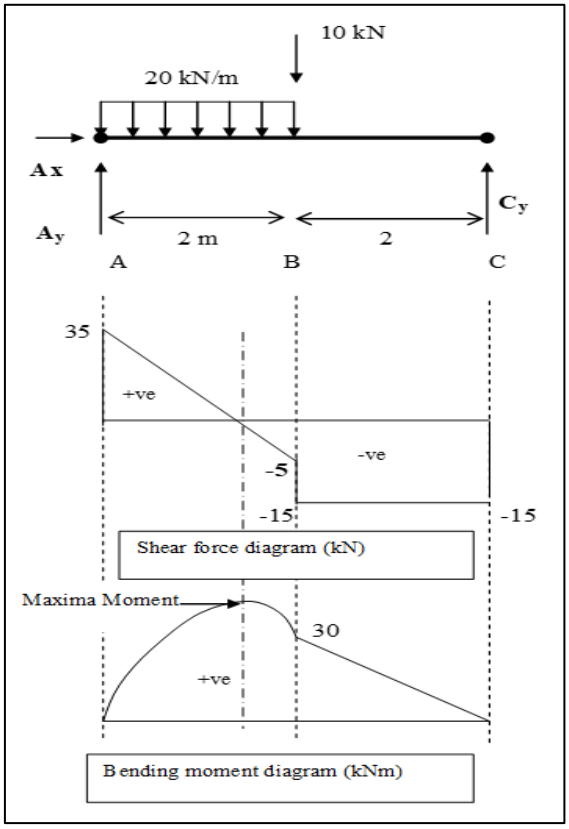


Diagram B4(b)

Rajah B4(b)

[10 marks]

[*10 markah*]

CLO2

(c) Illustrate the shear force and bending moment diagram for the beam in Figure B4(c) below.

Lukis gambarajah daya ricih dan gambarajah momen lentur bagi rasuk di dalam Rajah B4(c).

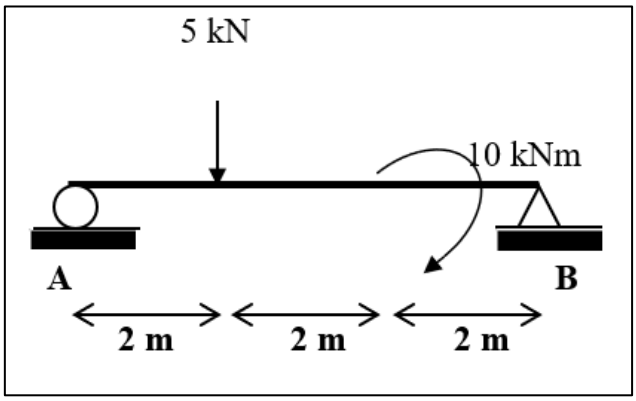


Figure B4(c)

Rajah B3(c)

[10 marks]

[*10 markah*]

SOALAN TAMAT