SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2016

DCW3012 : WOOD MECHANIC STRUCTURE 1

TARIKH : 08 APRIL 2017
MASA : 11.15 AM - 1.15 PM (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** 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 struktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1
C1

(a) List down **SEVEN (7)** structural properties in wood.

*Senaraikan **TUJUH (7)** ciri-ciri struktur di dalam kayu*

[7 marks]

[*7 markah*]

CLO1
C2

(b) Identify **FIVE (5)** factors influencing shear strength.

*Kenalpasti **LIMA (5)** faktor yang mempengaruhi kekuatan ricih.*

[10 marks]

[*10 markah*]

CLO1
C2

(c) The wooden strut shown in Figure Q1c below is suspended from a 10mm diameter steel rod and fastened to a wall. If the strut supports a vertical load of 5kN, calculate the average shear stress in the rod fastened to the wall and along the two shaded planes of the strut, one of which is indicated as abcd.

Tiang kayu seperti Rajah S1c digantung pada 10mm diameter rod keluli yang diikat pada dinding. Jika tiang menanggung beban menegak 5kN, kirakan tegasan ricih purata di dalam rod pada dinding dan sepanjang 2 satah berlorek pada tiang, salah satu adalah satah abcd.

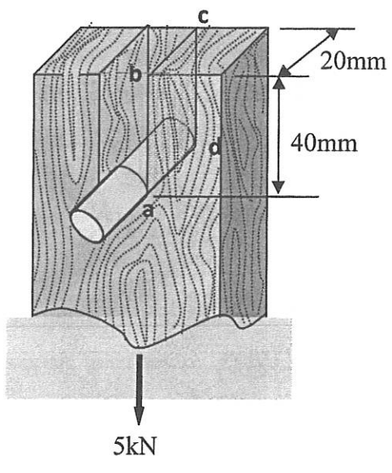


Figure Q1c/ *Rajah S1c*

[8 marks]
[*8 markah*]

QUESTION 2
SOALAN 2

CLO1
C2

(a) Identify **THREE (3)** types of reaction forces for each support with diagram.
*Kenalpasti **(TIGA) 3** jenis daya tindakbalas untuk setiap penyokong beserta gambar.*

[10 marks]
[*10 markah*]

CLO1
C3

(b) Figure Q2b below shows a cantilever beam. Calculate the reaction force for the support.

Rajah S2b di bawah menunjukkan rasuk julur. Kirakan daya tindakbalas pada penyokong.

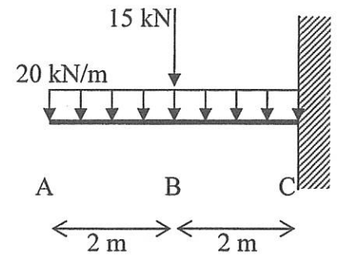


Figure Q2b/ *Rajah Q2b*

[15 marks]
[*15 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

CLO1
C1

(a) List **FOUR (4)** basic factors which affect the strength of wood.
*Senaraikan **FOUR (4)** faktor yang mempengaruhi kekuatan kayu.*

[4 marks]
[*4 markah*]

(b) Under a compression force P = 107kN, the length of a cylinder decreases from 305 mm to 304.72 mm, while the diameter of the cylinder increases from 152.4 mm to 152.408 mm. Calculate the normal stress and strain of material.

Di bawah beban mampatan P = 107kN, panjang silinder berkurang dari 305 mm kepada 304.72 mm manakala diameter silinder tersebut bertambah dari 152.4 mm kepada 152.408 mm. Kirakan tegasan normal dan terikan normal bagi bahan tersebut.

[6 marks]
[*6 markah*]

(c) A test specimen having 78.54mm^2 cross section areas and 1m length were tested in tensile test. The result was recorded as shown in Table Q1c.
Satu spesimen ujikaji dengan luas keratan rentas 78.54mm^2 dan panjang 1m diuji dalam ujian tegangan. Keputusan ujikaji direkodkan seperti dalam Jadual S1c.

i) Plot a load versus elongation graph.
Plot graf beban melawan pemanjangan.

ii) Calculate the modulus of elasticity for the material from the graph.
Daripada graf, kirakan modulus keanjalan bagi bahan.

Table Q1c/ *Jadual S1c*

Load (kN)	Elongation (mm)
0	0
8	0.010
16	0.014
24	0.016
32	0.019
43	0.023
50	0.028
59	0.035
67	0.042
76	0.047
84	0.054
90	0.060

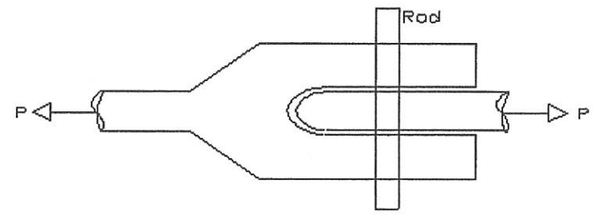
[15 marks]
[*15 markah*]

QUESTION 2
SOALAN 2

CLO1
C2

(a) The rod shown in Figure Q2a is to support a load P of 73.2 kN. The rod has an allowed shear stress of 51.7 N/mm^2. Determine the diameter of the rod.

Rajah S2a menunjukkan rod yang digunakan untuk menanggung beban P sebanyak 73.2 kN. Tegasan yang dibenarkan dalam rod adalah 51.7 N/mm^2. Kirakan diameter rod.



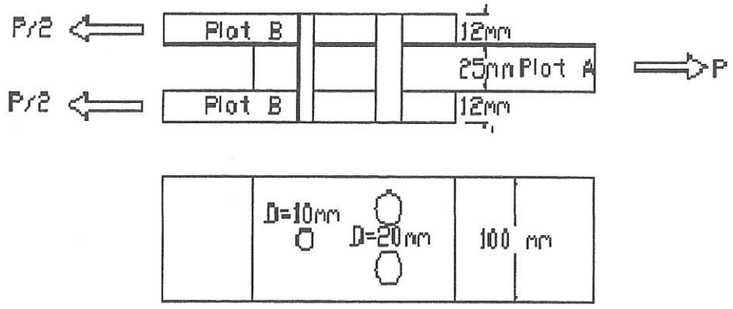
Rajah Q2a/ *Figure S2a*

[10 marks]
[*10 markah*]

CLO1
C3

(b) Figure Q2b shows a connection using 3 bolts. Given P = 2kN, determine the average shear stress for the bolts. Give your answer in N/mm^2

Rajah S2b menunjukkan satu sambungan menggunakan 3 bolt. Diberi P = 2kN, tentukan tekanan ricih purata bagi bolt. Berikan jawapan anda dalam N/mm^2.



Rajah Q2b/ *Figure S2b*

[15 marks]
[15 *markah*]

QUESTION 3
SOALAN 3

CLO1
C1

(a) There are **THREE (3)** types of beams categorized as the statically determinate beam which are simply supported beam, overhang beam, cantilever beam. Describe the cantilever beam.

*Terdapat **TIGA (3)** jenis rasuk dikategorikan sebagai rasuk boleh tentu statik iaitu rasuk sokong mudah, rasuk hujung tergantung dan rasuk julur. Terangkan mengenai rasuk julur.*

[4 marks]
[*4 markah*]

CLO1
C2

(b) A 5m long cantilever beam was subjected to a uniformed distributed load and moment 60kNm respectively as shown in Figure Q3b. Determine the force reaction at support D.

Satu rasuk julur dikenakan beban teragih seragam dan momen 60kNm seperti dalam Rajah S3b. Kirakan daya tindakbalas pada penyokong D.

[6 marks]
[*6 markah*]

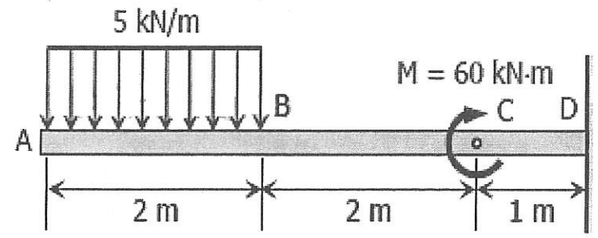


Figure 3b/ *Rajah 3b*

CLO1
C3

(c) Figure 3c shows a 16m long overhang beam subjected to a 20kN/m and 25kN/m uniformly distributed load and 50kN point load.
Rajah 3c menunjukkan sebuah rasuk hujung tergantung 16m panjang yang dikenakan beban teragih seragam 20kN/m dan 25kN/m dan beban tumpu 50kN.

i) Sketch the free body diagram for the beam.
Lakarkan gambarajah jasad bebas bagi rasuk.

ii) Calculate the force reaction acting at support R_B and R_E.
Kirakan daya tindakbalas pada penyokong R_B dan R_E.

[15 marks]
[*15 markah*]

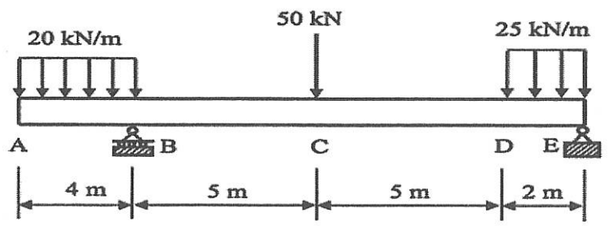


Figure 3c/ *Rajah 3c*

QUESTION 4
SOALAN 4

CLO1 C3 (a) An overhang beam 6m length was subjected to a point load of 30kN and 50kN as shown in Figure 4a. Draw the shear force and bending moment diagram of the beam. Given the reaction $R_B = 56kN$ and $R_D = 24kN$.

Satu rasuk hujung tergantung dengan panjang 6m dikenakan beban tumpu 30kN dan 50kN seperti dalam Rajah 4a. Lukiskan gambarajah daya ricih dan momen lentur bagi rasuk. Diberikan $R_B = 56kN$ and $R_D = 24kN$.

[10 marks]
[*10 markah*]

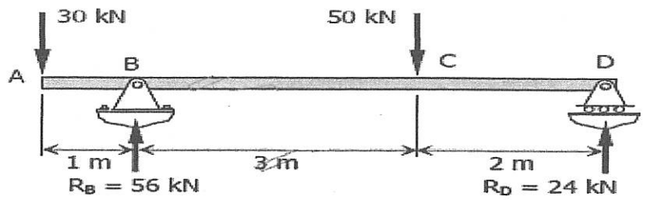


Figure 4a/ *Rajah 4a*

CLO2 C4 (b) Figure Q4b shows a 20m overhang beam was subjected to a uniformed distributed load of 10kN/m and moment of 12kN.m along its span.

Rajah S4b menunjukkan rasuk sokong mudah 20m panjang dikenakan beban teragih seragam 10kN/m dan momen 12kN.m disepanjang rasuk.

i) Calculate the reaction force at support B and D
Kirakan daya tindakbalas pada penyokong B dan D
ii) Calculate the shear force and bending moment acting at point A, B, C, and D.
Kirakan daya ricih dan momen lentur pada titik A, B, C, dan D.
iii) Draw the shear force and bending moment diagram for the beam.
Lukiskan gambarajah daya ricih dan momen lentur bagi rasuk.

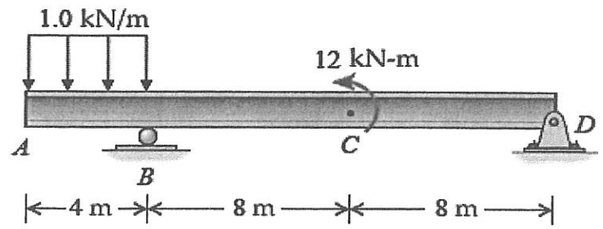


Figure Q4b/ *Rajah S4b*

[15 marks]
[*15 markah*]

SOALAN TAMAT