SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2016

DCW3012: WOOD MECHANIC STRUCTURE 1

TARIKH : 22 OKTOBER 2016
MASA : 2.30 PM - 4.30 PM (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Bahagian A: Esei Berstruktur (2 soalan)
Bahagian B: Esei Berstruktur (4 soalan)

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 essay questions. Answer **ALL** questions.

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan esei berstruktur. Jawab **SEMUA** soalan.*

CLO1
C1

QUESTION 1

SOALAN 1

(a) Using a related diagram, define mechanic structure.

Dengan menggunakan gambarajah berkaitan, takrifkan mekanik struktur.

[7 marks]
[*7 markah*]

CLO1
C2

(b) A wood rod has two different parts of cross section subjected to the compression load of 25N (Figure Q1b). Calculate the stress for each part.

Satu rod kayu mempunyai 2 bahagian keratan rentas dikenakan beban mampatan 25 N (Rajah S1b). Kirakan tegasan pada setiap bahagian.

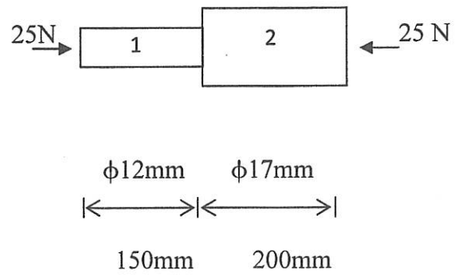

Figure Q1b/ *Rajah S1b*

[10 marks]
[*10 markah*]

CLO1 C2

(c) Identify **EIGHT (8)** factors influencing a shear strength.
*Kenalpasti **LAPAN (8)** faktor yang mempengaruhi kekuatan ricih.*

[8 marks]
[*8 markah*]

QUESTION 2
SOALAN 2

CLO1 C2

(a) Using diagrams, describe **THREE (3)** types of reaction.
*Nyatakan **TIGA (3)** jenis tindak balas beserta rajah.*

[10 marks]
[*10 markah*]

CLO1 C3

(b) Sketch shear force and bending moment diagrams for the Figure Q2b.
Lakar gambarajah daya ricih dan momen lentur bagi Rajah S2b.

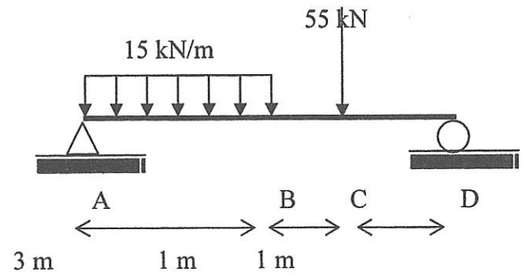

Figure Q2b/ *Rajah S2b*

[15 marks]
[*15 markah*]

SECTION B: 50 MARKS
BAHAGIAN B: 50 MARKAH

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

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

QUESTION 1
SOALAN 1

CLO1 C1

(a) Define the terms below:
Berikan definisi istilah dibawah:

i. direct stress
tegasan terus

ii. direct strain
terikan terus

[4 marks]
[*4 markah*]

CLO1 C2

(b) A 12m length with $0.36m^2$ area cross section beam is used in a bridge construction. The allowed stress in the beam must not exceed $560N/m^2$.

Sebatang rasuk 12m panjang dengan luas keratan rentas $0.36m^2$ digunakan untuk membina sebuah jambatan. Tegasan yang dibenarkan keatas rasuk adalah tidak melebihi $560N/m^2$.

i. Calculate the maximum force which the beam can sustain.
Kirakan beban maksimum yang boleh ditanggung oleh rasuk.

ii. If the modulus of elasticity (E) is $205x10^9 N/m^2$, determine the maximum strain in the beam.
Jika modulus keanjalan (E) adalah $205x10^9 N/m^2$, tentukan terikan maksimum yang dialami oleh rasuk.

[6 marks]
[*6 markah*]

CLO1
C3

(c) A tensile test was conducted on a piece of wood with a diameter of 12.5mm and 200mm length. It is found that the diameter of the wood decreased to 8mm and the length increased to 260mm. The data are as shown in Table Q1c.

Satu ujikaji tegangan dilakukan keatas sebatang kayu yang mempunyai diameter 12.5mm dan panjang 200mm. Setelah selesai ujikaji didapati diameter kayu berkurang kepada 8mm dan panjang kayu bertambah menjadi 260mm. Data ujikaji diberikan dalam Jadual S1c.

Table S1c / *Jadual S1c*

Stress/*Tegasan*, kN/mm^2	40.7	81.5	122.22	162.97	203.72	244.46
Strain/*terikan* (x 10^{-4})	2	3.9	5.9	7.9	9.9	11.9

i. Plot the stress versus strain graph.
Plot graf tegasan melawan terikan.

ii. Calculate the modulus of elasticity of wood from the graph
Kira modulus keanjalan kayu daripada graf.

[15 marks]
[*15 markah*]

QUESTION 2
SOALAN 2

CLO1
C2

(a) Shear stress and strain occurs when force were acting parallel to the shear area. Using diagrams, explain the single and double shear with diagram.

Tegasan ricih dan terikan ricih wujud apabila beban bertindak selari dengan permukaan ricih. Terangkan dengan bantuan gambarajah ricih tunggal dan ricih berganda.

[10 marks]
[10 *markah*]

CLO1
C3

(b) As shown in Figure Q2b, two bolts are used to form a joint connecting rectangular bar in tension. If the average shear stress for the bolts does not exceeds $138N/mm^2$:

Dua bolt digunakan untuk membentuk sambungan tegangan bagi bar segiempat seperti dalam Rajah S2b. Jika tegasan purata bolt tidak melebihi $138N/mm^2$:

i. Calculate the shear cross section area (A_s) of the bolts.
Kira luas permukaan ricih (A_s) bagi bolt.

ii. Calculate the diameter of the bolt.
Kirakan diameter bagi bolt.

iii. If the diameter of the bolt is 25mm, calculate the shear stress of the bolt.
Jika diameter bolt is 25mm, kira tegasan ricih dalam bolt.

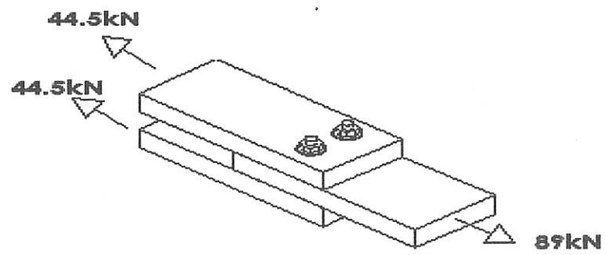

Figure Q2b / Rajah S2b

[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 and cantilever beam. Describe the overhang 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 hujung tergantung.

[4 marks]
[*4 markah*]

CLO1
C2

(b) The three common types of connections which connect a built structure to its foundation are roller, pinned and fixed end. Describe the beam reaction with a sketch for **TWO (2)** types of support found in a building structure.

*Tiga jenis sambungan yang menyambung struktur kepada asas adalah rola, pin dan hujung terjepit. Jelaskan tindakbalas rasuk beserta lakaran bagi **DUA (2)** jenis penyokong yang terdapat di struktur bangunan.*

[6 marks]
[*6 markah*]

(c) A 10m span cantilever beam was subjected to universal distributed load and point load as shown in Figure Q3c.
Satu rasuk julur dengan panjang rentang 10 m digunakan untuk menanggung beban teragih seragam dan beban tumpu seperti dalam Rajah S3c.

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

ii) Calculate the force reaction for support A.
Kirakan daya tindakbalas pada penyokong A.

[15 marks]
[*15 markah*]

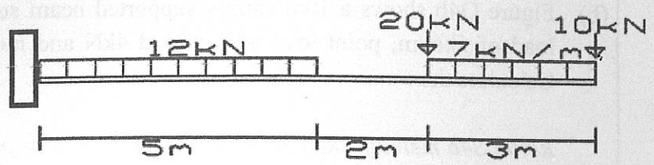

Figure Q3c/ Rajah S3c

QUESTION 4
SOALAN 4

CLO1
C3

(a) As shown in Figure Q4a, an overhang beam 5.5m length was subjected to a point load of 20kN and 40kN. Draw the shear force and bending moment diagrams of the beam: given the reaction $B_y = 14kN$ and $D_y = 36kN$.

Satu rasuk hujung tergantung dengan panjang 5.5m dikenakan beban tumpu 20kN dan 40kN seperti dalam Rajah S4a. Lukiskan gambarajah daya ricih dan momen lentur bagi rasuk. Diberikan $B_y = 14kN$ and $D_y = 46kN$.

[10 marks]
[*10 markah*]

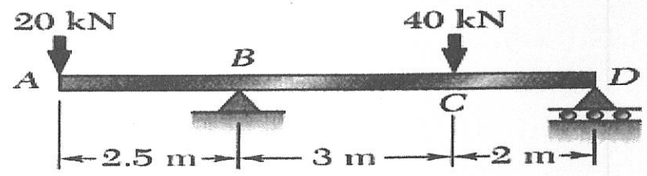

Figure Q4a/ Rajah S4a

CLO1
C4

(b) Figure Q4b shows a 10m simply supported beam subjected to an evenly distributed load of 5kN/m, point load of 2kN and 4kN and moment of 2kN.m along its span. Calculate the :

Rajah S4b menunjukkan rasuk sokong mudah 10m panjang dikenakan beban teragih seragam 5kN/m, beban tumpu 2kN dan 4kN serta momen 2kN.m disepanjang rasuk. Kirakan :

i. reaction force at support A and E.
daya tindakbalas pada penyokong A dan E

ii. shear force and bending moment acting at point A, B, C, D and E.
daya ricih dan momen lentur pada titik A, B, C, D dan E.

iii. draw the shear force and bending moment diagram for the beam.
lukiskan gambarajah daya ricih dan momen lentur bagi rasuk.

[15 marks]
[*15 markah*]

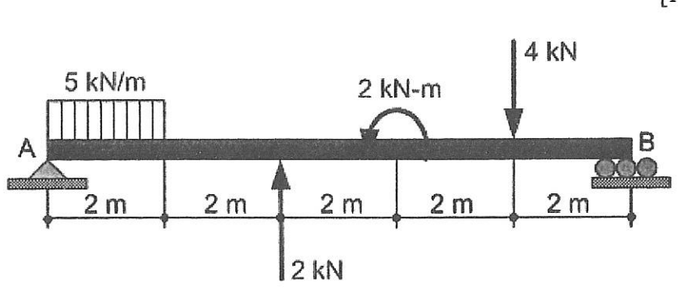

Figure 4b/ Rajah 4b

SOALAN TAMAT