

**SULIT**



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

**JABATAN KEJURUTERAAN AWAM**

**PEPERIKSAAN AKHIR**

**SESI II : 2021/2022**

**DCC20053 : MECHANICS OF CIVIL ENGINEERING STRUCTURES**

**TARIKH : 29 JUN 2022**

**MASA : 11.30 AM – 1.30 PM (2 JAM)**

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Kertas ini mengandungi **TUJUH (7)** halaman  
bercetak. Bahagian A: Struktur (3 soalan)  
Bahagian B: Esei (1 soalan)  
Dokumen sokongan yang disertakan : Formula

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**

**SECTION A : 75 MARKS**  
**BAHAGIAN A : 75 MARKAH**

**INSTRUCTION:**

This section consists of **THREE (3)** structured questions. Answer **ALL** question.

**ARAHAN :**

*Bahagian ini mengandungi **TIGA (3)** soalan struktur. Jawab **SEMUA** soalan.*

**QUESTION 1**

**SOALAN 1**

CLO1  
C2

- (a) An internal force is a force that acts from within the structure. With the aid of illustrate a diagram, list **FIVE (5)** internal forces in Civil Engineering.

*Daya dalaman ialah daya yang bertindak dari dalam struktur. Dengan bantuan ilustrasi gambarajah, senaraikan **LIMA (5)** jenis daya dalaman di dalam Kejuruteraan Awam.*

[5 marks]

[5 markah]

CLO1  
C3

- (b) Supports in a structure transfers the load to the ground and provides stability to the structure supported on it. By using a suitable sketching, describe **THREE (3)** type of supports with total numbers of reaction.

*Sokongan dalam struktur memindahkan beban ke tanah dan memberikan kestabilan kepada struktur yang disokong di atasnya. Dengan menggunakan lakaran yang sesuai, huraikan **TIGA (3)** jenis sokongan dengan jumlah bilangan tindak balas.*

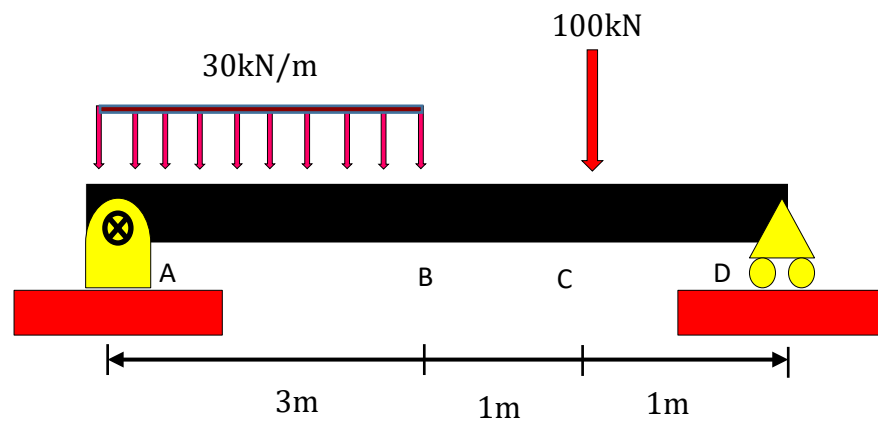
[10 marks]

[10 markah]

CLO1  
C3

- (c) A beam is subjected to a set of loads as shown in **Figure A1(a)**, using Equilibrium Force Principle, sketch the Free Body Diagram and calculate the reaction force in every support.

*Sebuah rasuk dikenakan beban-beban seperti dalam **Rajah A1(a)**, menggunakan Prinsip Keseimbangan Daya, lakarkan Gambarajah Daya Bebas dan kirakan daya tindakbalas pada setiap penyokong.*



**Figure A1(a) / Rajah A1(a)**

[10 marks]

[10 markah]

## QUESTION 2

### SOALAN 2

CLO1  
C2

- (a) Using stress vs strain diagram, describe elastic and plastic in Mechanical Characteristic in Material.

*Menggunakan lengkung tegasan-terikan, huraikan elastik dan plastik didalam sifat mekanikal bahan.*

[5 marks]

[5 markah]

CLO1  
C3

- (b) A tensile test was conducted on a 0.5metre long mild steel bar and has a diameter of 57mm. The bar is elongated to 0.0002mm when tension load of 250kN is applied. Determine Modulus of Elasticity of the steel bar.

*Ujian tegangan telah dijalankan pada 0.5meter bar keluli lembut yang mempunyai diameter 57mm. Bar tersebut mengalami pemanjangan sebanyak 0.0002mm bila dikenakan daya tegangan sebanyak 250kN. Kirakan modulus keanjalan bagi bar keluli.*

[10 marks]

[10 markah]

CLO1  
C3

- (c) A copper bar as shown in **Figure A2** has been imposed to 17kN tensile load. If the modulus of elasticity of copper is 150MPa, calculate stress in each part of the bar.

*Kuprum bar seperti dalam **Rajah A2** dikenakan beban terikan 17kN. Jika modulus keanjalan kuprum ialah 150MPa, kirakan tegasan pada setiap bahagian bar.*

[10 marks]

[10 markah]

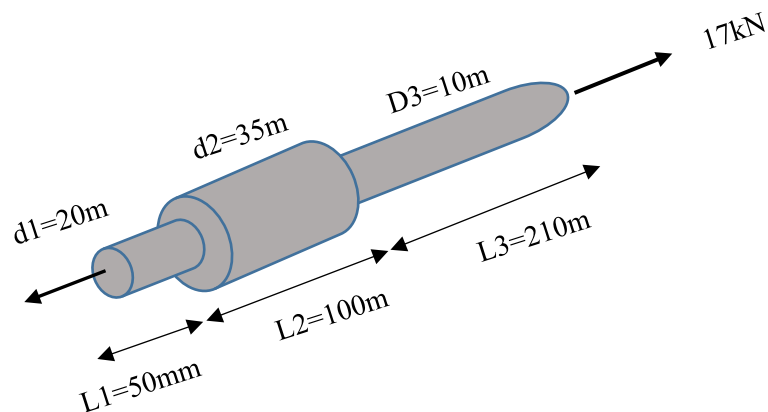


Figure A2 / Rajah A2

## QUESTION 3

## SOALAN 3

CLO2  
C3

- (a) A symmetrical I-section beams as shown in **Figure Q2(a)** is carrying an uniformly distributed load 25 N/m along the span. Identify the centroid and maximum moment for the beam.

*Satu rasuk simetri berkeratan I seperti **Rajah S2(a)** dikenakan beban teragih seragam 25N/m di sepanjang rasuk. Kirakan sentroid dan momen maksimum bagi rasuk.*

[10 marks]

[10 markah]

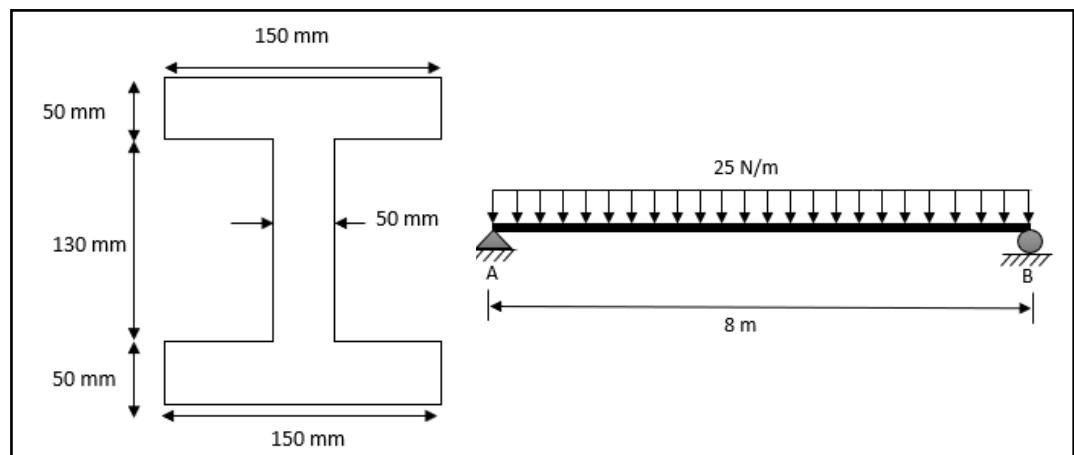


Figure Q2(a) / Rajah S2(a)

CLO2  
C4

- (b) Based on **Figure Q2(a)**, analyze the bending stress for the beam cross section.  
*Berdasarkan **Rajah S2(a)**, analisa nilai tegasan lentur untuk keratan rentas rasuk.*

[15 marks]

[15 markah]

**SECTION B : 25 MARKS****BAHAGIAN B : 25 MARKAH****INSTRUCTION:**

This section consists of **ONE (1)** essay questions. Answer the question.

**ARAHAN:**

Bahagian ini mengandungi **SATU (1)** soalan esei. Jawab soalan tersebut.

**QUESTION 1****SOALAN 1**

CLO2  
C4

- (a) Three plates are connected by two bolts of 15mm diameter as shown in **Figure B1(a)(i)** will be replaced with a new connection as shown in **Figure B1(a)(ii)** to bear the same of tensile force and shearing stress. Calculate how many bolts are required for this new connection.

*Tiga plat disambungkan dengan dua bolt diameter 15mm seperti yang ditunjukkan dalam **Rajah B1 (a) (i)** akan digantikan dengan sambungan baru seperti yang ditunjukkan dalam **Rajah B1 (a) (ii)** untuk menanggung daya tegangan dan tekanan ricih yang sama. Kirakan berapa banyak bolt yang diperlukan untuk sambungan yang baru ini.*

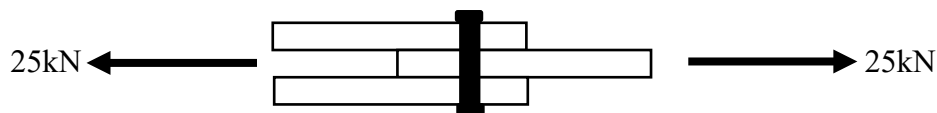


Figure B1(a)(i)/Rajah B1(a)(i)



Figure B1(a)(ii)/Rajah B1(a)(ii)

[10 marks]

[10 markah]

CLO2  
C4

- (b) A T-section beam as shown in **Figure B1(b)** is subjected to a shearing force of 30kN. The second moment of area about the neutral axis is  $16.57 \times 10^6 \text{mm}^4$ . Illustrate the shear stress distribution across the section by showing its shearing stress value at neutral axis, flange and junction of the web.

*Rasuk keratan T seperti yang ditunjukkan dalam **Rajah B1(b)** dikenakan daya ricih 30kN. Momen luas kedua terhadap paksi neutral ialah  $16.57 \times 10^6 \text{mm}^4$ . Gambarkan taburan tegasan ricih merentasi keratan dengan menunjukkan nilai tegasan ricih pada paksi neutral, bebibir dan persimpangan web.*

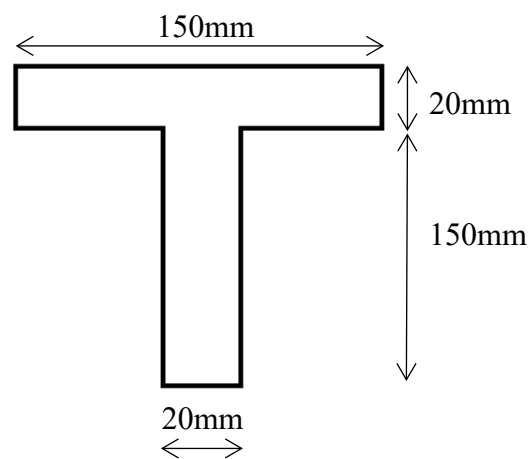


Figure B1(b)/Rajah B1(b)

[15 marks]

[15 markah]

**SOALAN TAMAT**

**LIST OF FORMULA FOR DCC20053**  
**MECHANICS OF CIVIL ENGINEERING STRUCTURES**

$$\sigma = \frac{P}{A}$$

$$\epsilon = \frac{\delta L}{L}$$

$$E = \frac{PL}{\delta L \cdot A}$$

$$E = \frac{\sigma}{\epsilon}$$

$$I_{xx} = \frac{bd^3}{12} + Ad^2$$

$$Z = \frac{I}{y_{max}}$$

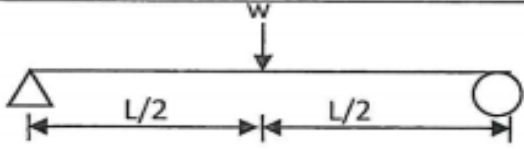
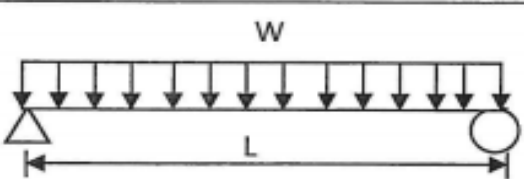
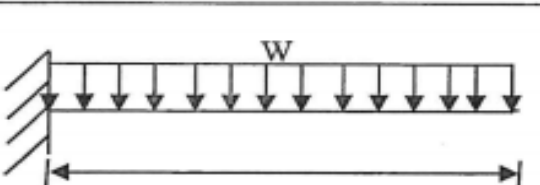
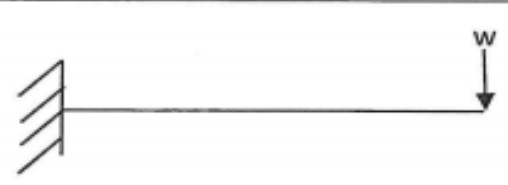
$$\frac{M}{I} = \frac{\sigma}{Y}$$

$$\tau = \frac{F}{A}$$

$$\tau = \frac{VAy}{I_{xx} \cdot b}$$



**Table 1: Maximum Moment Formula For Specific Beam and Load**

BEAM WITH SPECIFIC LOAD	MAXIMUM MOMENT
	$wL/4$
	$WL^2/8$
	$WL^2/2$
	$wL$