

**FINAL
ALTERNATIVE ASSESSMENT**

(COVER PAGE)

Session : January 2022

Programme : Diploma in Mechanical Engineering (DMEN)

Course : **EGM1180: Mechanics of Engineering Materials**

Date of Examination : 8 March 2022 (Tuesday)

Time : 12.00noon – 2.30pm Reading Time : Nil

Duration : 2 Hours 30 Minutes

Special Instructions :

This paper consists of **FOUR (4)** questions. Answer all **FOUR (4)** questions. All questions carry equal marks.

Material permitted : Non-Programmable Scientific Calculator

Materials provided : Nil

Examiner(s) : Mohamad Faiz Osrin

Chief Moderator : Ganaswaran

This paper consists of 5 printed pages, including the cover page

DIPLOMA IN MECHANICAL ENGINEERING PROGRAMME (DMEN)
EGM1180: MECHANICS OF ENGINEERING MATERIALS
FINAL ALTERNATIVE ASSESSMENT: JANUARY 2022 SESSION

Instruction: This paper consists of **FOUR (4)** questions. Answer all **FOUR (4)** questions. All questions carry equal marks.

Question 1

For the stressed element shown in Figure Q1, determine

- (a) The principal stress, σ (5 marks)
- (b) The orientation of principal stress, θ_p (7 marks)
- (c) The maximum in-plane shear stress, τ_{max} (4 marks)
- (d) The orientation represent maximum in-plane shear stress, θ_s (9 marks)

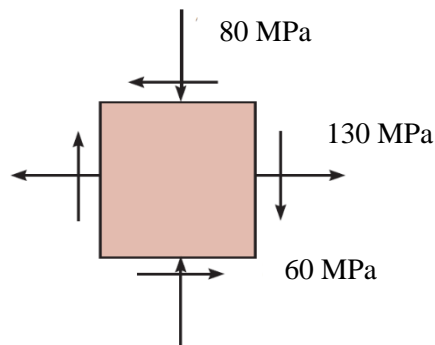


Figure Q1

Question 2

Q2(a) The I-shaped cross section with length of 48 m is shown in Figure Q2(a). The load on each beam is 9.5 kN/m, includes the weight of the girder. Determine the maximum bending stress in a girder due to this load.

(13 marks)

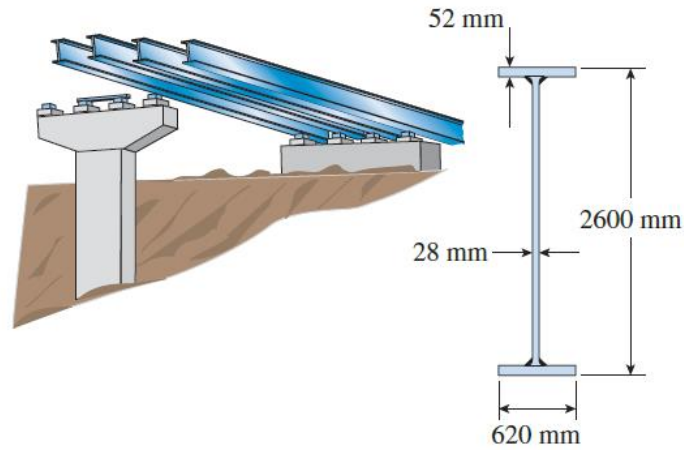


Figure Q2(a)

Q2(b) The simple beam AB is shown in Figure Q2(b). The data are as follows: $P = 6.2\text{kN}$, $L = 3.2\text{ m}$, $d = 1.25\text{ m}$, $b = 80\text{ mm}$, $t = 25\text{ mm}$, $h = 120\text{ mm}$, and $h_1 = 90\text{ mm}$. Determine;

(i) The maximum tensile stress, σ_t

(7 marks)

(ii) The maximum compressive stress, σ_c .

(5 marks)

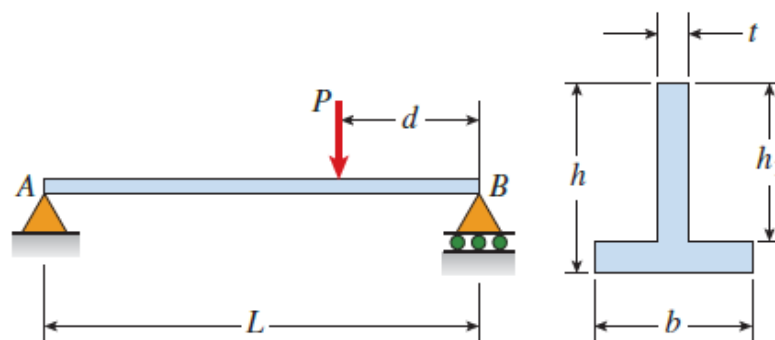


Figure Q2(b)

Question 3

- (a) The T-beam shown in the figure has cross-sectional dimensions as follows: $b = 210\text{mm}$, $t = 16\text{ mm}$, $h = 300\text{ mm}$, and $h_1 = 280\text{mm}$. The beam is subjected to a shear force $V = 68\text{kN}$. Determine the maximum shear stress, τ_{max} in the web of the beam.

(13 marks)

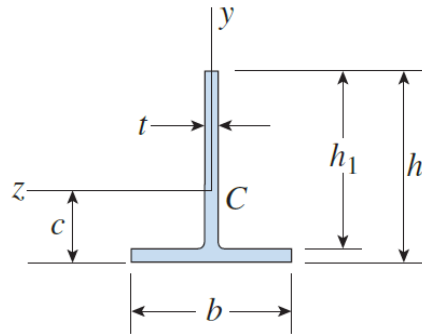


Figure Q3(a)

- (b) A beam of T cross section consist of two block having the dimensions shown in the Figure Q3(b). The total shear force, V acting on the cross section is 500N . The load, F applied to each nail is 760 N . Determine the maximum allowable nail spacing, s ?

(12 marks)

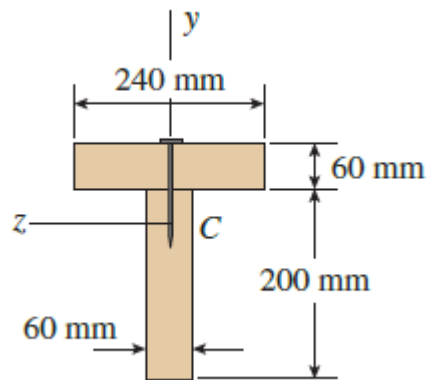


Figure Q3(b)

Question 4

The flexural stiffness (EI) of the loaded beam shown in Figure Q4 is 300 MPa. Determine:

- (a) The reactions at each support, (3 marks)
- (b) The slope at each support, (12marks)
- (c) The deflection at point B, C and D. (10 marks)

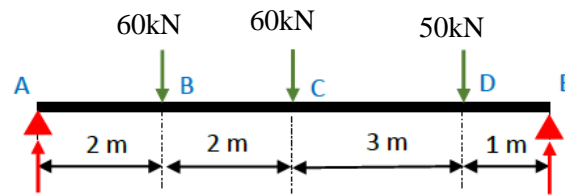


Figure Q4

~THE END~

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