FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**April 2022**
Programme	:	Diploma in Mechanical Engineering (DMEN)
Course	:	**EGM1180: Mechanics of Engineering Materials**
Date of Examination	:	August 2, 2022 (Tuesday)
Time	:	8.00am – 10.30am 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.

NOTE : 30 minutes is added into the duration of the examination to factor in any connectivity matters and for you to scan and upload your scripts.

Material permitted :
Non-Programmable Scientific Calculator

Materials provided :
Nil

Examiner(s)	:	**Mr Soo Swee Yoong** and Mr Lim Kah Hei
Chief Moderator	:	Mr Phua Chin Lai

*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: APRIL 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, calculate

(a) The normal and shear stresses on the plane AB,

(8 marks)

(b) The principal stresses,

(4 marks)

(c) The maximum shear stress,

(3 marks)

(d) Show the position of the principal planes on a suitable diagram.

(10 marks)

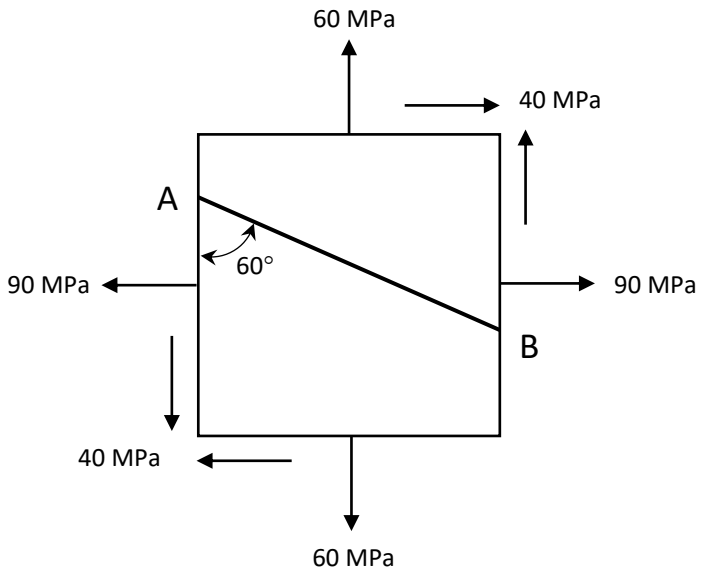

Figure Q1

Question 2

(a) Figure Q2a shows a beam that is subjected to an internal moment of **M** = 75 kNm, determine the maximum tensile and compressive stress acting in the beam.

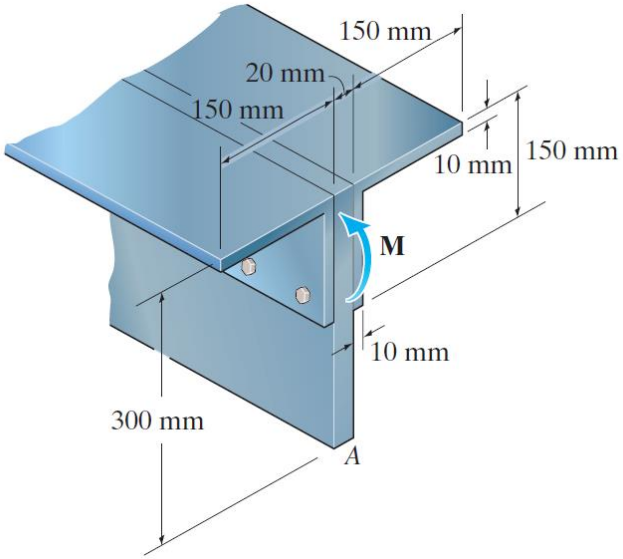

Figure Q2a

(15 marks)

(b) Determine the largest bending moment M that can be applied to the beam shown in Figure Q2b. Take the allowable stress as 155 MPa and neglect the effect of fillets.

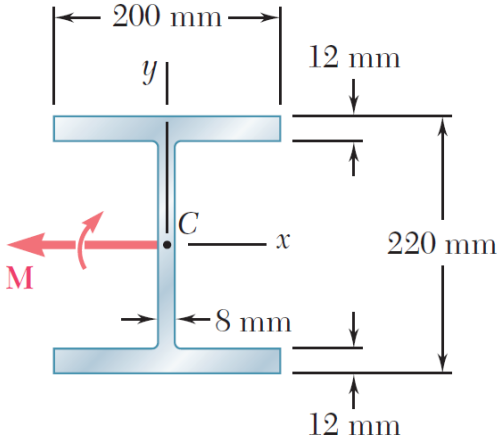

Figure Q2b

(10 marks)

Question 3

(a) Determine the maximum shear stress in the member in Figure Q3a if a shear force, **V** of 90 kN is applied.

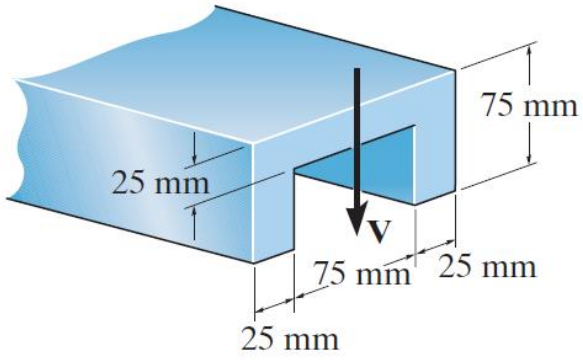

Figure Q3a

(13 marks)

(b) As shown in Figure Q3b, three rectangular boards (each has a thickness of 50 mm) are joined together using nails to form a beam which is subjected to a vertical shear. Given the allowable shearing force in each nail is 600 N and the spacing '*s*' between the nails is 75 mm, determine the allowable shear.

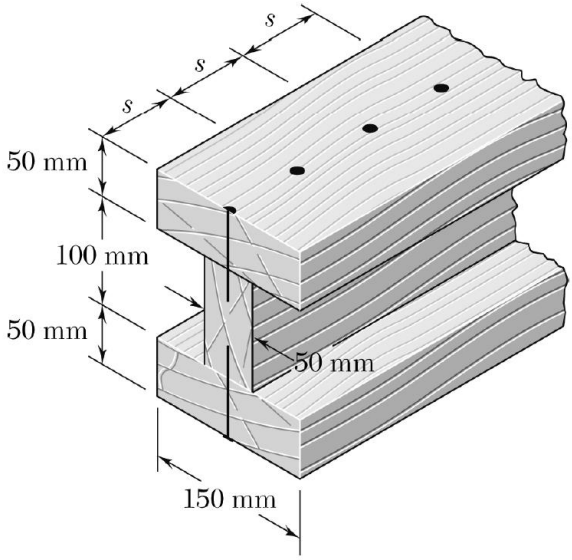

Figure Q3b

(12 marks)

Question 4

The flexural stiffness (EI) of the loaded beam shown in Figure Q4 is 300×10^6 N/m^2. Calculate,

(a) The reactions at each support, (3 marks)

(b) The slope at each support, (13 marks)

(c) The deflection at point B, C and D. (9 marks)

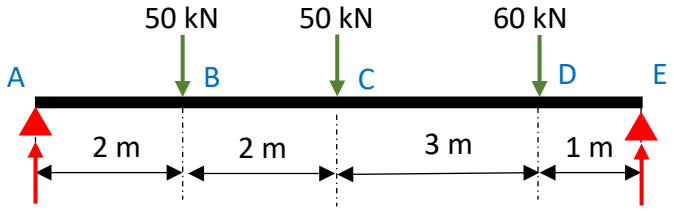

Figure Q4

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