FINAL

ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**January 2021**
Programme	:	Diploma In Mechanical Engineering (DMEN)
Course	:	**EGM1180 : Mechanics of Engineering Materials**
Date of Examination	:	March 10, 2021 (Wednesday)
Time	:	8:00 am – 10:15 am Reading Time : Nil
Duration	:	2 hours 15 mins

Special Instructions :

This paper consists of **FOUR (4)** questions. Answer **ALL** the questions. **Write ALL your answer** in the foolscap papers (you need to prepare your own papers)

Material permitted :

Non-Programmable Calculator

Materials provided :

Nil

Examiner(s)	:	**Tham Chan Seng a**nd Dr Aaron Edward Teo
Chief Moderator	:	Mr Soo Swee Yoong

*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 2021 SESSION

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

Question 1

(a) Figure Q1 (a) 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.

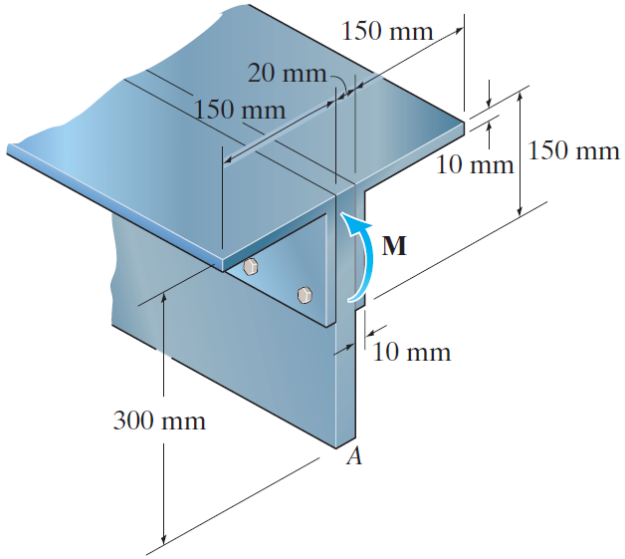

Figure Q1 (a)

(15 marks)

(b) Determine the largest bending moment M that can be applied to the beam shown in Figure Q1(b). Take the allowable stress as 155 MPa and neglect the effect of fillets.

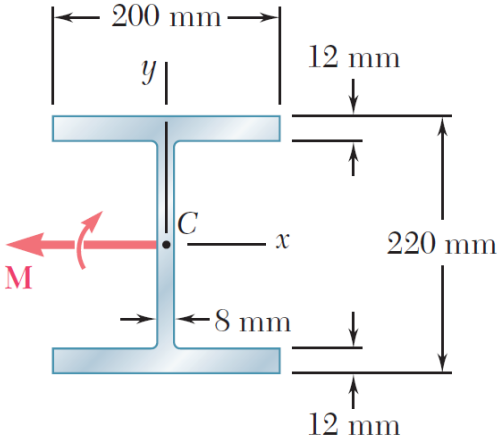

Figure Q1 (b)

(10 marks)
(Total: 25 marks)

Question 2

(a) Determine the maximum shear stress in the member in Figure Q2 (a) if a shear force, V of 90 kN is applied.

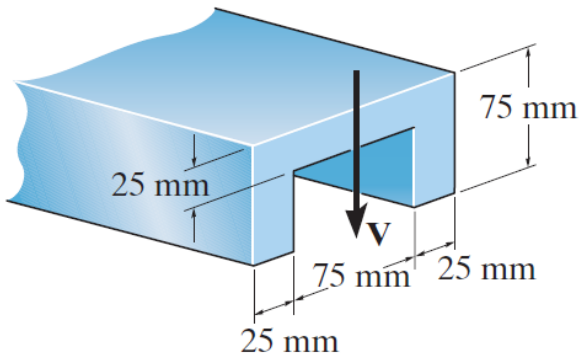

Figure Q2 (a)

(13 marks)

(b) As shown in Figure Q2 (b), 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 75mm, determine the allowable shear.

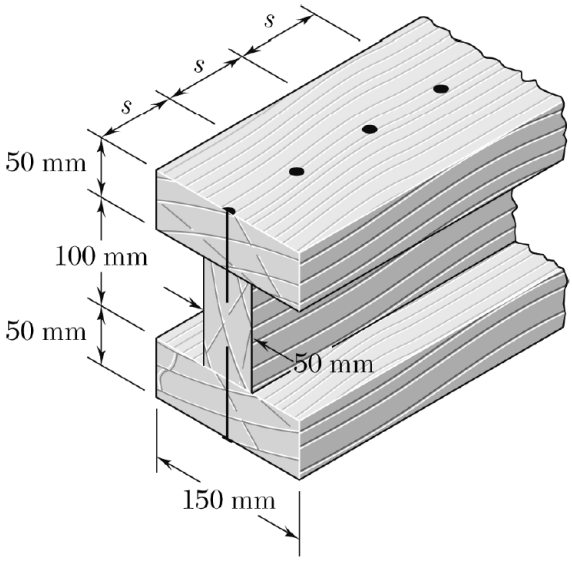

Figure Q2 (b)

(12 marks)
(Total: 25 marks)

Question 3

(a) Referring to Figure Q3 (a), determine the normal and shearing stresses if the element shown has been rotated:

(i) Clockwise by 25°

(ii) Counterclockwise by 10°

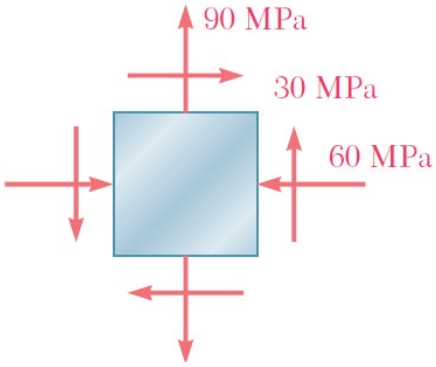

Figure Q3 (a)

(15 marks)

(b) If the element in Figure Q3 (b) is rotated to a positive 60° orientation from its initial position, determine the equivalent state of stress of the element. Please include the sketch.

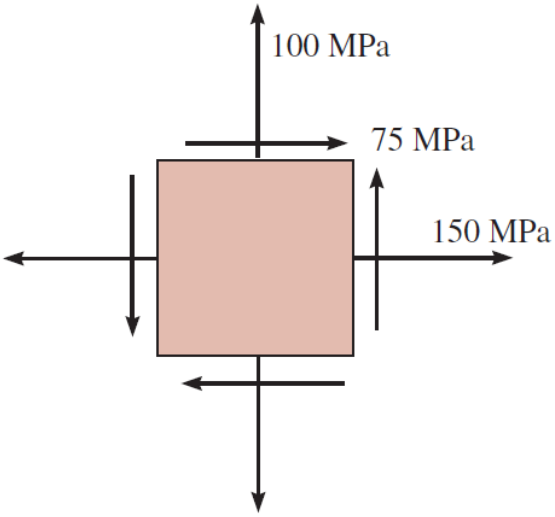

Figure Q3 (b)

(10 marks)

(Total: 25 marks)

Question 4

Determine the maximum deflection of the rectangular cross-sectional simply supported beam. The beam is made of wood having a modulus of elasticity of E = 10.5 GPa.

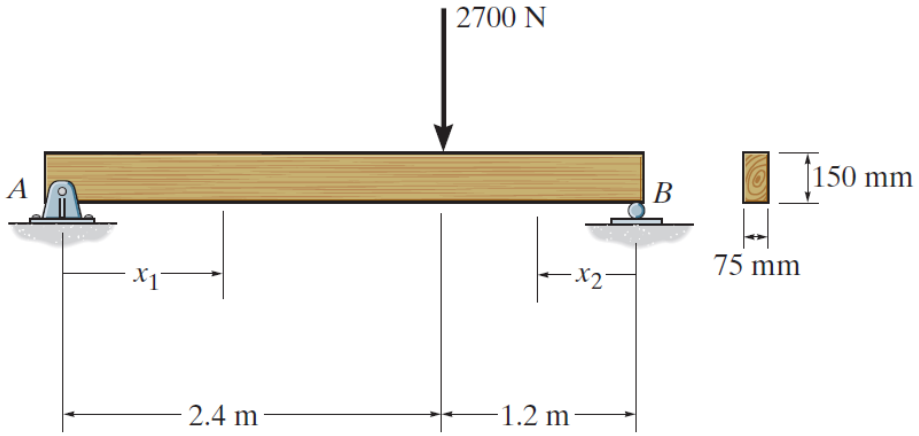

Figure 4

(25 marks)
(Total: 25 marks)

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