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Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2022/2023**

COURSE NAME : STRUCTURAL ANALYSIS

COURSE CODE : BPD 20403

PROGRAMME CODE : BPC

EXAMINATION DATE : JULY/AUGUST 2023

DURATION : 3 HOURS

INSTRUCTION : 1. ANSWER ALL QUESTIONS

2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**

3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSIST OF SIX (6) PAGES

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- Q1** (a) A structural support is a part of a building or structure that provides the necessary stiffness and strength in order to resist the internal forces and withstand the loads.

Explain **THREE (3)** types of structural support.

(6 marks)

- (b) A simply supported beam as shown in **Figure Q1** in **Appendix I** is supported with pin and roller at point A and D. The uniform distributed loads of 25 kN/m and 10kN/m are loaded at points A to B and from point B to C respectively. A point load of 12 kN is reacted 2m from point D.

Calculate the reaction forces at points A and D.

(14 marks)

- Q2** A structure frame as shown in **Figure Q2** in **Appendix I** is loaded with a concentrated load of 25 kN at points C to D. The frame is pin support at point A and a roller support at point D.

- (a) Analyse the stability of the frame.

(6 marks)

- (b) Calculate the internal forces of member AB, BC and CD by using the method of section.

(14 marks)

- Q3** A beam as shown in **Figure Q3** in **Appendix II** is loaded with 15 kN/m uniformed distributed load at points C to D and 25 kN concentrated load at point C and 25 kN at point E. The beam is pin support at point A and roller support at point B.

- (a) Calculate the reaction forces at points A and B.

(6 marks)

- (b) Analyse Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) at point A, B, C, D and E.

(14 marks)

- Q4** A simply supported beam as shown in **Figure Q4** in **Appendix II** is subjected to uniform distributed load of 25 kN/m from A to B, and point loads of 35 kN and 45 kN at points C and D respectively. The beam is supported with roller support at both ends A and E. Given the value of elastic modulus,  $E = 200 \text{ kN/mm}^2$  and moment inertia,  $I = 10^8 \text{ mm}^4$ .
- (a) Calculate the reaction forces at points A and E. (6 marks)
- (b) Calculate the slope and deflection at point C using Macaulay method. (14 marks)
- Q5** A plane truss as shown in **Figure Q5** in **Appendix III** is supported with pin and roller at point A and G respectively. The point loads imposed are 150 kN at point B, 250 kN at point D, and 60 kN at point F.
- (a) Analyse the stability of the plane truss. (5 marks)
- (b) Calculate the internal forces of each member by using the method of joint. (15 marks)

- END OF QUESTIONS -

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APPENDIX I

SEMESTER / SESSION: SEM II / 2022/2023  
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PROGRAMME CODE : 2BPC  
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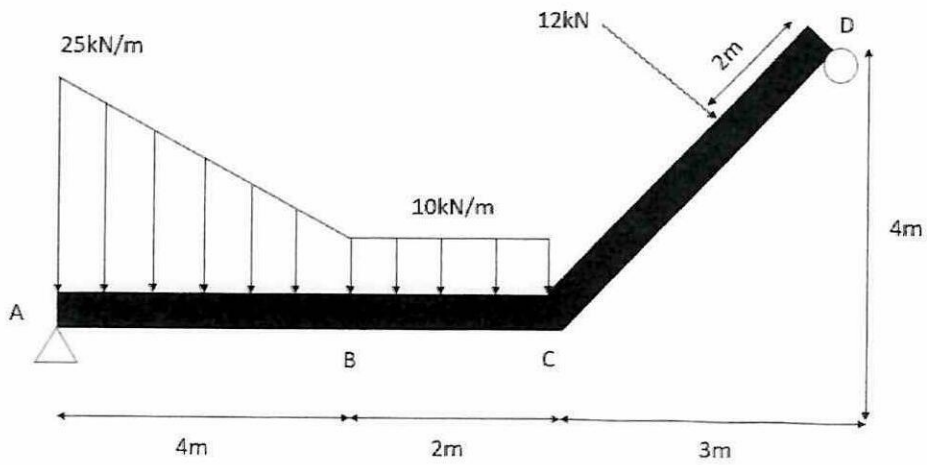


Figure Q1: Simply Supported Beam

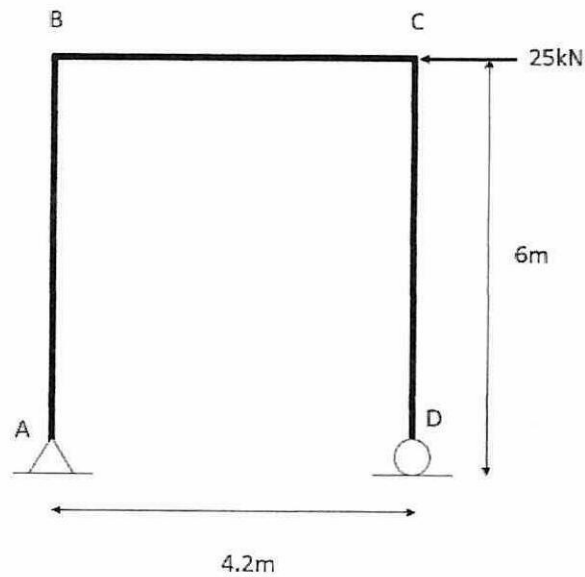


Figure Q2: Structure Frame

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APPENDIX II

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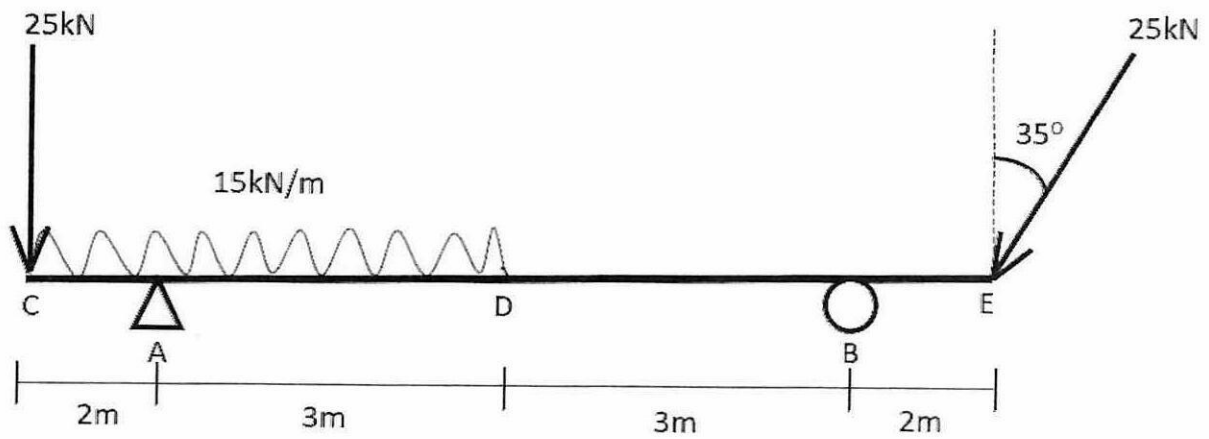


Figure Q3: A Beam

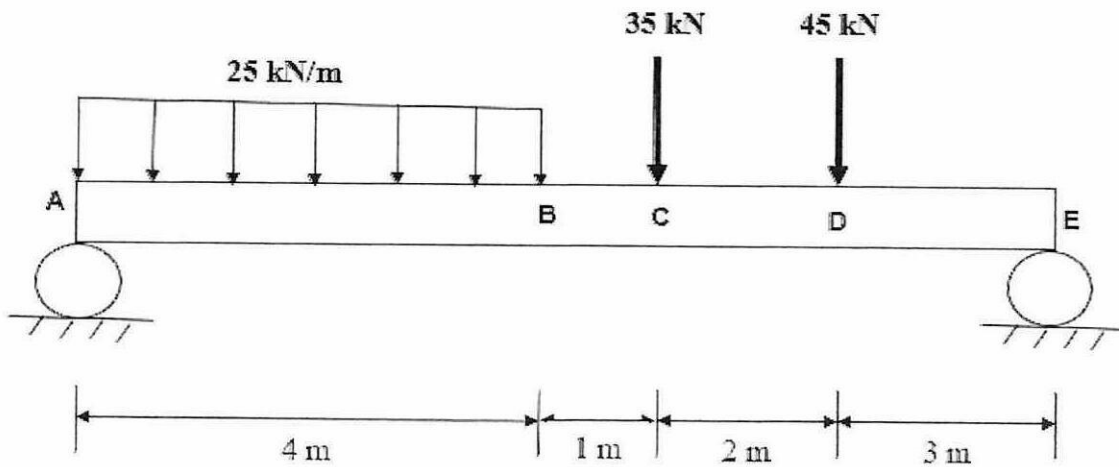


Figure Q4: A Simply Supported Beam

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APPENDIX III

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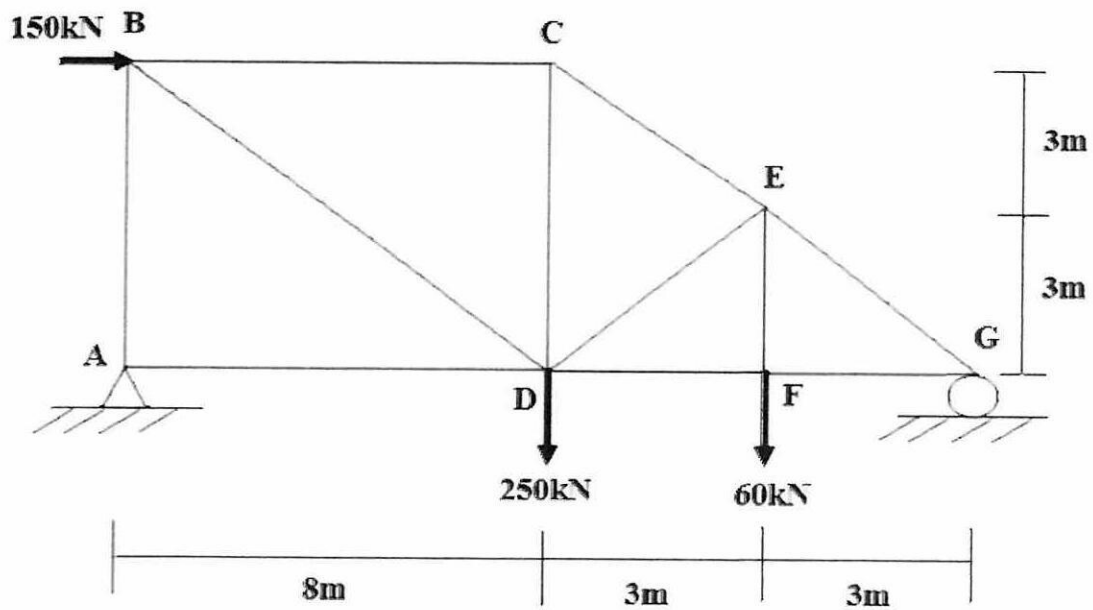


Figure Q5: A Plane Truss

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