Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	ADVANCED STRUCTURAL ANALYSIS
COURSE CODE	:	BFS 40103
PROGRAMME CODE	:	BFF
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 CONSISTS OF **FIVE (5)** PAGES

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Q1 (a) Briefly discuss **FOUR (4)** assumptions in yield line analysis.

(5 marks)

(b) A slab depicted in **Figure Q1(b)** has dimensions of 7.5 m x 4.5 m.

Given:

(i) Live load plus self weight of slab = 15 kN/m2

(ii) Dead load of the masonry wall = 3 kN/m

Determine the resistance moment, m, for the slab for the given collapse mechanism.

(20 marks)

Q2 **Figure Q2** shows a 2-bay frame loaded with a horizontal point load at B and a vertical point load at mid-span of beam BC. Beam CD is subjected to a uniformly distributed load of 10 kN/m. Column A and E are fix supported at their ends, while column F is supported by a roller.

Determine:

(a) All the collapse mechanism of the beams and columns

(6 marks)

(b) Moment for each mechanism

(18 marks)

(c) Maximum moment in the frame

(1 mark)

Q3 (a) List all assumptions for Euler theory in a simply supported column.

(5 marks)

(b) Synthesis the Euler load, $P_{cr} = \frac{n^2\pi^2 EI}{L^2}$ from column that has a pinned support at oneend and a fixed support at the other end. In addition, determine the effective length l_e for the column owing to the support conditions.

(20 marks)

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Q4 (a) Elaborate the main concept of stability and determinacy of a structure.

(4 marks)

(b) **Figure Q4** shows an indeterminate truss subjected to a concentrated load of P kN at point B. Point A, C and D are fixed nodes and point B is a free node. Solve the problems by using Force Method.

(i) Sketch with appropriate scale and establish the determinate form of the truss.

(5 marks)

(ii) Develop the equation for the axial force and strain energy of the structure in equilibrium state.

(4 marks)

(iii) Define the total strain energy of the given structure.

(4 marks)

(iv) Calculate the unknown force at point B.

(8 marks)

- END OF QUESTIONS -

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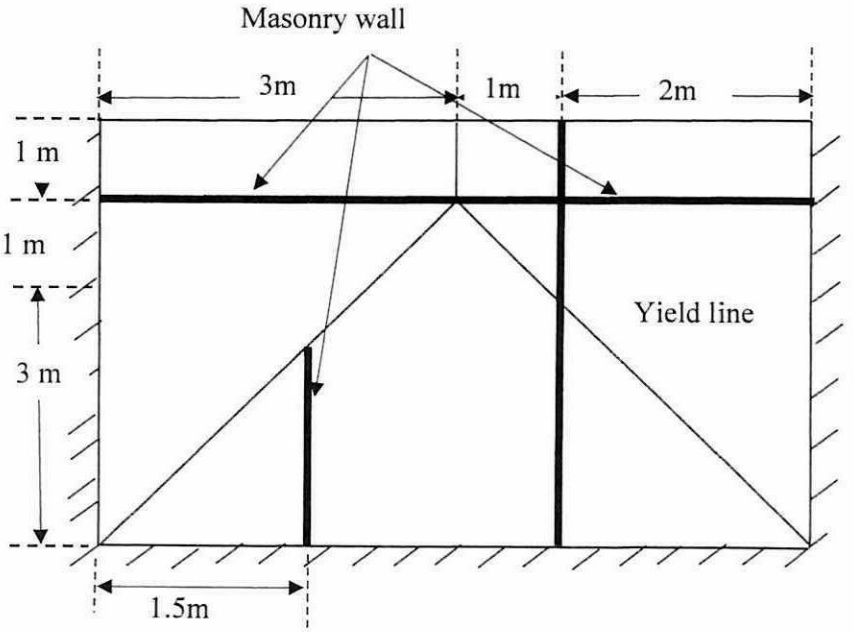

Figure Q1

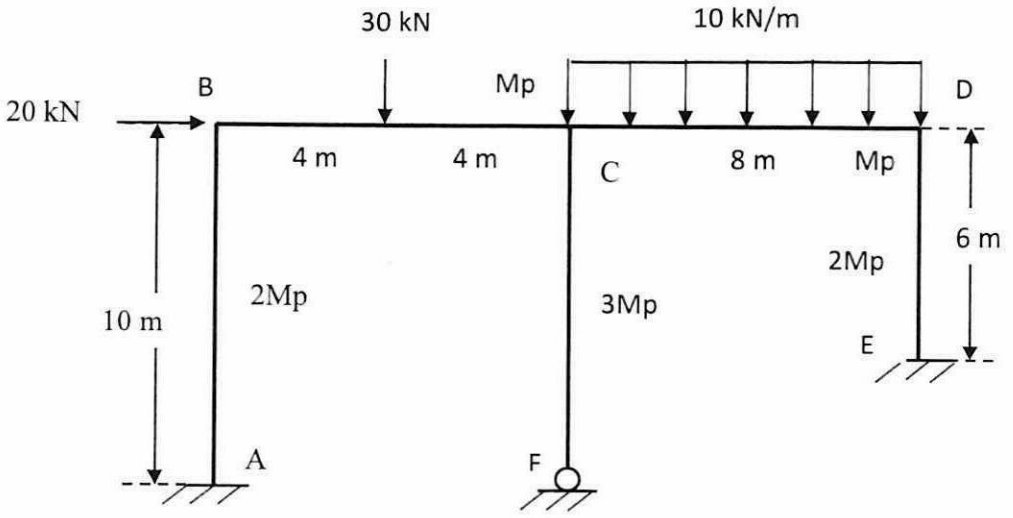

Figure Q2

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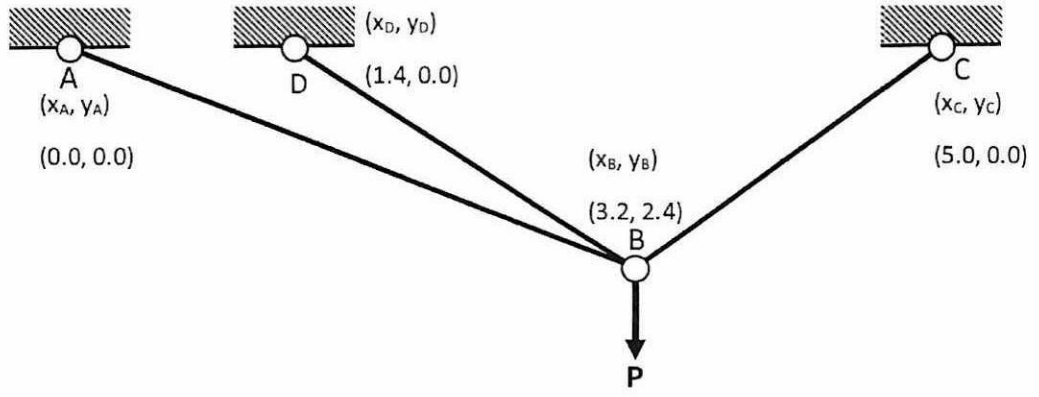

Figure Q4

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