Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019

COURSE NAME	:	STRUCTURAL ANALYSIS
COURSE CODE	:	BFC21403
PROGRAMME CODE	:	BFF
EXAMINATION DATE	:	DECEMBER 2018/JANUARY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS IN **PART A** & ONLY **ONE** (1) QUESTION IN **PART B**

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

PART A: ANSWER ALL QUESTIONS

Q1 **FIGURE Q1** shows a truss system with point loads acting at joints B and D. The properties of the truss is shown in **TABLE Q1.**

(a) Classify the truss system.

(3 marks)

(b) Use your own judgment in order to select the redundant member of the truss. Then determine the real force of the truss structure. The truss structure must be in stable condition.

(22 marks)

(c) Remove the selected redundant member in **Q1 (b)** and calculate the vertical displacement at joint B using virtual work method. Express your answer in unit milimeter (mm) and assume the unit load acting downward.

(15 marks)

TABLE Q1

Member	Area (mm^2)	Modulus Elasticity (kN/mm^2)
AB	150	200
AE	150	200
BC	250	210
BD	250	210
BE	250	210
CD	250	210
DE	250	210
EC	250	210

Q2 (a) List **THREE (3)** methods for analysing statically determinate plane truss.

(3 marks)

(b) **FIGURE Q2** shows a warehouse non-sway frame which fixed supported at A and D and pin supported at E. The frame is uniformly loaded throughout span AB, BC and CE with 5 kN/m and 15 kN/m load, respectively. Span BC has additional point load of 10 kN located at 2 m from B and C. Meanwhile span CE is loaded with point load of 10 kN at its mid span. All members of the frame were made from mild steel.

(i) Calculate the end moment in all members.

(20 marks)

(ii) Draw the shear force and bending moment diagrams of the frame.

(7 marks)

PART B :ANSWER ONLY ONE (1) QUESTION

Q3 (a) Define the term "influence line".

(4 marks)

(b) Give **TWO (2)** advantages of using influence line.

(6 marks)

(c) Referring to **FIGURE Q3**, draw the influence line for force in member EH, member JE, member AL and member JI.

(20 marks)

Q4 (a) State **THREE (3)** conditions to ensure full collapse of a structure.

(6 marks)

(b) A continuous beam ABD supports a distributed load, w (kN/m), along span AB, and a point load P (kN) at point C as shown in **FIGURE Q4**.

(i) Prove the position of plastic hinge within the region of a distributed load for span AB is 0.414L from point D.

(12 marks)

(ii) Determine the maximum Mp -of beam ABD and the critical span if given w = 10 kN/m, P = 20 kN and L = 6m.

(12 marks)

– END OF QUESTIONS –

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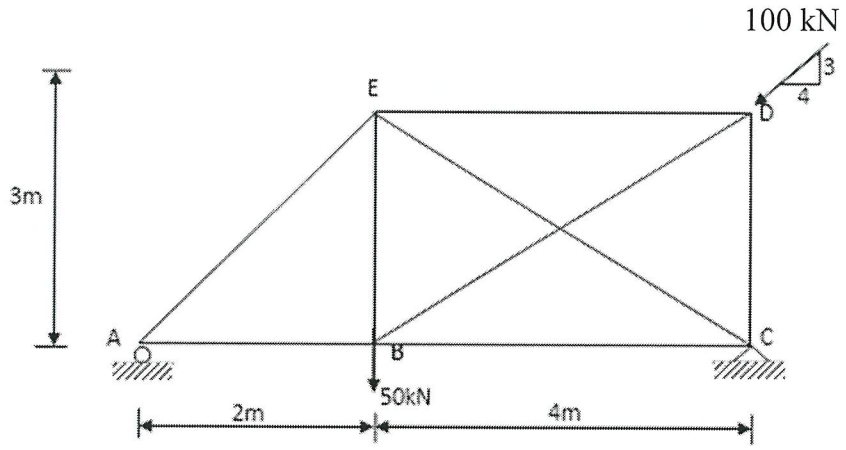

FIGURE Q1

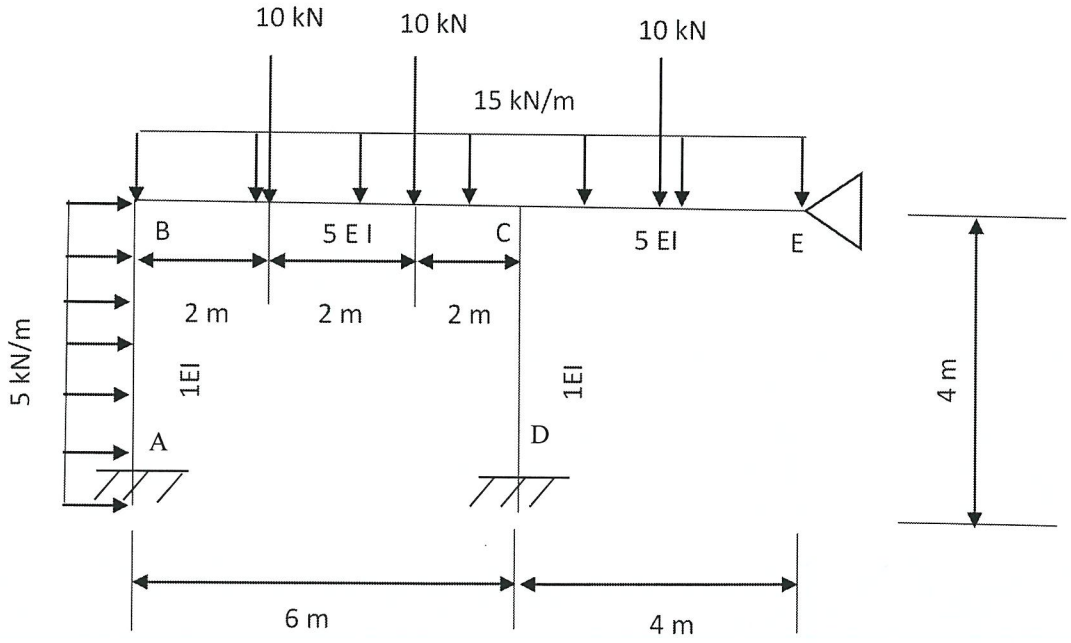

FIGURE Q2

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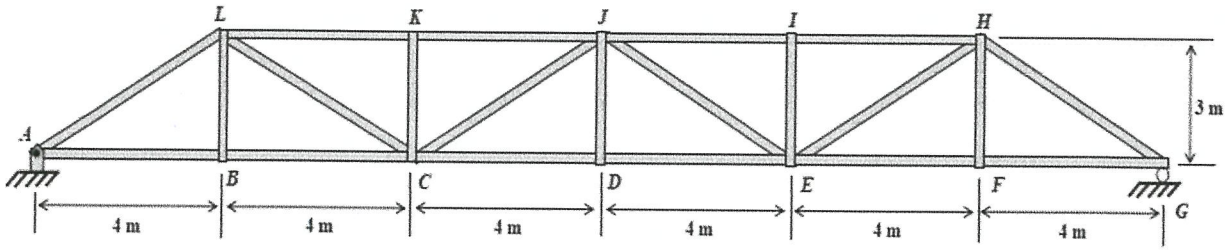

FIGURE Q3

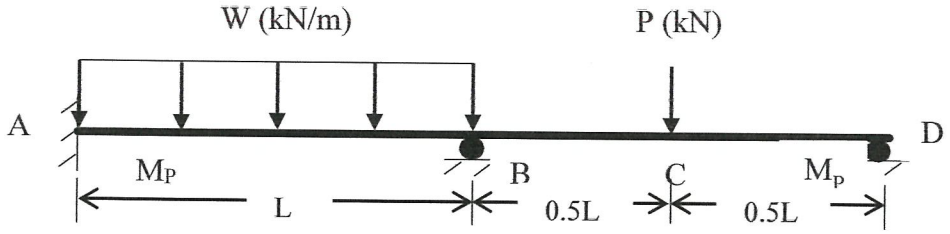

FIGURE Q4

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FIXED END MOMENTS: