B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023

Subject: THEORY OF STRUCTURES-II

Full Marks:100

Time: 3hours

(Use Separate Answer scripts for each Part)

Part- I (Marks 60)

1. Determine the bending moment and shear force on beams and columns shown in Fig.1. Use **Cantilever Method**. Also draw bending moment diagram. Area of exterior column is one half of the area of interior column. (30)
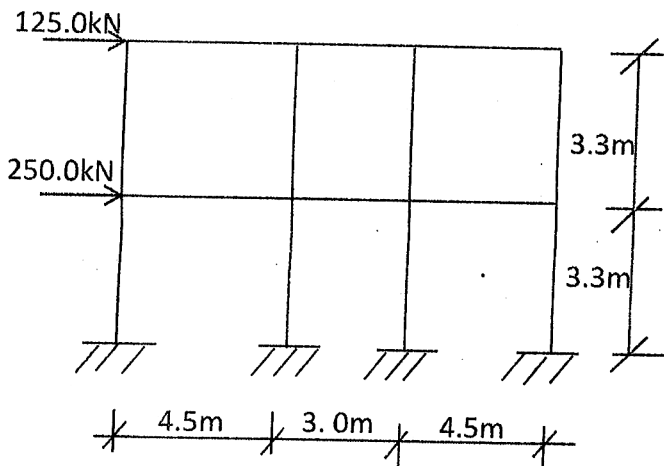

Fig.1

2. Draw the shear flow for the channel section shown in **Fig. 2**, if it is subjected to a shear force of 270kN. Also find the shear centre of this channel section. (10)
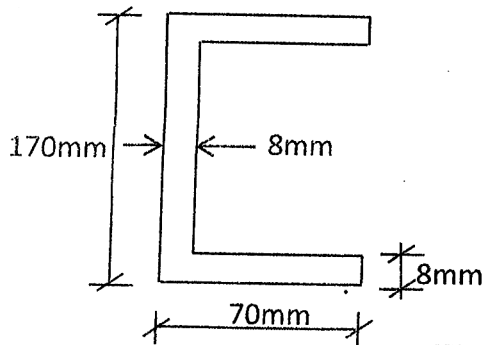

Fig.2

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3. A horizontal cantilever 3.5m long is constructed from Z-section shown in **Fig. 3**. A load of 50 kN is applied to the end of the cantilever at an angle of 30^0 to the vertical.   (20)
   a) Determine the stress at point A and B.
   b) Determine the principal second moments of area of the section and hence by applying the simple bending theory about each principal axis, check the answer obtained in *(a)*.
   c) What will be the deflection at the end of cantilever? Given $E=2\times10^5 \text{N/mm}^2$, $I_{xx}=55.0\times10^{-6}\text{m}^4$, $I_{yy}=4.0\times10^{-6} \text{m}^4$
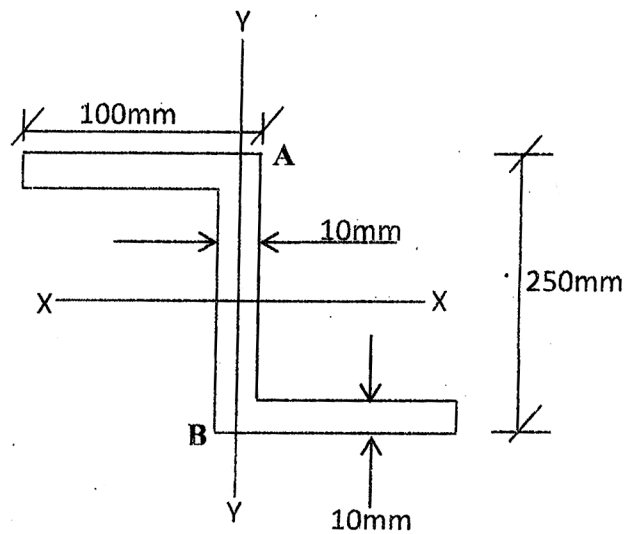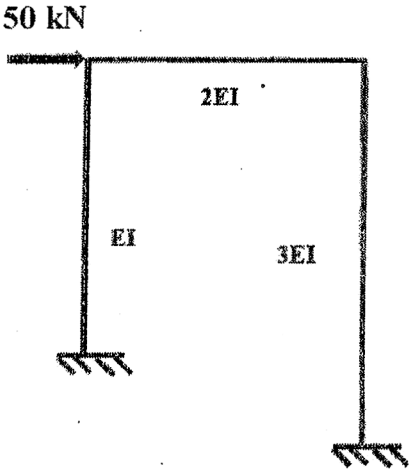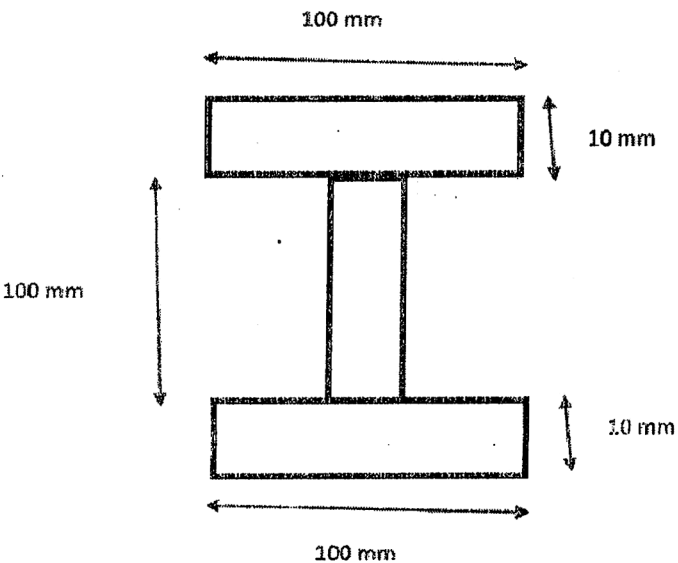

Fig.3

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Theory of Structures-II
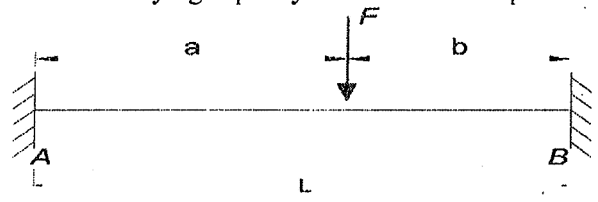**PART-II**

Time: Three Hours

Full Marks 100
(40 marks for 2nd part)

Use a separate Answer-Script for each part
[No code or handbook is allowed]

No. of questions	Part I (answer all questions)	Marks
1	Analyze the following portal frame by column analogy method and draw the Bending moment diagram. **50 kN** 2EI EI 3EI	12
2 (a)	Find the Shape factor of the following section. 100 mm 10 mm 100 mm 10 mm 100 mm	6

Find out the ultimate load F by upper bound theorem and lower bound theorem, if the plastic

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Theory of Structures-II
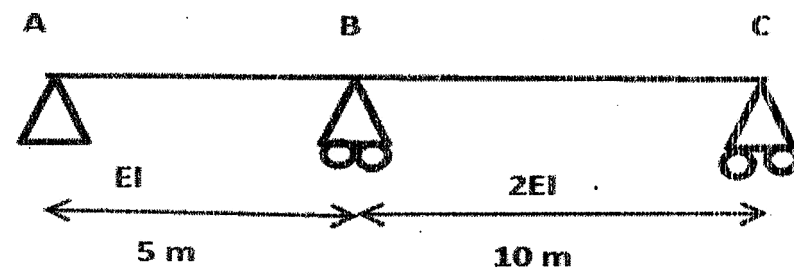
PART-II

Time: Three Hours

Full Marks 100

(40 marks for 2nd cart)

Use a separate Answer-Script for each part

[No code or handbook is allowed]

No. of questions	Part I (answer all questions)	Marks
2(b)	moment carrying capacity of the beam is Mp.	7
3	Find the maximum value of **reaction at B** of the beam ABC, if 15kN/m UDL of length 20mload passes over ABC. The beam is made of M30 grade of concrete. $I=0.09$ m^4.	15