Ex/CE/5/T/306/2023

BACHELOR OF ENGINEERING (CIVIL ENGINEERING) THIRD YEAR SECOND SEMESTER EXAM 2023

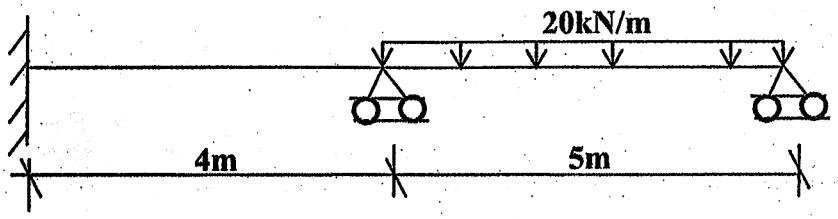
Subject: THEORY OF STRUCTURES-III

Full Marks:100 **Time: 3hours**

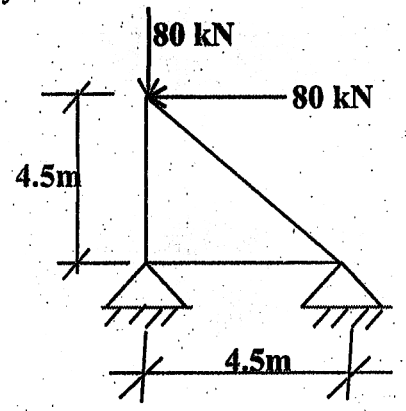
(Use Separate Answer scripts for each Part)

Part- I (Marks 50)

1. Analyze the beam given below. **Use Flexibility method (member approach).** **25**



1. Analyse the truss shown below. All members have same "*A*" and "*E*". **Use Stiffness method.** **25**



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BACHELOR OF ENGINEERING (CIVIL ENGINEERING) THIRD YEAR SECOND SEMESTER EXAM 2023

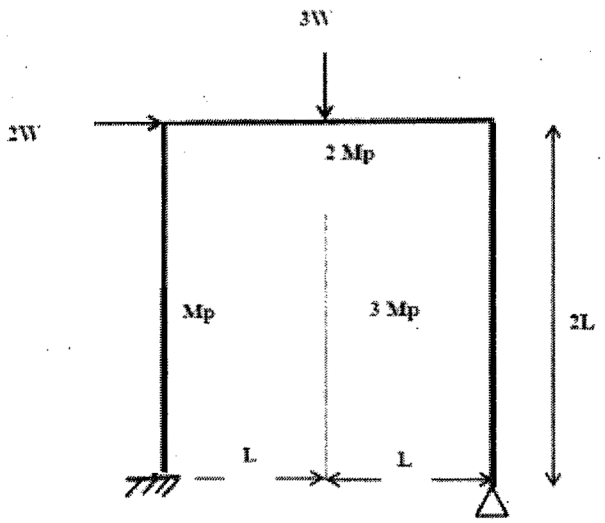
Theory of Structures III

PART-II (50 Marks)

Time: Three Hours | Full Marks 100

Use a separate Answer-Script for each part

[No code or handbook is allowed]

No. of questions	Part I (answer all questions)	Marks (50)
1)	A suspension cable of 100 meters horizontal span and central dip 6 m has a stiffening girder hinged at both ends. The load transmitted to the cable including its own weight is 2500 kN. The girder carries live load 20 kN/m UDL over the left quarter of the span. Assuming the girder to be rigid, calculate the shear force, bending moment in the girder at 15 m from the left support. Also calculate the maximum tension in the cable.	12
2 (a)	Find out the ultimate point load W, acting on a propped cantilever beam of length L, by upper bound theorem and lower bound theorem, if the plastic moment carrying capacity of the beam is Mp.	7
2(b)	Find the collapse load for the following portal frame. 	7

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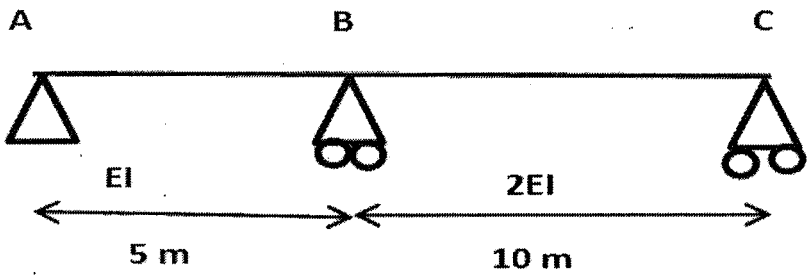
Theory of Structures III

PART-II (50 Marks)

Time: Three Hours | Full Marks 100

Use a separate Answer-Script for each part

[No code or handbook is allowed]

No. of questions	Part I (answer all questions)	Marks (50)
3)	Find the maximum value of B.M. at midpoint of BC of the beam ABC, if 10kN/m UDL load of length 50m load passes over ABC. The beam is made of M30 grade of concrete. I=0.1 m^4. 	14
4)	A steel beam is simply supported over a span of 8m. The cross section of the beam is an I section with depth 600mm. The moment of inertia with respect to the major axis is $2X10^9$ mm^4 and the modulus of elasticity, $E=2.1X10^5$ N/mm^2. The beam is subjected to central concentrated load of 10kN. Design a model for direct analysis using aluminum plates which are available in 3mm thickness. E for aluminum=$0.7X10^5$ N/mm^2.	10