Ref. No.: EX/CE/T/324/2017

Name of the Examination: B. E. CIVIL ENGINEERING 3rd Year, 2nd Semester, 2017

Subject: Theory of Structures – III **Time: Three (3) Hours** **Full Marks: 100**

Part I

Use separate answerscript for each part

Question 1: Analyze the beam shown in Figure 1 using Stiffness Matrix Approach/Flexibility Matrix Approach and plot the shear force (SFD) and bending moment diagram (BMD). (25)

Question 2: Analyze the portal frame shown in Figure 2 using Stiffness Matrix Approach. Consider the axial effect of the individual member. Plot the SFD and BMD for the frame. Show clearly the development of the transformation matrix (if required) and the sign convention used while analyzing the problem. (25)

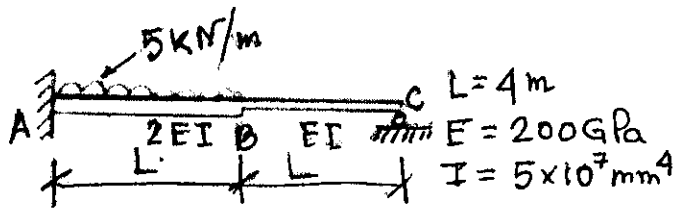


Figure 1

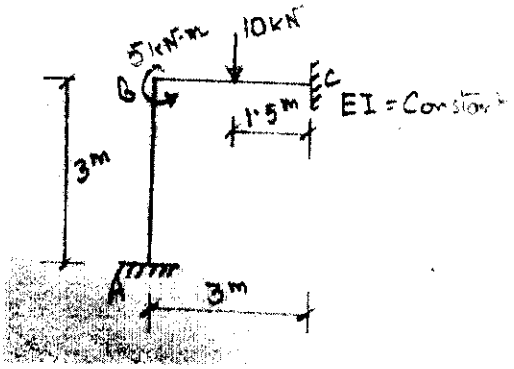


Figure 2

B.E. Civil Engineering - Third Year - Second Semester

Theory of Structures-III

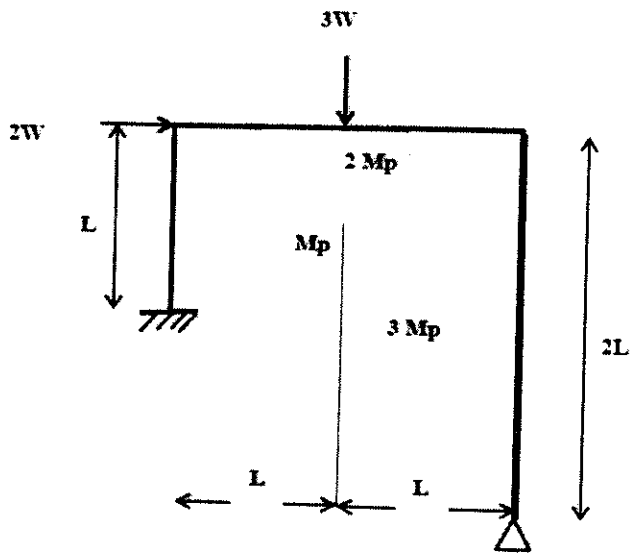
PART-II

Time: Three Hours

Full Marks
(50 marks for each p

Use a separate Answer-Script for each part

[No code or handbook is allowed]

No. of questions	Part II (Answer Any Two of the following questions.)	Marks (2X25=5
1	A suspension cable of 80 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 1500 kN. The girder carries live load 25 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.	10
2	A suspension bridge is of 150 m span. The cable of the bridge has a dip of 10m. The cable is stiffened by a girder with hinges at either end and at centre. The dead load of the girder is 10 kN/m. A single concentrated load of 400 kN passes through it. i) What is the value of maximum horizontal pull? ii) What will be the maximum load intensity (w) of load transmitted to the cable? iii) What will be the maximum bending moment at 12 m from left end? iv) Find the greatest positive and negative bending moment of the girder when Also find the maximum tension in the cable.	15
2 (a)	Define lower bound theorem and upper bound theorem and uniqueness theorem.	7
(b)	Find the collapse load for the following portal frame. 	18

Ex/CE/T/324/2017

B.E. Civil Engineering - Third Year - Second Semester

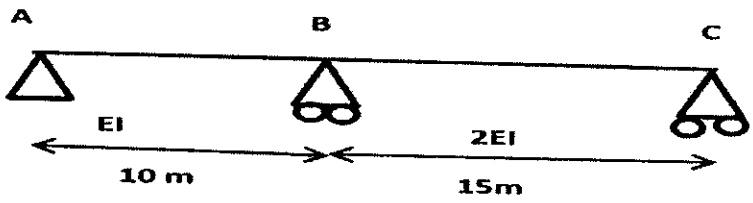
Theory of Structures-III

PART-II

Time: Three Hours

Full Marks 100
(50 marks for each part)

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

No. of questions	Part II (Answer Any Two of the following questions.)	Marks (2X25=50)
3 (a)	Draw the influence line diagram for R_A, R_C, M_B, B.M. and S.F. at midpoint of AB of the beam ABC. The beam is made of M25 grade of concrete. I=0.0864 m^4. 	20
(b)	State and explain Mulller-Breslau's principle.	5