

Name of the Examinations: B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER - 2018

Subject : THEORY OF STRUCTURES-III

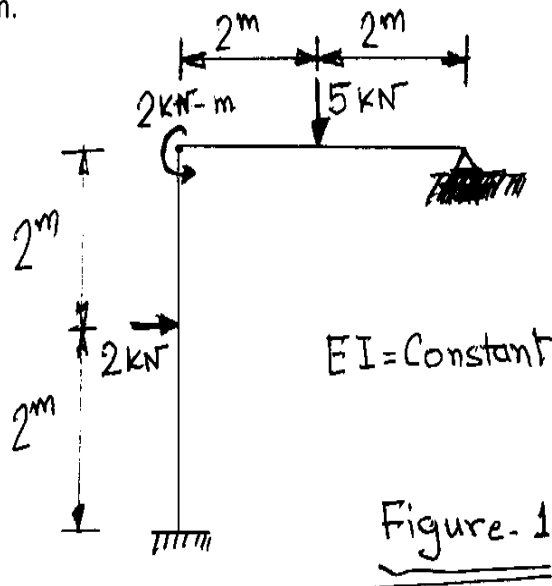
Time : Three Hours

Full Marks : 100

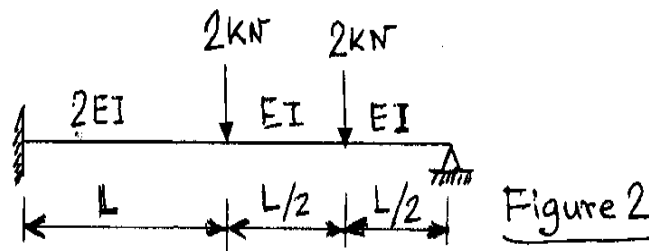
## Part I

Instructions : Use Separate Answer scripts for each Part

Question 1. Analyse the frame shown in Figure 1 using stiffness matrix method and plot the bending moment and shear force diagram for the same. Assume  $E = 200 \text{ GPa}$  and a square cross section of  $0.15 \text{ m} \times 0.15 \text{ m}$ . (25)



Question 2. Analyze the beam shown in Figure 2 using Flexibility Matrix approach and plot the SFD and BMD. ( $E = 200 \text{ GPa}$ ,  $I = 50 \times 10^6 \text{ mm}^4$ ,  $L = 4 \text{ m}$ ) (25)



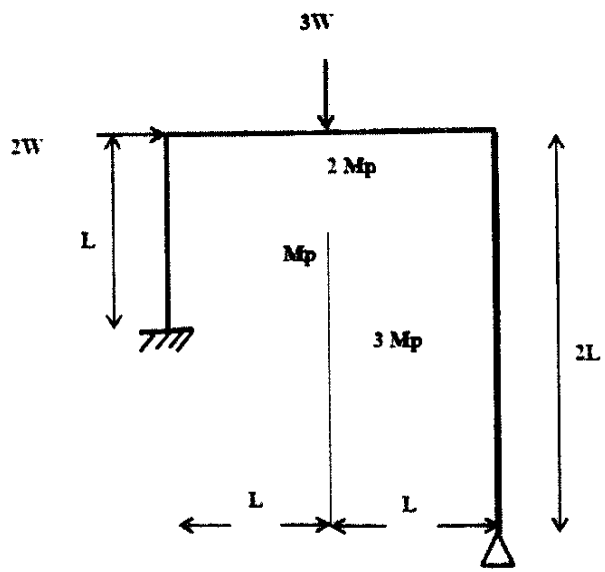
Question 3. Illustrate the different steps to obtain the flexibility matrix for an indeterminate structure. (10)

**B.E. Civil Engineering - Third Year - Second Semester-18**  
**Theory of Structures-III**  
**PART-II**

Time: Three Hours

Full Mark  
(40 marks for 2<sup>n</sup>)

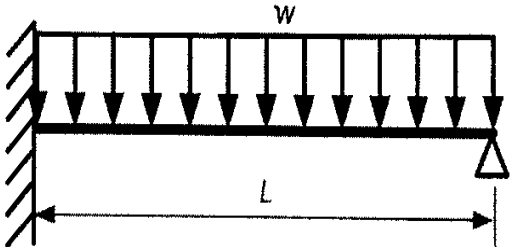
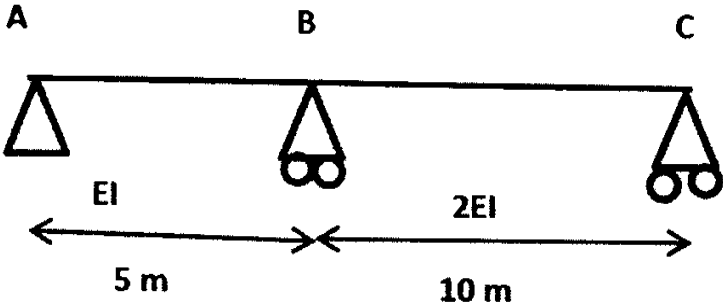
Use a separate Answer-Script for each part  
**[No code or handbook is allowed]**

No. of questions	(answer all questions)	Marks (10+1)
1	<p>Derive the influence line diagram of horizontal force on pylon, tension in the suspender, bending moment and shear force at any point on a three hinge stiffening girder of a suspension cable stayed bridge.</p> <p style="text-align: center;">Or</p> <p>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.</p> <p>i) What is the value of maximum horizontal pull?            ii) What will be the maximum load intensity (<math>w</math>) 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.</p>	10
2 (a)	<p>Find the collapse load for the following portal frame.</p> <div style="text-align: center;">  </div>	8

**B.E. Civil Engineering - Third Year - Second Semester-18****Theory of Structures-III****PART-II**

Time: Three Hours

Full Marks 100  
(40 marks for 2<sup>nd</sup> part)Use a separate Answer-Script for each part  
[No code or handbook is allowed]

No. of questions	Questions (answer all questions)	Marks (10+15+15)
2(b)	<p>Find out the ultimate load <math>w</math> by upper bound theorem and lower bound theorem, if the plastic moment carrying capacity of the beam is <math>M_p</math>.</p> 	(7)
3	<p>Find the maximum value of B.M. and S.F. at midpoint of AB of the beam ABC, if 50 kN concentrated load passes over ABC. The beam is made of M25 grade of concrete. <math>I=0.0864 \text{ m}^4</math>.</p> 	15