H.T.No. | | | | | | | | | | |

**Code No: CE1503** **GEC-R14**

## II B. Tech I Semester Supplementary Examinations, May 2016

# MECHANICS OF SOLIDS–I

**(Civil Engineering)**

**Time: 3 Hours** **Max. Marks: 60**

**Note:** All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

## PART-A

**6 × 2 = 12M**

1. Define Lateral strain and Poisson's ratio.
2. Establish the relation between the elastic constant E and K.
3. Define point of contra- flexure and give its significance?
4. What assumptions are taken in the analysis of shear stress in beams?
5. Determine equivalent spring stiffness of two springs when connected in series and parallel.
6. List out the assumption made in the analysis of perfect frames.

## PART-B

**4 × 12 = 48M**

1. Axial pull of 35000 N is acting on a bar consisting of three lengths as shown in Fig. 1.If the Young's modulus = 2.1 x $10^5$ N/mm$^2$, determine: (12M)
   i) Stresses in each section and
   ii) Total extension of the bar.

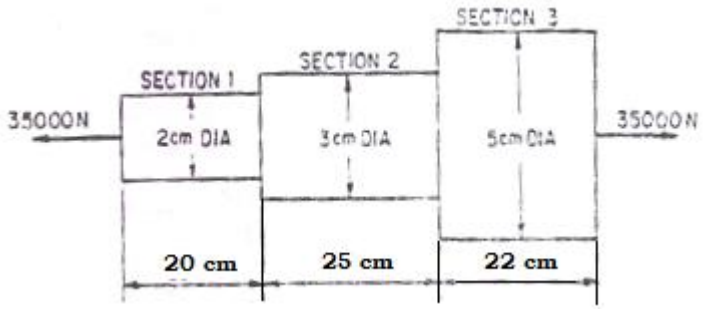



Fig.1

2. Determine the changes in length, breadth and thickness of a steel bar which is 5 m long, 40 mm wide and 30 mm thick and is subjected to an axial pull of 35 kN in the direction of its length. Take E = 2 x $10^5$ N/mm$^2$ and Poisson's ratio = 0.32. (12M)
3. a) Draw the SFD (shear force diagram) and BMD (Bending moment diagram) for the cantilever with uniformly distributed load (UDL) of intensity "w" per meter length acting over total length of the beam L. (6M)

b) Derive the relationship between rate of loading, shear force and bending moment starting from fundamentals. (6M)

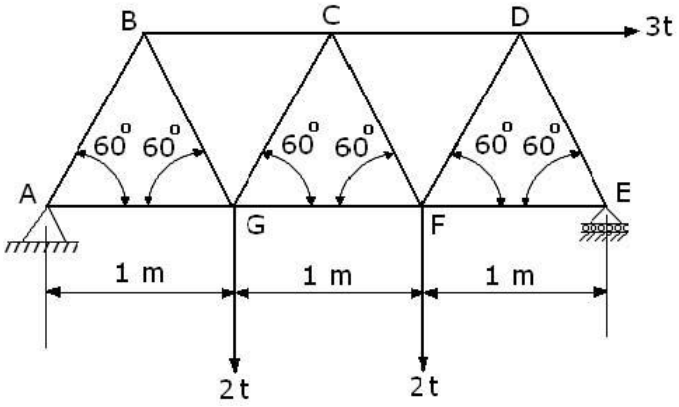
4. a) Derive the expression $M/I = f/y = E/R$ from first principles. (6M)

   b) A rectangular column of width 120 mm and of thickness 100 mm carries a point load of 120 kN at an eccentricity of 10 mm. Determine the maximum and minimum stresses at the base of the column. (6M)

5. A 300 mm X 150 mm I girder having 12mm thick flanges and 8 mm thick web is subjected to a shear force of 150kN at a particular section. Determine the value of the maximum shear stress in the flange. Also find the ratio of the maximum shear stress to minimum shear stress in the web.

(12M)

6. Calculate the forces induced in the member of a pin-jointed truss shown in figure. (12M)

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