**Registration no:** | | | | | | | | | | |

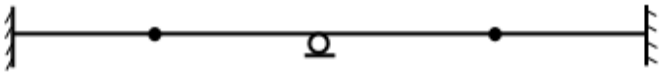
**Total Number of Pages: 2** **B.Tech**
**PCCE4204**

# 4th Semester Back Examination 2016-17
## STRUCTURAL ANALYSIS - I
### BRANCH: CIVIL
### Time: 3 Hours
### Max Marks: 70
### Q.CODE: Z450

**Answer Question No.1 which is compulsory and any five from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1** **Answer the following questions:** **(2 x 10)**

**a)** Define *strain energy*.
**b)** Draw a qualitative influence line diagram for the support reactions of a simply supported beam of span L?
**c)** Name any four methods used for computation of deflections of a structure.
**d)** Distinguish between *pin jointed* and *rigid jointed* structures.
**e)** What is the different between the basic action of an *arch* and a *suspension cable*?
**f)** Draw the stress-strain curve for mild steel showing salient features.
**g)** Differentiate between *determinate structure* and *indeterminate structure*.
**h)** State Castigliano's second theorem.
**i)** Find degree of indeterminacy of structures as given below



**j)** State Maxwell-Betti"s theorem.

**Q2** **a)** Under what conditions will the bending moment in an arch be zero throughout? **(2)**

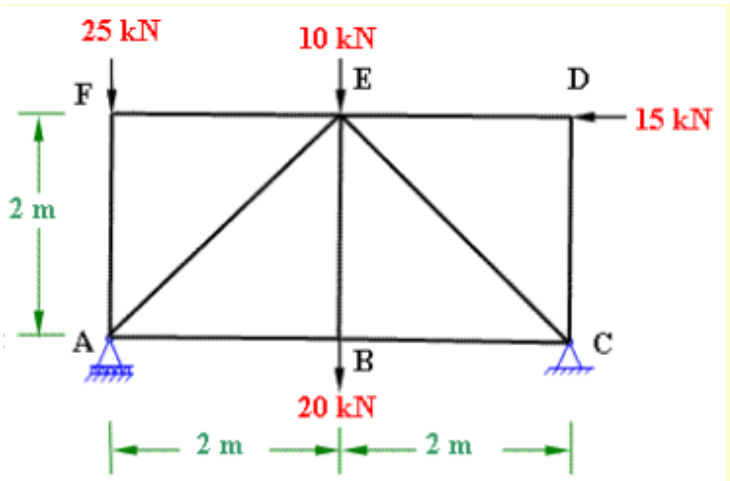
**b)** A three hinged semi circular arch of radius R having uniform flexural rigidity carries a concentrated load w at the crown. Find the horizontal reaction at each support. **(8)**

**Q3** Derive the influence diagram for reactions and bending moment at any section of a simply supported beam. Using the ILD, determine the support reactions and find bending moment at 2m, 4m and 6m for a simply supported beam of span 8m subjected to three point loads of 10kN, 15kN and 5kN placed at 1m, 4.5m and 6.5m respectively. **(10)**

**Q4** A three hinged parabolic arch of span 20 m and rise 4m carries a UDL of 20 kN/m over the left half of the span. Draw the BMD. Calculate normal thrust and radial shear at 5m from the left hand hinge. **(10)**

**Q5** A fixed beam ABC has two spans, AB= 5m and BC =4m. A uniformly distributed load of 15kN/m acts on span AB. On span BC ,a point load of 20 kN acts at the centre of the span. Analyse the beam using three moment theorem method. Also draw the bending moment diagram. **(10)**

**Q6** Determine the vertical deflection of joint E. All the members have cross-sectional area of 250mm$^2$ and E= 200GPa. **(10)**




**Q7** A suspension cable with 50m span and 4m dip is stiffened by a three-hinged girder. The dead load of the girder and the deck is 7.5kN/m. A concentrated load of 100kN is placed at 8m from the left end. Find the maximum tension in the cable. **(10)**

**Q8** **Write short answer on any TWO:** **(5 x 2)**

**a)** Unit load method

**b)** Virtual work method

**c)** Consistent deformation method

**d)** Degree of redundancy