**Registration No :** | | | | | | | | | | |

**Total Number of Pages : 02** **B.Tech**

**PCCE4204**

**4th Semester Back Examination 2018-19**

**STRUCTURAL ANALYSIS - I**

**BRANCH : CIVIL**

**Time : 3 Hours**

**Max Marks : 70**

**Q.CODE : F916**

**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 degree of static indeterminacy.

**b)** What is the degree of kinematic indeterminacy of a beam fixed at both ends?

**c)** Define influence line diagram.

**d)** Find the degree of degree of static indeterminacy of beam fixed at one end and hinged at other end.

**e)** Write advantages of fixed beams.

**f)** State Betti's law.

**g)** Define horizontal thrust at supports of an arch.

**h)** A three hinged parabolic arch of span L and rise h carries a uniformly distributed load of w per unit over whole span. Show that the arch is not subjected to any bending moment at any section.

**i)** Define strain energy.

**j)** Distinguish between pin jointed frame and rigid jointed frame.

**Q2** **a)** A cantilever beam of span 4m is supported at the free end to the level of fixed end. It carries a concentrated load of 20 kN at the centre of the span. Calculate the reaction at the prop and draw the shear force and bending moment diagram. **(5)**

**b)** State and explain Castigliano's theorems. **(5)**

**Q3** **a)** Write note on consistent deformation method. **(5)**

**b)** A suspension cable has a span of 160m and central dip of 16m. It carries a load of 5kN/m over horizontal length. Calculate maximum and minimum tension in the cable. **(5)**

**Q4** **a)** A uniformly distributed load of intensity 30 kN/m crosses a simply supported beam of span 60m from left to right. The length of uniformly distributed load is 15m. Find the value of maximum bending moment for a section 20 m from left end. **(5)**

**b)** A symmetric three-hinged parabolic arch of span 20m and rise 3m is subjected to a concentrated load of 300 kN, moving from left to right. Determine the maximum positive and negative bending moments at 5m from left support. **(5)**

**Q5** **a)** Find out the end moments of a beam fixed at both ends and length 4 m, carrying a point load of 30 kN at mid span. Find out the maximum deflection if EI= 2000 $kNm^2$. Given E= Young's modulus of elasticity and I is moment of inertia of beam **(5)**

**b)** A uniformly distributed live load 60 kN per meter run of length 5m moves on a girder of span 16m. Find out the maximum positive and negative shear force at a section 6m from the left end. **(5)**

**Q6** A three hinged parabolic arch parabolic arch hinged at supports and crown has a span of 25 m and rise of 5m. It carries a concentrated load of 50 kN at 15m from left support and uniformly distributed load of 30 kN/m over left half of the portion. Determine the normal thrust, radial shear and bending moment at a section 5m from left support. **(10)**

**Q7** A continuous beam ABC, simply supported at A, B and C having AB= 6m and BC=4m. The span AB caries uniformly distributed load of 4 kN/m and span BC carries BC carries uniformly distributed load of 6 kN/m. Find reactions and bending moments at three supports and draw the shear force and bending moment diagrams. Use three moment theorem. **(10)**

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

**a)** Space truss
**b)** Virtual work method
**c)** Maximum bending moment envelope