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

Total Number of Pages : 02 **B.Tech**
PCI5I101

5th Semester Regular / Back Examination 2019-20
STRUCTURAL ANALYSIS - II
BRANCH : CIVIL
Max Marks : 100
Time : 3 Hours
Q.CODE : HRB068

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) State the difference between force method and displacement method.
b) Write assumptions made in slope deflection method.
c) Define the term storey shear.
d) Explain the term plastic moment capacity.
e) Write the difference between elastic hinge and plastic hinge.
f) State the relationship between stiffness matrix and flexibility matrix.
g) Define degree of kinematic indeterminacy.
h) Write two conditions for sway.
i) What is horizontal thrust of a semicircular arch (Radius R) subjected to point load W at crown?
j) Define carryover factor.

Part- II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) A simply supported beam of rectangular section carries a uniformly distributed load of intensity w per unit run over the whole span. Determine at collapse condition, what part of beam is fully elastic.
b) A two hinged arch parabolic arch of span 'L' and rise 'H' carries a uniformly distributed load of w per unit run for a distance 'a' from the left end. Determine the horizontal thrust.
c) A continuous beam ABC consists of spans AB and BC of lengths 5m and 8m respectively. The span AB carries a uniformly distributed load of 10 kN/m, while span BC carries a uniformly distributed load of 20 kN/m. The ends A and C are simply supported. Find the support moments assuming EI constant. Use slope defection method. (EI is constant) Where E= Young's modulus of elasticity, I= moment of inertia
d) Derive the expression for a shape factor for circular section having diameter D.
e) Write note on Matrix stiffness method.
f) State the upper bound and lower bound theorems and write their applications.
g) A continuous beam ABC consists of spans AB and BC of lengths 4 m and 8 m respectively. The span AB carries a uniformly distributed load of 60 kN/m, while span BC carries a concentrated load of 20 kN in the middle of the span. The ends A is fixed and C are simply supported. Find the support moments assuming EI constant. Use flexibility matrix method. (EI is constant) Where E= Young's modulus of elasticity, I= moment of inertia

h) A continuous beam ABC consists of spans AB and BC of lengths 5m and 6m respectively. Both ends A and C of the beam are having fixed support condition. The moment of inertia of span AB is four times of BC. The span AB carries a uniformly distributed load of 20 kN/m, while span BC carries a uniformly distributed load of 30 kN/m. find the support moments using Kani's method.

i) Write steps involved in analysis of fixed arches.

j) Derive slope deflection equation for two span beams.

k) Derive the sway correction factor of a single bay, single story frame.

l) Define the term rotation factor as used in Kani's method and derive the expression for it.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A two hinged portal frame ABCD consist of vertical columns AB and CD of 6 m height each and beam BC of 10 m length. The frame carries a vertical point load of 150 kN on the beam at a distance 4 m from B. Find the reactions at supports and draw the bending moment diagram for the frame. Assume all members have same flexural rigidity (EI is constant). Use moment distribution method. The ends A and D are hinged. Where E= Young's modulus of elasticity, I= moment of inertia. The ends A and D are having hinged support. **(16)**

Q4 The two hinged girders of a suspension bridge have a span of 150 m, the dip of the supporting cable is being 15 m. If the girder is subjected to two point loads of 250 kN and 500 kN at distances of 30m and 100 m from the left end respectively. Find the shear force and bending moment for girder at 35 m from left end. Find the maximum tension in the cable. **(16)**

Q5 A two span continuous beam ABC with end A is fixed and C is hinged. The span AB is loaded with uniformly distributed load having intensity of 100 kN/m and the span BC carries a point load of 150 kN at middle. The length of span AB and BC are 10 m and 15 m respectively. Use stiffness matrix method for analysis assuming uniform flexural rigidity. (EI is constant) Where E= Young's modulus of elasticity, I= moment of inertia **(16)**

Q6 Determine the plastic moment carrying capacity of the frame of the frame ABCD assuming same section throughout. In this frame AB and CD are columns and BC is the beam. The ends A and D are having fixed support. The length of AB and CD are 4m and 6m respectively. A horizontal concentrated load 20 kN acting at the joint B. The beam carries a concentrated load of 50 kN in the middle of the span (Transverse loading). The span length of beam BC is 10m. (EI is constant) Where E= Young's modulus of elasticity, I= moment of inertia **(16)**