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

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

PCI4I001

4th Semester Regular / Back Examination 2018-19

STRUCTURAL ANALYSIS - I

BRANCH : CIVIL

Max Marks : 100

Time : 3 Hours

Q.CODE : F698

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) Define statically indeterminate structures.
b) Write applications of influence line diagrams.
c) State the advantages of arches over beams.
d) Define conjugate beam.
e) State Castigliano's first theorem finding deflections.
f) Differentiate between force method and displacement method of structural analysis.
g) Define crown of an arch.
h) State principle of minimum potential energy.
i) Distinguish between plane truss and space truss.
j) State the theorem of three moments.

Part- II

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

a) A three hinged parabolic arch has a span of 50 m and rise of 15m. The arch carries a uniformly a distributed load of 80 kN per meter on the left half of the span. It also carries two concentrated loads of 160 kN and 100 kN at 10m and 20m from right end. Determine the horizontal thrust at each support.
b) Write note on Williot-Mohr Diagram.
c) A cable carrying a load of 10 kN per meter run of horizontal span is stretched between supports 100 m apart. The supports are at same level and central dip is 8m. Find the greatest and least tensions in the cable.
d) A simply supported beam of 5m span carries a point load of 40 kN at a distance of 2m from left end. Find the deflection under the point load. Take EI= 8000kNm^2. Where E= Young's Modulus of Elasticity and I= Moment of Inertia. Use strain energy method.
e) A simply supported beam of length L carries a central point load W. If the moment of inertia is 3Iat the left half, andI at the right half, find the slope at supports and deflection at midspan. Use conjugate beam method. Where I is moment of inertia.
f) A simply supported beam has a span of 15m. Uniformly distributed load of intensity 40 kN/m and 5m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section 6m from left end.
g) State and prove moment area theorems.
h) A live load of 50 kN per meter and 8 meter long moves on a simply supported girder of span 10m. Find the maximum bending moment which can occur at a section 4m from the left end.
i) Two wheel loads 80 kN and 1200 kN, spaced 2m apart move on a girder of span 16m. Find the maximum positive and negative shear force at a section 4m from the left end. Any wheel load can lead the other.

j) A cantilever of span L carries a point load W at its free end. It is propped at a distance L/3 from free end. Find the prop reaction.

k) Write note on normal thrust and radial shear for three hinged arches.

l) Explain about unit load method of analysis of structures.

Part-III

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

Q3 The cable of a suspension bridge of span 100m has a dip of 10m. The cable is stiffened by a three hinged girder. The dead load of the girder is 10 kN per meter. Find the greatest bending moment for the girder due to passage of a 200 kN load. Find the maximum tension in the cable. **(16)**

Q4 A continuous beam ABC are of span lengths AB= 5m and BC = 8m. The portion AB carries a uniformly distributed load of 50 kN/m and the portion BC carries a uniformly distributed load of 120kN/m. If all the supports are simply supported, then analyze the beam using three moment theorem. Draw the shear force and bending diagram. **(16)**

Q5 Draw the influence line diagram for reaction, shear force, bending moment of a simply supported beam of span "L". **(16)**

Q6 A fixed beam of 4m span is carrying a uniformly distributed load of 10 kN/m, spreading over whole span and a point load of 10 kN at the mid span.Draw the shear force and bending diagram and find maximum deflection if EI= 2500 kNm^2. Where E= young's modulus of elasticity and I= moment of inertia. **(16)**