Printed Pages—4 TCE501

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0053 Roll No.

B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2012-13

STRUCTURAL ANALYSIS—II

Time : 3 Hours *Total Marks : 100*

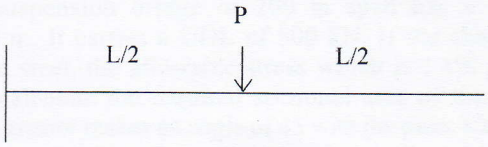
Note :—*(1) All questions are compulsory and carry equal marks.*

(2) Assume suitable data wherever necessary.

$E = 2 \times 10^6$ kN/m²

1. Answer any **FOUR** parts of the following : **(4×5=20)**

(a)



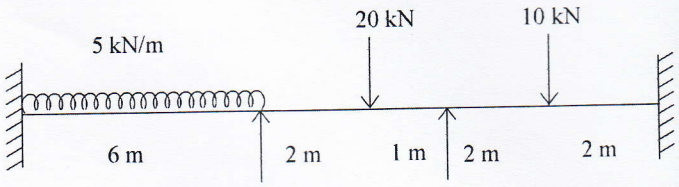
Find reaction at free support for above figure if moment of inertia of left half is twice as that of right half.

(b) A continuous beam ABCD fixed at A and D and hinged at B and C is divided in three equal parts of 5 m each. If B sinks by 20 mm and C by 40 mm find the moments at each end. Assume standard values of E, I.

(c) State and explain the method of least work.

(d) State and explain Strain energy method.

(e) Solve the numerical below by moment distribution method :



AB = CD = I, BC = 2I

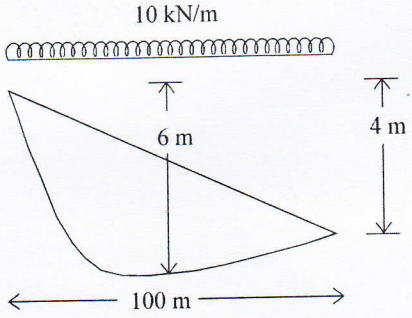
(f) Derive slope deflection equation for general cases of beams.

2. Answer any **FOUR** parts : **(4×5=20)**

(a) State and explain MULLER-BREASLAU principle along with assumptions.

(b) A suspension cable supported at same level has maximum dip of 3 m and loaded with a UDL of 1 kN/m on its horizontal span of 30 m. Find maximum tension in cable and inclination with horizontal.

(c) A cable of uniform cross sectional area is stretched between two supports 100 m apart with one end 4 m above the other end. The cable is loaded with a UDL of 10 kN/m and the sag of cable measured from the higher end is 6 m. Find the horizontal tension in the cable. Also find maximum tension in the cable.



(d) Derive the formula for horizontal thrust for a parabolic arch having span I, rise h having load W at distance 'a' from left end.

(e) Prove that horizontal thrust developed due to point load W acting at the crown in a two hinged semicircular arch of radius 'R' is independent of its radius. Consider E, I as constant.

(f) A two hinged parabolic arch of span 30 m and rise 6 m is loaded with 60 kN from its left end. Find the horizontal thrust and maximum positive bending moment.

3. Answer any **TWO** parts : **(2×10=20)**

(a) A suspension bridge of 4 m span has 3 m wide platform which is subjected to a load of 6400 kN/m^2. The bridge is supported by a pair of cables having central dip of 4·5 m. Find the cross sectional area of the cable wire if the permissible stress in cable material is not to exceed 1200 kN/cm^2.

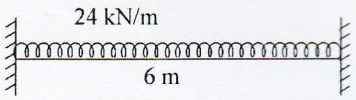
(b) A suspension bridge of 200 m span has a dip of 200 m. It carries a UDL of 500 kN. If the chains are mild steel, the allowable stress which is 1 kN per sq. m, calculate the required sectional area of the chain. The anchor makes an angle of 45 with the piers. Calculate the over turning force on the pier (a) when the chain runs over the pulley device (b) when the chains are attached to a saddle resting on rollers at the top of pier.

(c) A three hinged stiffening girder of a suspension bridge of span 100 m is subjected to two point loads of 200 and 300 kN at a distance of 25 m and 50 m from left end. Find the shear forces and bending moments for the girder at a distance 30 m from the left end. The supporting cable has a central dip of 10 m. Find also the max tension and the slope in the cable.

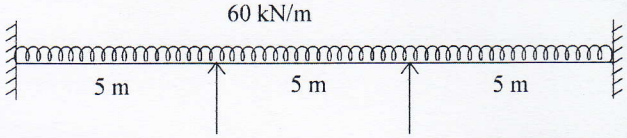
4. Attempt any **TWO** parts of the following : **(2×10=20)**

(a) State and establish relation between flexibility and stiffness matrix.

(b) Analyze the fixed beam shown below using force method :



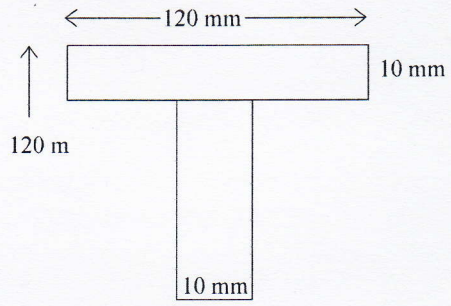
(c) Analyze the continuous beam shown by displacement method :



5. Answer any **TWO** parts of the following : **(2×10=20)**

(a) A propped cantilever of length 3 L have weight W at a distance L from fixed end. Find collapse load.

(b) Determine the shape factor of the following figure :



(c) For the following frame, find the plastic moment capacity of the section. Load factor = 1·75.