

**B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)**

**Term-End Examination
December, 2013**

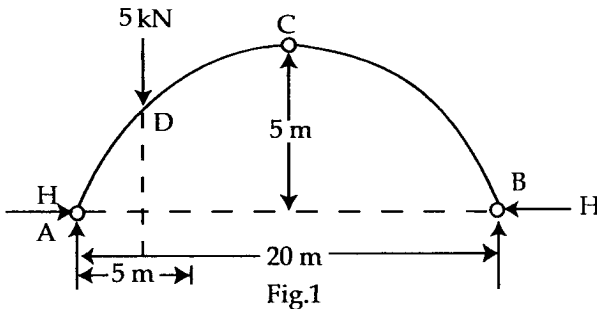
ET-502(B) : STRUCTURAL ANALYSIS

Time : 3 hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. A three hinged parabolic arch of 20 m span and 5 m central rise carries a point load of 5 kN at 5 m from the left hand hinge. Calculate the reactions at A and B and horizontal thrust. 14



2. A live load of 8 kN per meter moves on a simply supported girder of span 12 meters. Find the maximum bending moment which can occur at a section 4 meters from the left end. The length of the load is greater than the span of girder. 14

3. Calculate the moments at the fixed ends of the beam as shown in figure-2. Also draw the shearforce and bending moment diagram. 14

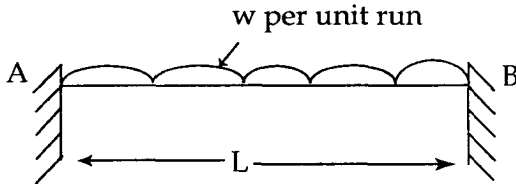


Fig - 2

4. A beam of length L is supported at the ends and at the middle point as shown in figure-3. The beam carries a uniformly distributed load of w per unit run over the whole span. Determine the reactions at A, B and C by using strain energy concept. 14

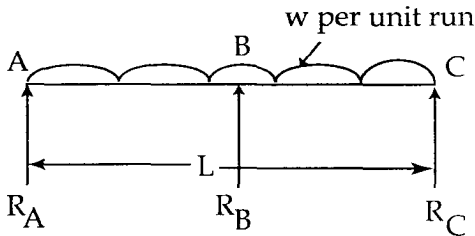


Fig - 3

5. Using Euler's theory, compare the buckling strength of two long columns of same length, material and weight. One of solid circular section 20 mm in diameter, the other of solid square section. Both columns are pinned at the ends. 14

(a) Show that shape factor for a rectangular section is 1.5. 7

(b) A propped cantilever beam of span L carries a uniformly distributed load W (total load) on whole span as shown in figure-4. Determine the value of W at collapse. The plastic moment of resistance of the beam is M_p . 7

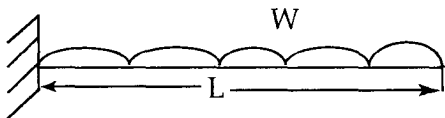


Fig - 4

Two steel shafts A and B of the same length are subjected to equal torques. Shaft A is of diameter D and shaft B is of diameter D over its half length and diameter $D/3$ over the other half of the length. Show that ratio of strain energy in shaft B and A is 41. 14

Write short notes on any two of the following :

(a) Determinate Structures

2x7=14

(b) Tension in Cables

(c) Types of supports.