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Total No. of Questions : 09

B.Tech.(CE) (2012 to 2017) (Sem.–4)

STRUCTURAL ANALYSIS – I

Subject Code : BTCE-406

M.Code : 56088

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1. Answer briefly :

a) Define Castigiliano's first theorem.

b) Differentiate between sway and non sway frames. Explain with diagram.

c) What do you mean by kinetic indeterminacy?

d) Explain Maxwell's law of reciprocal deflection.

e) Define tension coefficient.

f) What is retaining wall? Write down different types of retaining wall.

g) Describe in brief the significance of influence line diagram.

h) State the Muller Breslau's principle.

i) When the macaulay's method is preferred over double integration method?

j) What do you mean by middle third rule?

SECTION-B

Q2. A three hinged parabolic arch hinged at the supports and at the crown has a span of 26m and a central rise of 6m. It carries a concentrated load of 55kN at 8 m from the left support and udl of 25 kN/m over the right half portion. Determine the maximum moment for the arch.

Q3. Compute the ordinates, at interval of 2.5m. of the influence line for the moment at A in figure below. The moment of inertia is constant.

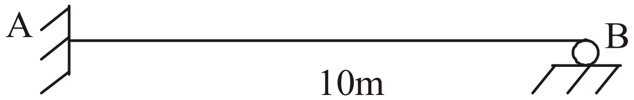

Fig.1

Q4. A retaining wall. 4m high, has a smooth vertical back. The backfill has a horizontal surface in level with the top of wall. There is uniformly Distributed surcharged load $36 kN/m^2$ intensity over the backfill. The unit weight of backfill is $18 kN/m^3$. Its angle of shearing resistance is 30° and cohesion is zero. Determine the magnitude and the point of application of active pressure per metre length of the wall.

Q5. A live load of 20KN/m, 6 m long moves on a simply supported girder of 10 m span. Find the maximum bending moment that can occur at a section 4m from the left end.

Q6. A beam of length "L" is simply supported at its ends and carries a point load of "W" at the centre. The moment of inertia of the beam is "2I" for the left half and "I" for the right half. Using conjugate beam method. Calculate slope at each end and at the centre. Also, find the deflection at the centre.

SECTION-C

Q7. A portal frame ABCD hinged at the base is loaded with a point load of 20 kN at the middle point of the beam BC and a horizontal UDL of 1.2 kN per metre on the column AB. The vertical members AB and DC are of same section, and $I_{bc} = I_{ab}$ Find the reactions at the supports and draw the B.M diagram.

Q8. A suspension bridge cable hangs between two points A and B separated horizontally by 120 m and with B 20m above A. The lowest point in the cable is 4m below A. The cable supports a stiffening girder weighing 0.33 KN/m run which is hinged vertically below A, B and the lowest point of the cable. Calculate the maximum tension which occurs in cable when a 10KN load crosses the girder from A to B.

Q9. Find the maximum deflection for the beam loaded as shown below using Macaulay's method.

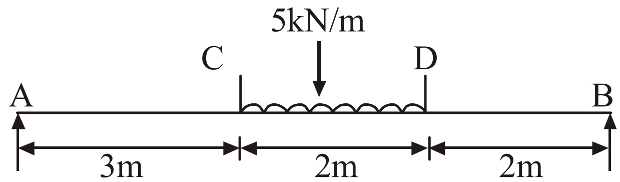

Fig.2

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.