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15CV42

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain briefly about different types of structural forms with the aid of neat sketches. **(06 Marks)**

b. What is linear and non-linear structural system? **(03 Marks)**

c. Analyse the pin jointed plane truss as shown in Fig.Q1(c) by method of joints and hence tabulate the member forces. **(07 Marks)**

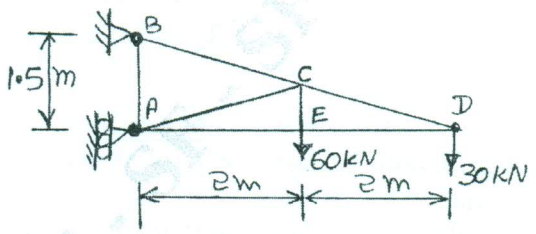

Fig.Q1(c)

OR

2 a. Explain briefly the following :
i) Conditions of equilibrium
ii) Determinate and indeterminate structures
iii) Degree of freedom. **(06 Marks)**

b. List the assumptions made in the analysis of pin jointed plane truss. **(03 Marks)**

c. Determine the force in the members CD, DF, EF and CF for the pin jointed plane truss as shown in Fig.Q2(c) by the method of sections. **(07 Marks)**

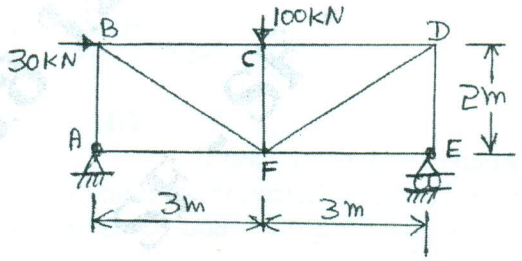

Fig.Q2(c)

Module-2

3 a. Derive the second order differential expression $EI\frac{d^2y}{dx^2} = m$ with usual notations. **(06 Marks)**

b. Calculate the deflection at point C and slope at point A for the beam loaded as shown in Fig.Q3(b) by moment area method. **(07 Marks)**

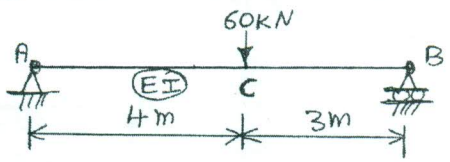

Fig.Q3(b)

c. State the moment area theorems. **(03 Marks)**

OR

4 a. Calculate the deflections at points C and D and maximum deflection and its location for the beam as shown in Fig.Q4(a) by Machaulay's method. Take value of EI = 17000 kN-m^2. **(09 Marks)**

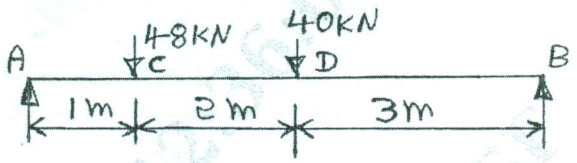

Fig.Q4(a)

b. Calculate the maximum deflection and slope in the beam loaded as shown in Fig.Q4(b) by conjugate beam method. **(07 Marks)**

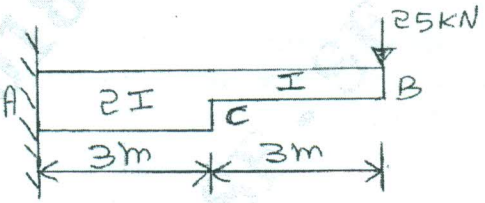

Fig.Q4(b)

Module-3

5 a. Derive the expression for strain energy stored in an prismatic element subjected to pure bending moment. **(05 Marks)**

b. Explain briefly what is complimentary strain energy. **(02 Marks)**

c. Determine the vertical and horizontal deflection point C for the mill bent as shown in Fig.Q5(c) by unit load method. **(09 Marks)**

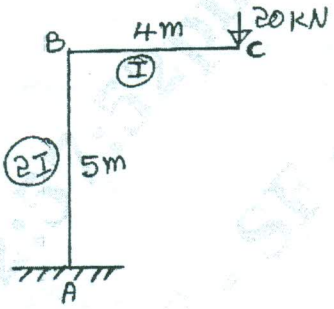

Fig.Q5(c)

OR

6 a. Sate Castigliano's theorems I and II. **(03 Marks)**

b. Determine the vertical deflection at point C for the pin jointed plane truss as show in Fig.Q6(b) by strain energy method. Cross section are of each member is 5000mm^2 and E = 2 × 10^{5}N/mm^2. **(07 Marks)**

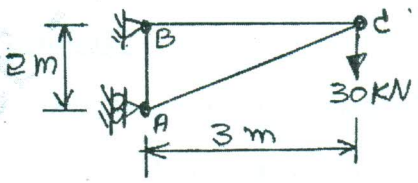

Fig.Q6(b)

c. Determine the deflection at point C for the beam loaded as shown in Fig.Q6(c) by unit load method. **(06 Marks)**

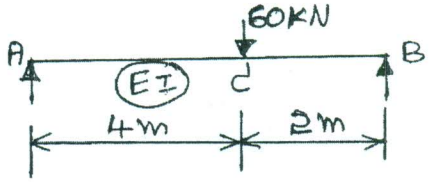

Fig.Q6(C)

Module-4

7 a. A three hinged parabolic arch is having a span of 36m. It is subjected to uniformly distributed load of intensity 30kN/m from left support hinge to crown hinge. Determine the normal thrust, radial shear and bending moment at quarter span point located from left support. **(08 Marks)**

b. A cable is suspended from two points 'A' and 'B' which are 80m apart. 'A' is positioned 5m below 'B'. The lowest point on the cable is 10m below point 'A'. The cable supports a uniformly distributed load of intensity 20kN/m over the entire span. Calculate reaction at supports and maximum tension in the cable. **(08 Marks)**

OR

8 a. Calculate the support reactions, normal thrust and radial shear at point 'D' for a three hinged parabolic arch as shown in Fig.Q8(a). **(08 Marks)**

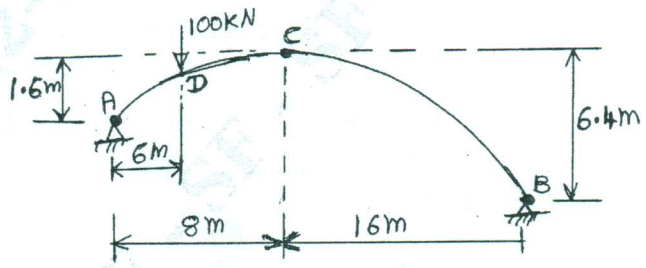

Fig.Q8(a)

b. A three hinged stiffening girder of suspension bridge of span 120m is subjected to two point loads of 480 kN and 600 kN at distances of 25m and 80m from the left support respectively. The dip of the cable is 12m. Calculate maximum tension in the cable and shear force, bending moment values for the stiffening girder at 40m from the left support. **(08 Marks)**

Module-5

9 a. Determine the shear force at a section located 3m from left support by constructing influence line diagram for the beam with loading as shown in the Fig.Q9(a). **(07 Marks)**

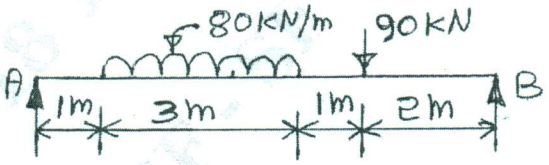

Fig.Q9(a)

b. A system of wheel loads move from left end to right end as shown in Fig.Q9(b) on a beam simply supported and having a span of 10m. Calculate the maximum bending moment which can occur at a section located 4.0m from the left end. **(07 Marks)**

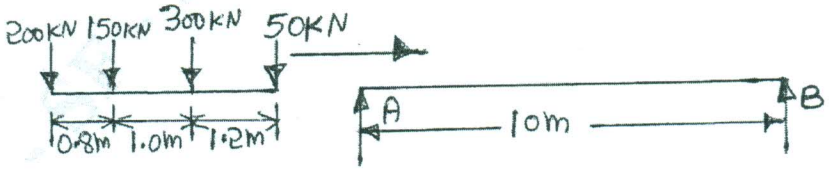

Fig.Q9(b)

c. Explain briefly what is influence line diagram. **(02 Marks)**

OR

10 a. Determine the influence line diagrams for the forces in the members U_1U_2, U_2U_3, L_2L_3, U_2L_2 and U_2L_3 for the part truss as shown in Fig.10(a). **(10 Marks)**

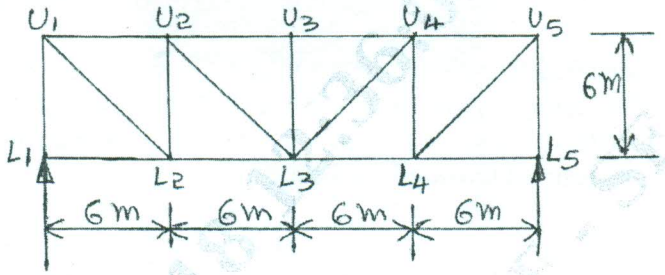

Fig.Q10(a)

b. A moving load travels from left to right on a girder of span 10m as shown in Fig.Q10(b). Determine the absolute maximum benign moment acting in the girder. **(06 Marks)**

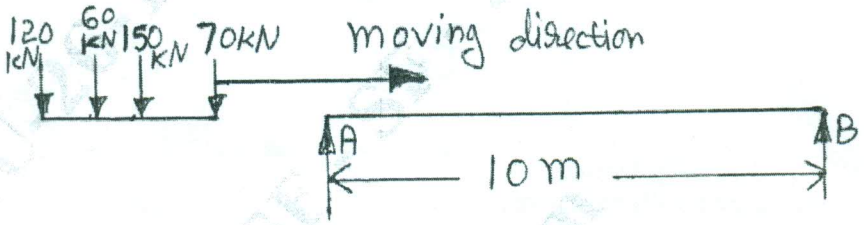

Fig.Q10(b)

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