Total No. of Printed Pages:3

S.E. (Civil) Semester- IV (Revised Course 2007-08)
EXAMINATION Nov/Dec 2019
Structural Analysis – I

[Duration : Three Hours] **[Total Marks : 100]**

Instructions:

1) Solve any Five (5) questions from the following such that it includes atleast 1(one) question from each module.
2) All main questions carry 20 marks each, with equal marks for all sub questions within.
3) Do substantiate your answers with illustrative sketches wherever found necessary.
4) IMPT: Assume realistic values of data that you may find missing in the problems, and state them clearly.

Module I

Q.1 With neat sketches, explain the behavior of deflection of a fixed cantilever beam loaded by a Point Load at its free end for: (i) gradual, (ii) sudden and (iii) impact loading conditions (showing variations in time.)

Q.2 Using any of the Strain Energy Methods, calculate the deflection of Point C of the Truss in Fig.1. Consider: E=2 x 10^5 N/mm2, and Area of cross Section as 100 mm^2 for all the members.

Module II

Q.3 Analyse (using any known method) the continuous beam as in Fig2; and sketch the resulting SFD and BMD.

Q.4 Analyse (using any known method) the continuous beam as in Fig 3; and sketch the resulting SFD and BMD.

Module III

Q.5 Consider a 20 m simply supported span and a load train passing on it from right to left as shown in fig.4. calculate: Absolute maximum bending moment for the span; maximum bending moment at a distance of 8m from the left hand support; and the maximum bending moment possible under the leading load.

Q.5 Sketch the influence line diagram for (a) Reactions at Support A, & (b) Influence Lines for BM at mid span, for a 20 m simply supported span. Using these two Influence Line Diagrams, calculate the Reactions at support A and the mid-span BM for the static load combination as shown in Fig.5.

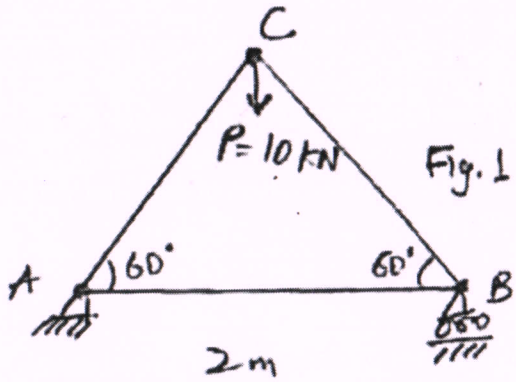
Module IV

Q.7 Consider a typical steel rope suspension bridge of 100 m span and with pylons supporting the 2 main suspension cables having a central dip of 20 m. UDL throughout is 100 kN/m for the entire span. Calculate the maximum and minimum cable tension and the vertical and horizontal reactions at the 2 supports. Differentiate between the 2 cable anchorage systems: (a) cable over guide pulleys at supporting pier, (b) cable clamped at saddle on smooth rollers. In case the cables of a suspension bridge is failing by

CB73D8065034A0BF9B3C0C6452B607C0

yielding, where do you expect the point to be; is it at the support pulleys, or the mid-span region? (Fig.6)

Q.8 See Fig.7. For the 2 hinged stiffening girder of a suspension bridge, draw the Influence Lines for reaction in member U3L3 (vertical member) and L3L4 (bottom horizontal); and find the forces in these two members (U3L3 & L3L4) if the stiffening girder is loaded only to the right half (U4 to U7) of the unit.



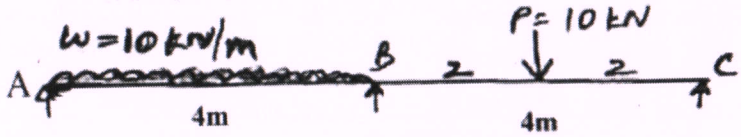


Fig. 2

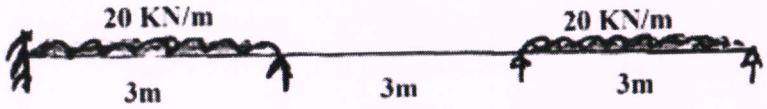


Fig . 3

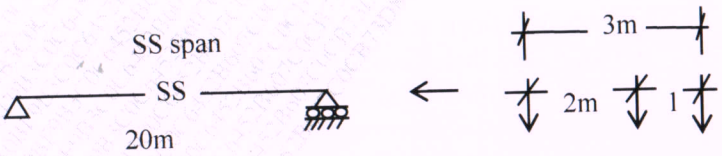


Fig .4 Load train

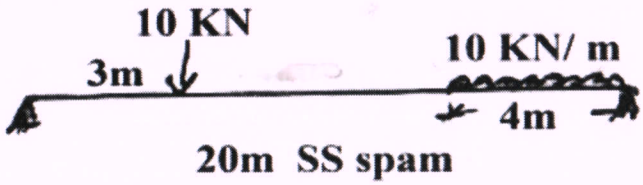


Fig . 5

a.

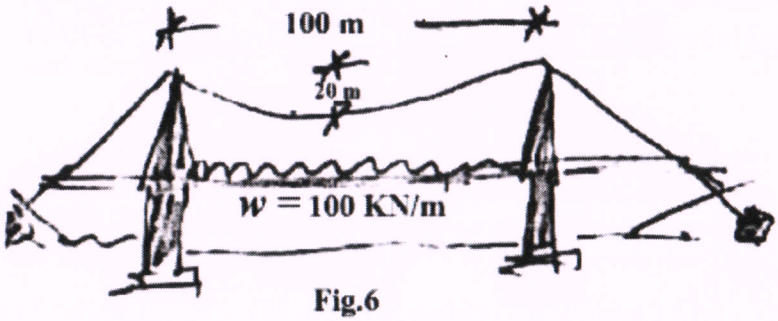


Fig.6

(Sketch)

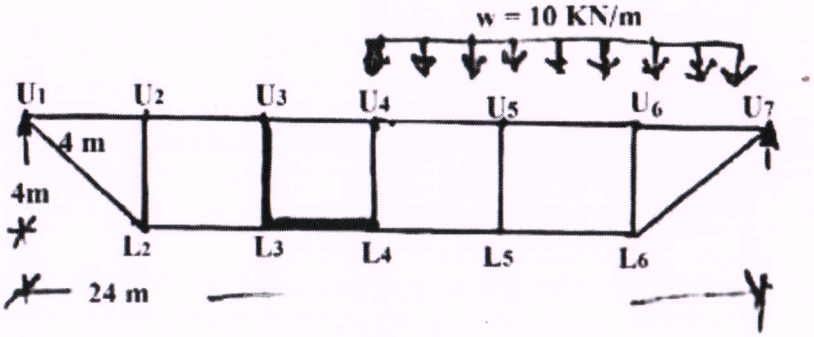


Fig . 7