VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

[Central Technological Institute, Maharashtra State]

Matunga, Mumbai-400 019

Semester Examination :April/May 2012   Date : 18th May 2012
Semester and☐ Course :SY Btech (Civil)   Time : 1.30pm to 4.30pm.
Time allowed :3 Hours   Maximum Marks :100
SUBJECT.: Structural Analysis I

INSTRUCTIONS:

1.   All questions are compulsory.
2.   Figures to the right indicate full marks.
3.   Assume suitable data if necessary and state the same clearly.
4.   Illustrate your answers with neat sketches wherever necessary.

Q1   Answer the following.

a   State and derive Betti's generalized reciprocal theorem.   3

b   State and explain with the help of neat sketches , Moment area theorems   3

c   Draw ILD of BM at pt.D , at distance 2m from left support of a cantilever 3
6m long.
Explain meaning and use of ILD by determining BM at D due to load of
30KN at free end.

d   Draw ILD for radial shaer at pt D distance (x, y)from LH support of a   3
three hinged arch showing important values in terms of Θ, L,,h.

e   Give formulae for maximum tension in a cable due to udl from suspension   4
bridge.

f   Prove that for MS, Euler's buckling load formula can be applied only if   4
slenderness ratior is more than 80.

Q2   a   For the truss shown determine vertical deflection of C. Take C/S area of   10
all the members = 150mm^2 and E = 2.1 X 10^5 N/mm$^{2.}$
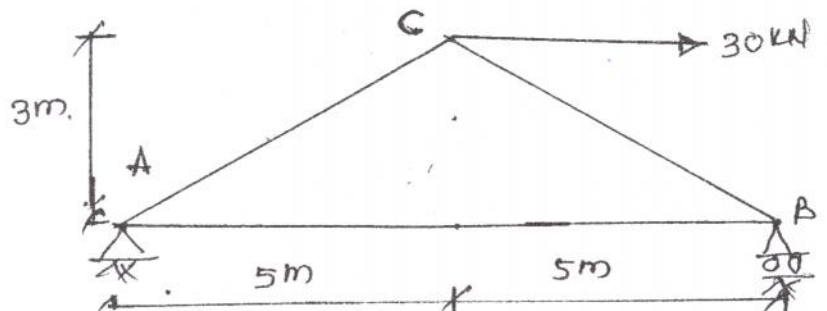
b.   For the simply supported beam AB of span 6m , determine. deflection at   6
midspan C using moment area method., if it carries udl of 20Kn/ m over
left half span of 3m.

Q3 a. For the simply supported beam,10m sapn, draw ILD for the reaction at left 10.
hand support A , SF at D (2m from A) and BM at E(4 m from A). Find
out BM at E due to load of 50Kn at F (6 from A), using ILD.

b. Load system of four wheels travels the girder of 16m span from left to 6.
right. Determine absolute maximum BM for the beam.
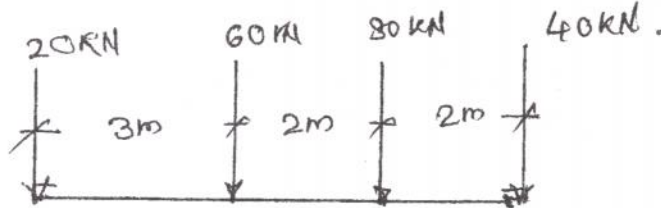
Q4 For the ' circular' three hinged arch determine 1. Radial SF at D. , 2. 6
Axial force at D. and 3. Calculate BM values at 10 m interval points. 6
4.
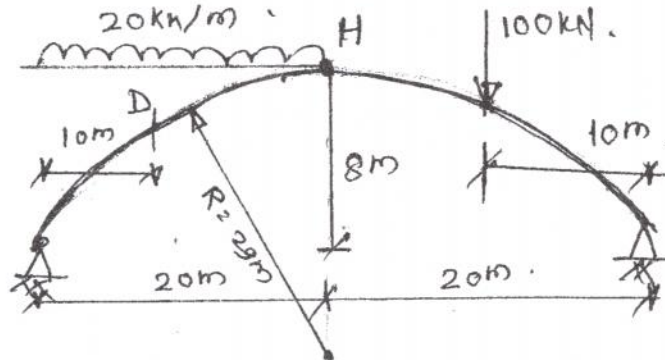
Q5 Three hinged stiffening girder of a suspension bridge of span 120m is 6
subjected to two point loads as shown.1. Find reactions of girder and 4
equivalent udl on cable. 2. Find SF and BM for the girder at point D. 3
3.Draw BMD for the girder . 4.Find maximum tension in the cable. 3
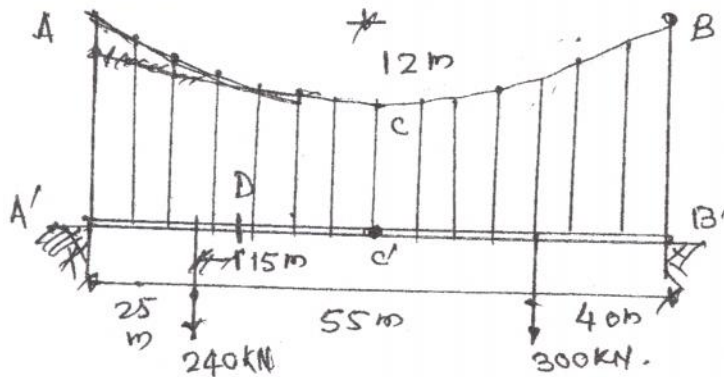
Q6 a A hollow circular column 300mm OD X 250mm ID is 5m long. Determine 10
Euler's buckling load and Rankine's laod , if one end fixed and one
hinged. Take α = 1/7500,E = 2.1 X 10^5 N/mm^2 F$_c$ = 330MPa
b Give assumptions made in Euler's formula of buckling load. 6