Printed pages: 03 **Sub Code: NCE504**

Paper Id | 0 | 0 | 2 | 8 | **Roll No.** | | | | | | | | | | |

B. TECH.
(SEM III) THEORY EXAMINATION 2017-18
STRUCTURAL ANALYSIS - II

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

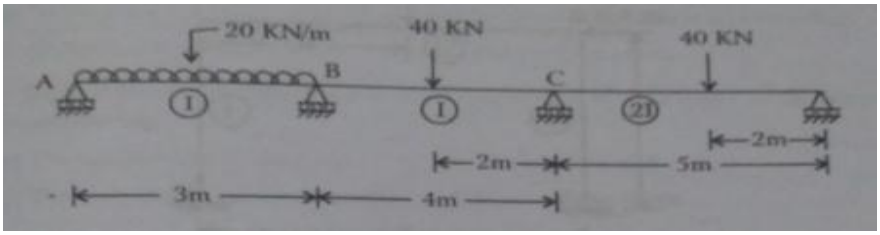
1. Attempt *all* questions in brief. **2 x 10 = 20**

a. What do you mean by carry over moment?
b. State Castigliano's second theorem.
c. Two hinged arch is a indeterminate structure. Why?
d. How horizontal thrust can be obtained by using Castigliano theorem?
e. What is the range of central dip?
f. What is the effect of temperature change in cable?
g. Define stiffness coefficients.
h. What are the objectives of analysis of structures?
i. Differentiate between plastic modulus and section modulus.
j. What do you mean by plastic hinge?

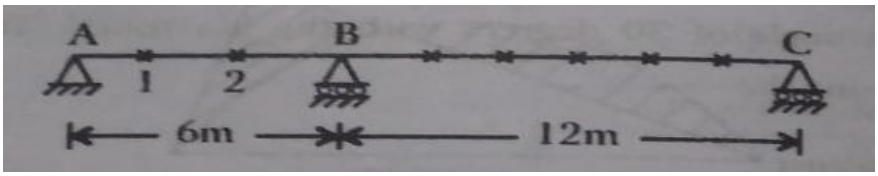
SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Find the moments at the supports for the continuous beam shown in figure below. Draw also B.M. diagram for the beam. Use slope deflection method.

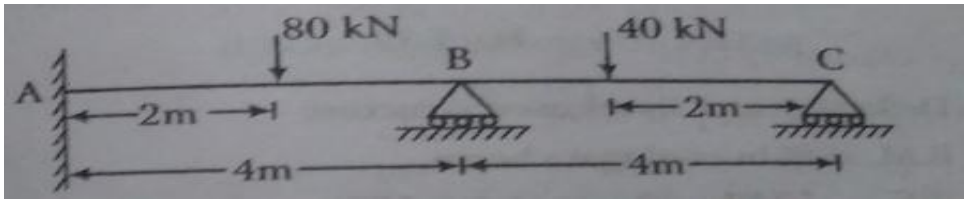


b. Using Muller Breslau Principle, compute the influence line obtained at 2 m intervals for moment at mid span of BC of the continuous beam ABC shown in figure below:



c. A cable of span 120 m and dip 10 m carries a load of 8 KN/m on the horizontal span. Find the maximum tension in the cable and the inclination of the cable at the support. Find also the forces transmitting to the supporting pier, if the cable passes over smooth pulley on the top of the pier. The anchor cable is at 30^0 to the vertical. Determine the maximum bending moment for the pier , if the height of pier is 14 m.

d. Analyse the continuous beam in shown figure. If the downward settlement of supports B and C are 10 mm and 5 mm respectively. Take EI = 184 x 10^{11} N-mm^2. Use flexibility matrix method.



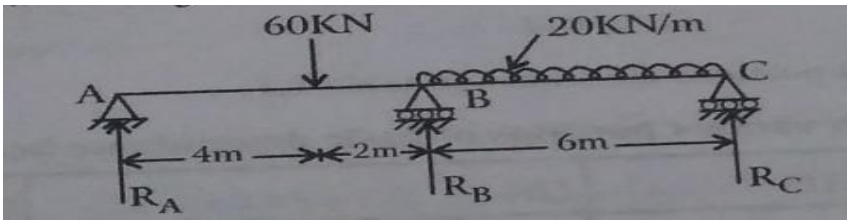
e. A two span continuous beam ABC has span lengths AB = 6 m and BC = 6 m and carries a UDL of 30 KN/m on entire length of the beam. A and C are simply supports. If the load factor is 1.80 and the shape factor is 1.15 for the I – section. Find the section modulus needed. Assume yield stress for the material is 250 N/mm^2.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) A continuous beam ABCD is simply supported at A, B, C and is fixed at D. The span AB, BC and CD are 3m, 4 m and 2m long. The beam carries a point load of 12 KN on AB at 2 m from A, a point load of 20 KN at the middle of BC and a point load of 6 KN at middle of CD. If $I_{ab} : I_{bc} : I_{cd}$ = 1:2:2, find the supports moments using moment distribution method.

(b) Analyse the following continuous beam shown in figure using 'method of consistent deformation'. Draw the bending moment diagram.



4. Attempt any *one* part of the following: 10 x 1 = 10

(a) A two hinged parabolic arch of span 30 m and rise 6m carries two point loads, each 60 KN, acting at 22.5 m and 15 m from the right end respectively. Determine the horizontal thrust and maximum positive and negative moment in the arch.

(b) A two hinged semicircular arch of radius 'R' carried a load 'W' at a section the radius vector corresponding to which makes an angle 'α' with the horizontal. Find the horizontal thrust at each support. Assume uniform flexural rigidity.

5. Attempt any *one* part of the following: 10 x 1 = 10

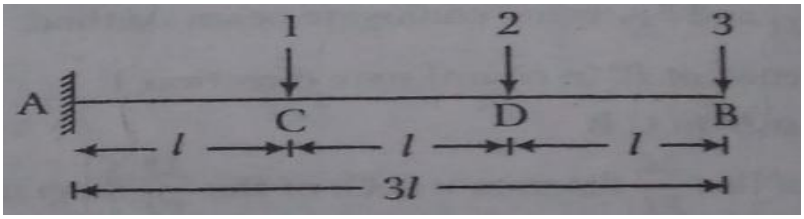
(a) A suspension cable of length 174.53 m is supported at the two ends at the same levels. The supports are 170 m apart. The cable is subjected to a UDL of 20 KN/m of horizontal length over its entire span. Determine the reactions developed at the supports and their inclination to the horizontal.

(b) A three hinged stiffening girder of a suspension bridge of span 120 m is subjected to two point loads of 240 KN and 300 KN at distances of 25 m and 80 m respectively from the left end. Find the forces and bending moment in girder at a section 40 m from the left end. The central dip of the supporting

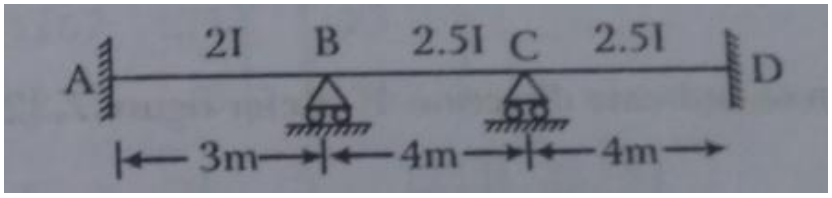
cable is 12 m. find also the maximum tension in the cable and draw the B.M.D. for the girder.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Develop the flexibility matrix for the cantilever with co-ordinate as shown in figure. Take uniform flexural rigidity.

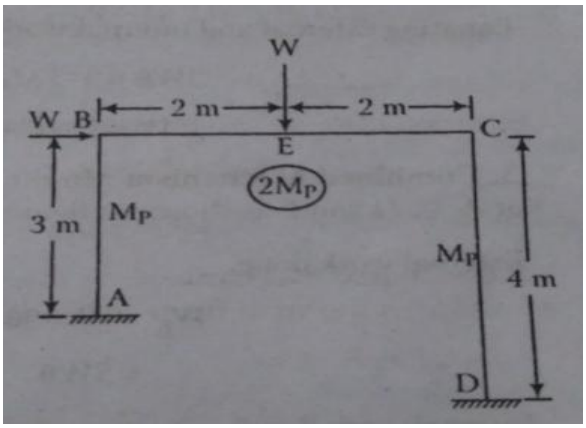


(b) Analyse the continuous beam as shown in figure by stiffness matrix method . if the support B sinks by 10 mm. Take EI= 6000 KN-m^2.



7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Find the collapse load for the loaded portal frame shown in figure



(b) A continuous beam ABC is loaded as shown in figure, determine the required plastic moment. If the load factor is 3.2.