(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100401   **Roll No.**

B.Tech.

(SEM. IV) THEORY EXAMINATION 2013-14

STRUCTURAL ANALYSIS—I

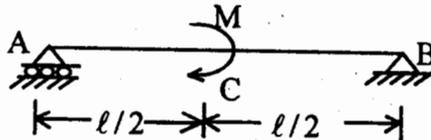*Time : 3 Hours*   *Total Marks : 100*

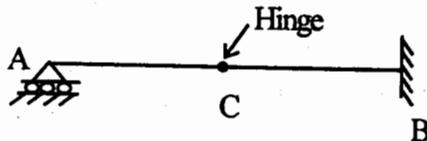### SECTION—A

1. Attempt **all** parts :   **(2×10=20)**

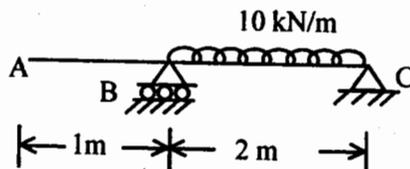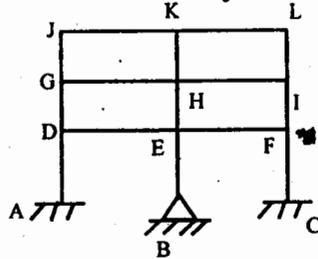   (a) Draw BMD of following beam

    (b) What is perfect and imperfect truss ?

    (c) What is meant by degree of freedom ?

    (d) Draw conjugate beam for following beam.

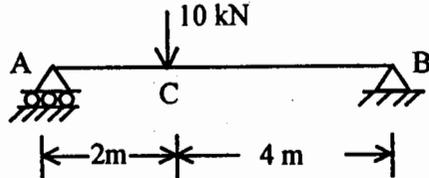   (e) Draw shape of shear force diagram for following beam.

(f) Find static indeterminacy of following frame

(g) Find kinemetic indeterminacy of abase frame.

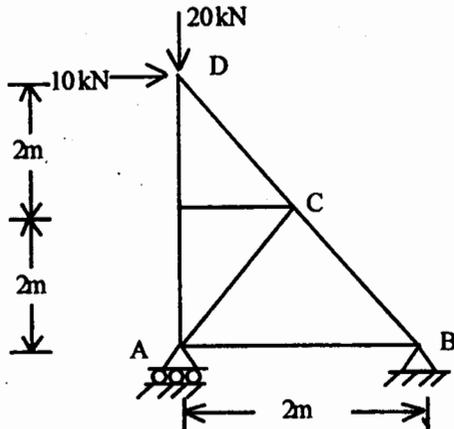(h) Draw ILD for BM for following beam at the point C.

(i) State Muller Breslau's principle.

(j) How arch is different from a similar beam ?

SECTION—B
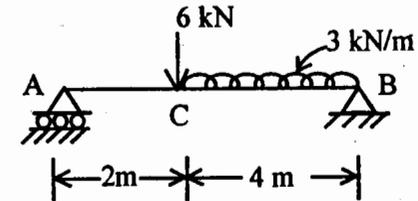
Note :—Attempt any five parts.　　(5×6=30)

2. How are structure classified ? Explain with example.

3. What is principle of superpositions ? Explain with example.

4. Find member forces in following truss :

5. State and explain Cartiglian's IInd theorem.

6. Explain method of substitute members for analysis of trusses with suitable example.

7. Draw SF diagram for following beam :

8. Explain Linear Arch and prove Eddy's Theorem.

SECTION—C

Note :—Attempt any five parts.　　(5×10=50)

9. The equation of a three hinged parabolic arch with origin at its left hand support is $y = x - \dfrac{x^2}{40}$. The span of arch is 40 m. Find normal thrust, radial shear and BM at a section 5 m from left hand if the arch is loaded with a udl of 30 kN/m upon its left half of the span ony.

10. Using unit load method, find horizontal deflection at the end E of following frame. Take EI as constant.
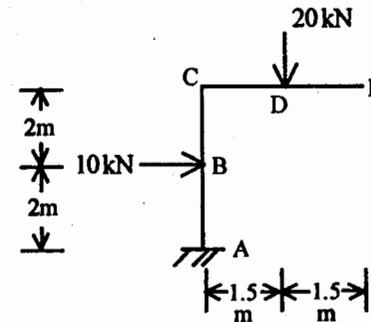
11. Find deflection at free end of following beam using conjugate beam method. Take EI as constant.

3 kN/m

A
B
C

|←——4m——→|←—1m—→|
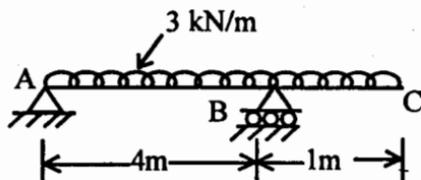
12. Find max. BM developed anywhere on the girder of span 20 M due to rolling loads of 250 kN and 150 kN spaced 6 M apart with 150 kN load as leading load while rolling from left to right. Also find equivalent udl to give same BM.

13. Prove that when a series of point loads rolls upon a simply supported girder, then for max. BM to occur under a choosen wheel load the span must equally divide the distance between the chosen wheel load and the resultant of all loads on the span.

14. Develop SFD and BMD of following beam :

6 kN/m

10 kN

3 kN/m

A
C
D
B

|←——4 m——→|←—2m—→|←—2m—→|
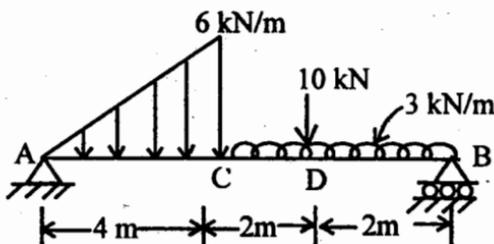
15. Find forces in the members, FE, BE and BC of the following truss.

C

B

1 m

2 m

A
F
E
D

35 kN   50 kN

|←—2 m—→|←—2m—→|←—2m—→|