Examination, May-2014 (SEM-IV)

STRUCTURAL ANALYSIS - I

Time: 3Hours   Total Marks: 100

Note: (i) Attempt **ALL** questions.

(ii) All questions carry **Equal** marks.

(iii) Be Precise in your answer.

1. Attempt any four out of the following. (4x5=20)

    a) Define indeterminacy. Give expression for external and internal static indeterminacy for a 2D truss.

    b) What are determinate structures? Give expressions for kinematic indeterminacy for a 2D frame.

    c) Find the static indeterminacy for the following frame considering frame is rigid..
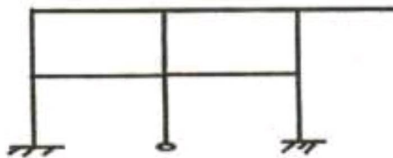
    d) Explain in detail Maxwell Reciprocal Theorem.

    e) Find the static indeterminacy for the following frame.
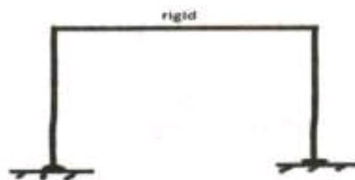
2. Attempt any four out of the following. (4x5=20)

    a) Define Castigliano's First and Second theorem.

    b) What are Influence Line Diagram? Give its application and uses.

    c) Describe the different parts of a suspension bridge with diagram.

    d) Draw Influence Line Diagram for R_A, R_B, M_C, S_C for overhang beam as shown.
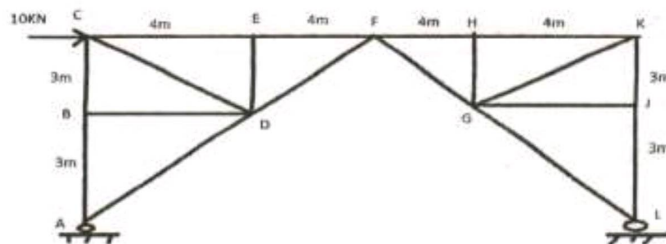
e) Define with diagram the different types of arches.

3. Attempt any two out of the following. (2x10=20)

a) Find forces in all the members by method of joints.
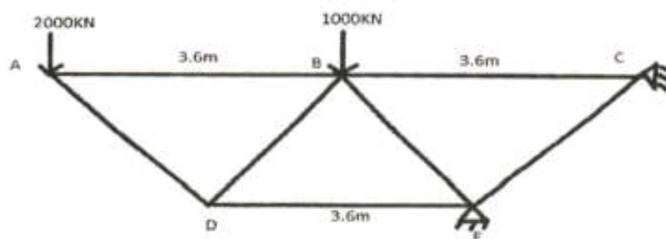
b) Find forces in DF and EF by method of section.

c) Four wheel loads of 6, 4, 8 and 5 KN cross a girder of 20m span, from left to right followed by UDL of 4KN/m and 4m long with 6KN load leading. The spacing between the loads in the same order are 3m, 2m and 2m. The head of the UDL is at 2m from the last 5KN load. Using influence lines, calculate the S.F and B.M at a section 8m from the left support when 4KN load is at centre of span.

4. Attempt any two out of the following. (2x10=20)

a) Find V_A, V_B, and maximum B.M for the following two hinge parabolic arch.

50 KN/m

C

h= 4m

A

L=20m

B
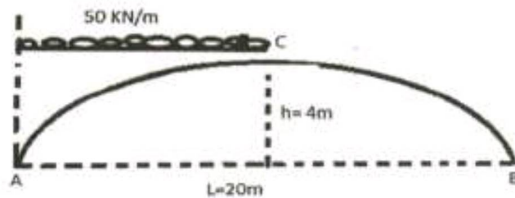
b) A three hinged arch has a span of 30m and rise of 10m. The arch carries a UDL of the left half of span. It also carries two concentrated loads of 160KN and 100KN at 5m and 10m from right end. Determine the horizontal thrust at each support.

c) A suspension bridge of 100m span and roadway 6m has two hinged stiffening girder supported by two cables, has dip 10m. the D.L of the bridge is $5KN/m^2$ and L.L is $10KN/m^2$, which covers left half of the span. Determine the S.F and B.M for the girder at 25m from the left end. Find also the maximum tension in cable for this position of load.

5. Attempt any two out of the following. (2x10=20)

a) Find 'H' by strain energy theorem. EI = constant

B   L/2   P   L/2   C
              E

H   H

A   D
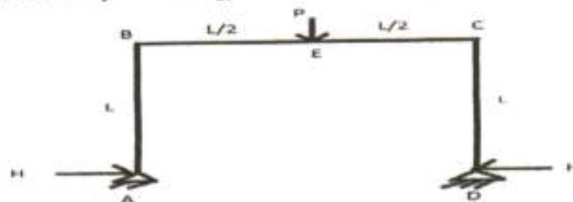
b) Find R_A and M_B by strain energy method.

1000N/M

B

3m   3m

A

c) Draw ILD for R_A, R_B, R_C and M_B and also find maximum value of above stress function when a live load of 10 KN/m moves from left to right which may have any length so as to produce maximum value.

A   20m   B   4m   D   6m   C