4. a) State the general cable theorem.
   b) Discuss the temperature effect on three hinged arch.
   c) Derive the expression for horizontal thrust in two hinged arch.
   d) A suspension cable, stiffened with a three hinged girder, has 100m span and 10m dip. The girder carries a load of 0.5kN/m. A live load of 10kN rolls from left to right. Determine :
      i) The maximum B.M. any where in the girder.
      ii) The maximum tension in the cable.

      OR

      A parabolic arch, hinged at the ends has a span 30m and rise 6m. A concentrated load of 16kN acts at 10m from the left hinge. The second moment of area varies as the secant of the slope of the ribaxis. Calculate the horizontal thrust and the reactions at the hinges. Also, calculate the maximum bending moment anywhere on the arch.

5. a) Explain the construction of maximum B.M. diagram.
   b) Define influence line diagram with examples.
   c) Find the value of E.U.D.L. for U.D.L. shorter than the span.
   d) The following system of the wheel loads crosses a span of 30m.

Wheel load (kN)	16	16	20	20	20
Distance between centres (m)		3.0	3.0	4.0	4.0

Find the maximum value of BM.

OR

For above system of the wheel loads, find the maximum value of shear force in the span.

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Roll No .....

CE - 505

B.E. V Semester

Examination, December 2015

Theory of Structure - I

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each question are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

1. a) State and explain Maxwell's reciprocal theorem.
   b) Explain strain energy and complementary energy.
   c) Discuss the principal of virtual work.
   d) A steel tube having outside and inside diameters of 10cm and 6cm respectively is bent into the form of a quadrant of 3m radius. One end is rigidly attached to a horizontal base plate to which a tangent to that end is perpendicular, and the free end supports a load of 1200N. Determine the vertical and horizontal deflections of the free end under this load.

OR

Determine the force in the member AC of the redundant frame loaded as shown in figure 1. All the members have the same cross-sectional area and modulus of elasticity.

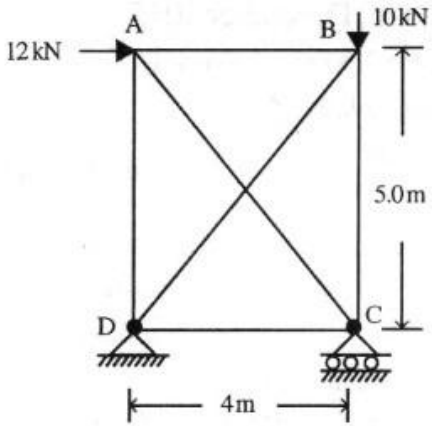

Figure 1

2. a) What do you mean by statically determinate and indeterminate structures? Explain with examples.

   b) Write down the expression for the three moments theorem in most generalised form. Explain the notations used.

   c) Derive the expression for moment induced due to sinking of support for propped cantilever beam.

   d) Draw the BMD and SFD using theorem of three moments for the beam as shown in fig 2.

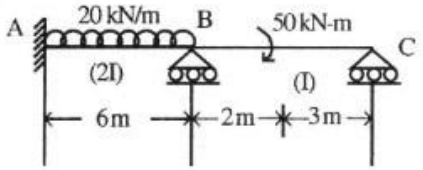

Figure 2

OR

Draw BMD for frame shown in figure 3 using moment distribution method.

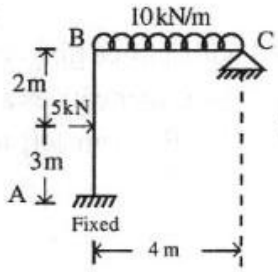

Figure 3

3. a) Explain shear equation.

   b) Write down the slope deflection equation for the beam and explain the notations used.

   c) Using column analogy method, find the fixed end moments for a fixed beam subjected to UDL.

   d) Analyse the beam, using column analogy method shown in figure 4.

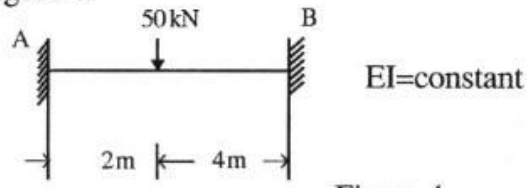

Figure 4

OR

Analyse the beam, using slope deflection method shown in figure 5.

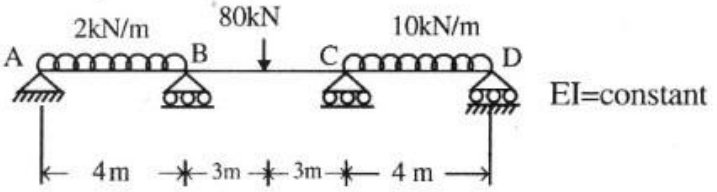

Figure 5