b) A circular arch of span 25 m with a central rise 5m is hinged at the crown and springing. It carries a point load of 100 kN at 6m from the left support. Calculate the reactions at the support.

c) Write in short with neat sketches:
i) Guided Pulley ii) Roller Pulley support.

d) A two hinged stiffening girder of a suspension bridge has a span of 80 m. The dip of the supporting cable is 8m. Two girders support a bridge deck. Two point loads of 400 kN and 600 kN at 16 and 32 m act on the deck, half of which comes on to one stiffening girder. Find SF and B.M at 25 from left hand end. Find also the maximum tension in the cable.

OR

A three hinged circular arch hinged at the springing and crown points has a span of 40 m and a central rise of 8m. It carries a u.d.l. 20 kN/m over the left half of the span together with a concentrated load of 100 kN at the right quarter span point. Find the reactions at the supports, normal thrust and shear at a section 10 m from the left support.

5. a) Explain in brief the term Absolute Maximum shear and Moment in beams.

b) Write Muller - Breslau principle.

c) Explain and expressed Influence line diagram for Radial shear and normal thrust.

d) A three hinged parabolic arch has span 20 m and rise 4 m. A concentrated load of 150 kN rolls from left to right. Calculate the maximum +ve and –ve moments at a section 5 m from the left end support. Also calculate the absolute maximum B.M that may occur anywhere in the arch.

OR

Two point loads 40 kN and 60 kN spaced at 6 m apart cross girder of 16m span with 40 kN load, leading from left to right. Construct the maximum S.F and B.M diagrams stating the absolute maximum values.

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CE - 505

B.E. V Semester

Examination, June 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 questions 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) Explain Maxwell's Reciprocal theorem.

b) What do you understand by complementary energy?

c) Explain principal of Virtual work.

d) Determine the deflection at the free end of the cantilever beam as shown in Fig. (1) use unit load method, Given $E = 2 \times 10^5$ N/mm^2 and $I = 12 \times 10^6$ mm^4.

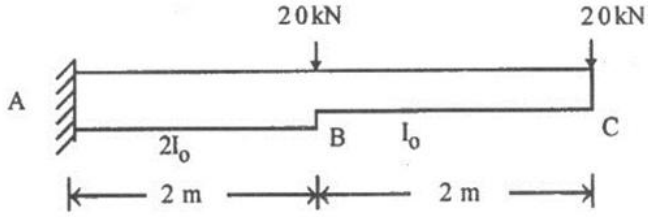

Fig. 1

OR

A frame ABCD consists of two equilateral triangles and is hinged at A and is supported on rollers at D as shown in Fig. (2). The size of members are so proportioned that

when a vertical load W = 80 kN acts at C, all the members will be stressed to 100 N/mm². But unfortunately the size of the member BD used in found to be 5 mm too long. What will be the vertical downward definition of point C. When load W = 80 kN is Acting Take E = 200 kN/mm²

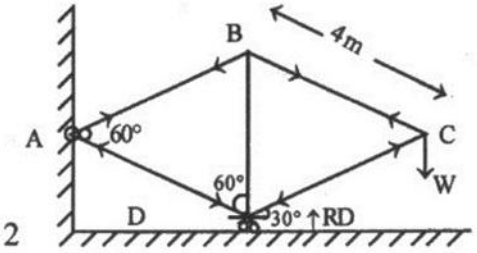

Fig. 2

2. a) Explain indeterminate structure with example.
   b) Write the equation of Three moments.
   c) Analyse a fixed beam for end moments subjected to a concentrated load W at centre of span.
   d) Find end moments in a fixed beam of span *l* under a uniformly varying load as shown in Fig. (3). Draw SFD and BMD.

Fig. 3

OR

Determine the support moments and sketch the moment diagram for the beam as shown in Fig. (4). EI is constant

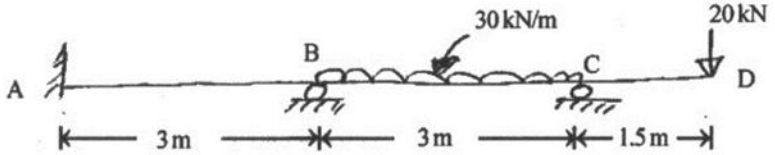

Fig. 4

3. a) Using column analogy method, find the fixed end moments for a fixed beam subjected to uniformly distributed load.
   b) Using column analogy method, determine fixed end moments for the beam shown in Fig. (5)

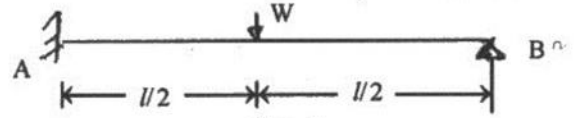

Fig. 5

   c) Enumerate the development of slope deflection equations.
   d) Determine the support moments for the continuous beam as shown in Fig. (6). By slope deflection method. The relative values of moment of inertia are shown in Fig. (6). E is constant. (Draw BMD)

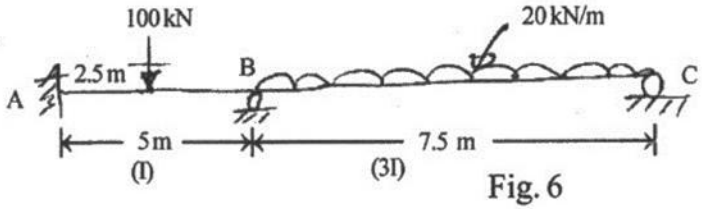

Fig. 6

OR

Analyse the portal frame as shown in Fig. (7) by column analogy method.

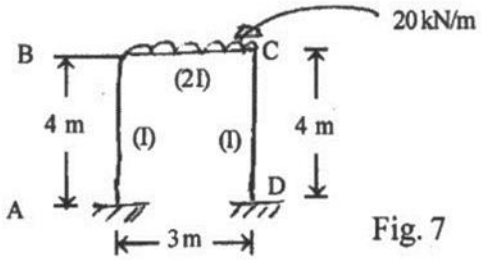

Fig. 7

4. a) Write the difference between Two hinged and three hinged arch.