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FIFTH SEMESTER
SUPPLEMENTRY EXAMINATION

B.TECH. [CIVIL ENGG.]
(FEB), 2019)

CE301 Analysis of Determinate Structures

Time: 3:00 Hours

Max. Marks: 40

Note: Answer **ALL** questions by selecting **any two parts** from each question.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) What is a Structure? Write its classification on the basis of dimensions with the help of two examples in each case.

(b) What is Castigliano's first theorem? Determine the slope and deflection at the free end A of a cantilever beam AB of span L carrying uniformly varying load with maximum w/unit length at the fixed end B and zero at the free end using this theorem.

(c) What is Betti's theorem? Also give its derivation.

Q.2 (a) A beam ABC of 5 m length is supported by a hinge at A and a roller support at B. Two supports are at 3 m apart. The beam carries an udl of 12 kN/m on the entire length. Determine shear force, bending moment and location of point of contraflexure. Also draw shear force and bending moment diagrams indicating maximum values.

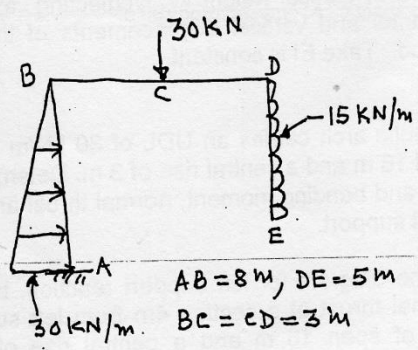(b) Draw axial force, shear force and bending moment diagrams of plane frame shown in Fig.1 indicating maximum values.
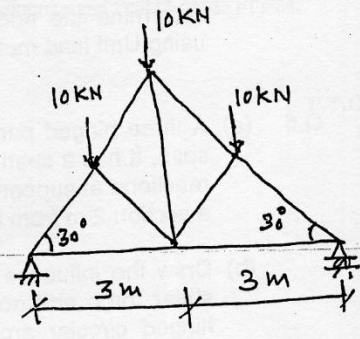

AB = 8 m, DE = 5 m
BC = CD = 3 m

Fig.1   Fig.2

(c) Determine the forces in all the members of truss shown in Fig.2.

Q.3 (a) Two point loads of 180 kN and 240 kN spaced at 5 m apart, crosses a girder of 25 m span from left to right with 180 kN leading load. Draw the maximum shear force (negative and positive) and bending moment diagrams indicating the absolute maximum values. Also give calculations.

(b) Draw the influence lines for the reaction at support A, the shear force in panel CD, and the bending moment at D of the girder with floor beam system shown in Fig. 3. Also give calculations.
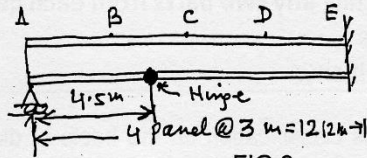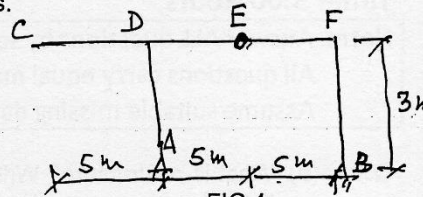

FIG.3

FIG.4

(c) Draw the influence lines for the horizontal and vertical reactions at supports A and B and the shear at hinge E of the frame shown in Fig. 4. Also give calculations.

Q.4 (a) Determine the slope at supports and deflection at the free end of the beam shown in Fig. 5 using Macaulay's method.
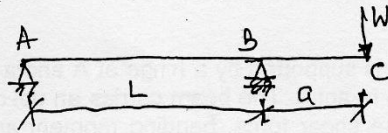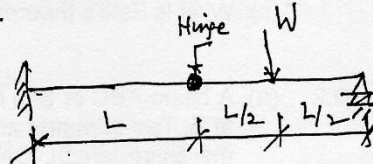

Fig.6

Fig.7

(b) Determine the slope and deflection at the internal hinge B of the beam shown in Fig.6 using Conjugate Beam method.

(c) A basket ball rigid frame AB of height L and horizontal rod BC span L/2 carries a basket board of vertical weight W. Neglecting axial deformations, determine the horizontal and vertical displacements of the board point C using Unit load method. Take EI is constant.

Q.5 (a) A three hinged parabolic arch carries an UDL of 30 kN/m on the left of the span. It has a span of 16 m and a central rise of 3 m. Determine the resultant reactions at supports and bending moment, normal thrust and radial shear at a section 2 m from left support.

(b) Draw the influence line diagram for left support reaction, bending moment, shear force and normal thrust at a section 4m from left support of a three hinged circular arch of span 16 m and a central rise of 4 m indicating maximum values. Also give the calculations.

(c) A hollow circular column section with both end fixed is 12 m long and has an outer diameter of 120 mm with 20 mm wall thickness. Compare the crippling load according to Euler's and Rankine's formulae. Modulus of elasticity (E) for the material is 80 kN/mm^2 and critical stress, f_c is equal to 550 N/mm^2.Determine the length at which both the crippling loads are equal. Take Rankine's constant, a = 1/1600.