Seat No._____

GANPAT UNIVERSITY

B.Tech.Semester IV (Civil)

Regular Examination – May / June: 2012

C-401: Structural Analysis-I

Max.Time: 3 Hours **Max. Marks: 70**

Instructions:-(1) Answer to the two sections must be written in **separate** answer books.

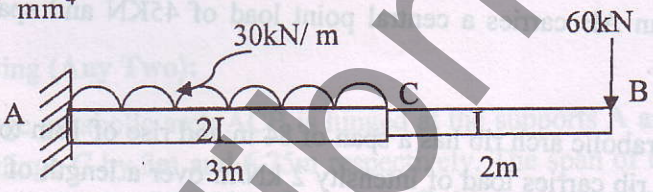
(2) Figures to the **right** indicate **full** marks.

(3) Assume suitable data if required.

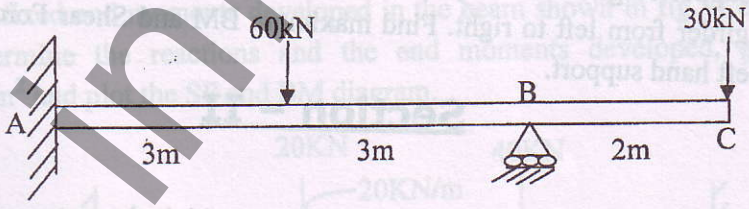
Section – I

Q.1 **(A)** Define (I) slope and deflection (II) Moment area theorem I and Moment area theorem II **(5)**

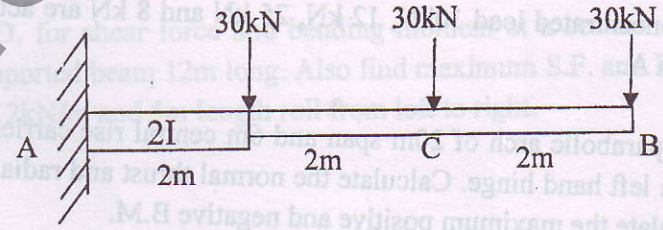
(B) Find out slope and deflection at free end using moment area method at point B and C. Inertia of first span is 2I and of second span is I. Take E= 2 x 10^5 N/mm^2 and I= 3x10^8 mm^4 **(6)**



Q.2 **(A)** Find out reaction for following beams using consistent deformation method. And also draw Shear force and bending moment diagram. **(6)**

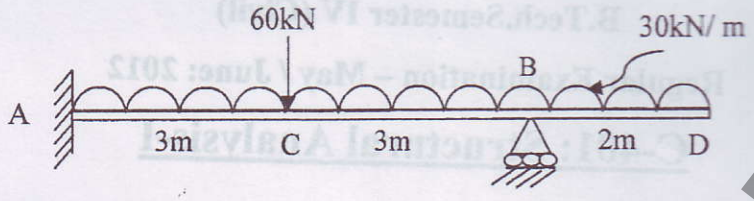


(B) Find out slope and deflection at point B using Conjugate beam method. Take E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4. **(6)**

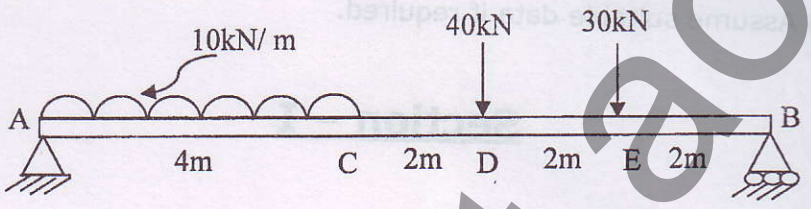


OR

Q.2 (A) Find out reaction for following beams using consistent deformation method. And also draw Shear force and bending moment diagram. **(6)**



(B) By using Macaulay's method find slope at A and deflection at D of a beam as shown in figure. Take E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4. **(6)**



Q.3 Attempt Any Two: **(12)**

(A) Analyze the beam using theorem of three moments and draw S.F. and B.M. dia for two span continuous beam ABC is simply supported at A, B and C such that AB= 4m, and BC= 6m. The span AB carries a central point load of 45KN and span BC carries a U.D.L of 30KN/m.

(B) A three hinged parabolic arch rib has a span of 84 m and rise of 18m to the central pin at the crown. The rib carries load of intensity 2 kN/m over a length of 1/3 of the span from the left hand hinge. Calculate the B.M. at the quarter span points.

(C) A simply supported girder has a span 30m. Six wheel loads 50kN each, spaced 2m apart cross the girder from left to right. Find maximum BM and Shear Force at section 8m from the left hand support.

Section – II

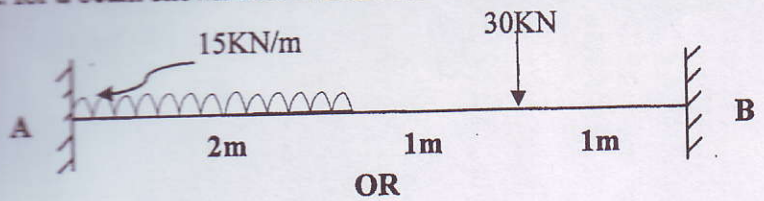
Q.4 (A) Define Influence line for determinate structure along with its importance in practice. **(3)**

(B) A simply supported beam AB has span of 5m. Draw influence lines for R_A, R_B, V_x and M_x for section x=2 m from left hand support. Also find values of R_A, R_B, V_x, M_x when a series of four concentrated load 10kN, 12 kN, 25 kN and 8 kN are acting at 1 m,2 m,3 m, and 4 m from A. **(5)**

(C) A three hinged parabolic arch of 20m span and 6m central rise carries a point load of 8kN at 4m from left hand hinge. Calculate the normal thrust and radial shear under the load. Also calculate the maximum positive and negative B.M. **(4)**

(6) **(A)** (A) Define continuous beam and state Clapeyron's theorem of three moments.
(B) Enlist basic types of indeterminate beam and enlist advantages and disadvantages of fixed beam. **(5)**

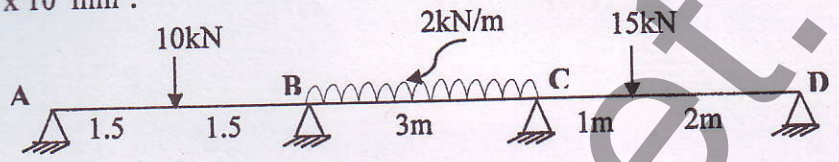
(B) Calculate fixing moments at the supports if support A sinks by 20mm down. Draw S.F. and B.M. dia. for a beam shown below. Take EI= 20000kN.m^2 **(6)**



OR

Q.5 **(A)** List out the differences between statically determinate and statically indeterminate structure. **(3)**

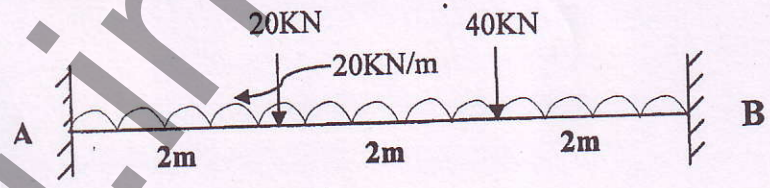
(B) A three span continuous beam ABCD is simply supported at A and D and loaded as shown in fig. If supports A settles by 10mm, B settles by 30mm and C settles by 20mm. Find out support moments and plot BM diagram. Take E= 2x10^5 N/mm^2 and I= 2.4 x 10^6 mm^4. **(8)**



Q.6 Explain the following **(Any Two):** **(12)**

(A) A three hinge parabolic arch ACB is hinged at the supports A and B which are below the crown hinge C by 3m and 6.75m respectively. The span of the arch is 22.5m. The arch carries an UDL of 30kN/m from A to C. Find the reactions at the supports and maximum positive and negative bending moments.

(B) Determine fixed end moments developed in the beam shown in fig. If end B settles by 1mm, determine the reactions and the end moments developed, given that EI= 90000KN.m^2 and plot the SF and BM diagram.



(C) Draw I.L.D. for shear force and bending moment at a section 3m from left and of a simply supported beam 12m long. Also find maximum S.F. and B.M. at this section due to UDL of 2kN/m and 5m length roll from left to right.

END OF THE PAPER