Seat No.: ____________ Enrolment No.______________

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEM. – IV Examination Nov/Dec - 2011

Subject code: 140603 **Subject Name: Structural Analysis – II**

Date: 30/11/2011 Time: 2.30 pm-5.30 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q-1. **(a)** List the advantages and disadvantages of a fixed beam. **04**

(b) Explain Strain energy stored in linear elastic system due to bending. **03**

(c) A fixed beam of 4 m span is carrying a u.d.l. of 10 kN/m over the entire span and a point load of 10 kN at the midspan. Draw the S.F. and B.M. diagrams and find the maximum deflection, if $EI = 2500\ kNm^2$. **07**

Q-2. **(a)** Analyse the propped cantilever beam shown in fig. 1 using consistent deformation method and draw shear force and bending moment diagram. **07**

(b) For continuous beam ABC as shown in fig. 2 determine support reactions with the use of Castigliano's theorem. **07**

OR

(b) Using unit load method, find horizontal and vertical displacement at R of frame as shown in fig. 3. Take $E = 2 \times 10^5\ N/mm^2$ and $I = 2 \times 10^8\ mm^4$ **07**

Q-3. **(a)** Determine the support moments using slope deflection method for the continuous girder shown in fig. 4, if the support B sinks by 2.5 mm. For all members Take E = 200 kN/mm^2 and $I = 3.5 \times 10^7\ mm^4$. **07**

(b) Determine the support moments using moment distribution method for the frame as shown in fig. 5. Also draw Bending Moment diagram. **07**

OR

Q-3. **(a)** Determine the support moments using moment distribution method for the continuous girder shown in fig. 4, if the support B sinks by 2.5 mm. For all members Take E = 200 kN/mm^2 and $I = 3.5 \times 10^7\ mm^4$. **07**

(b) Determine the support moments using slope deflection method for the frame as shown in fig. 5. Also draw Bending Moment diagram. **07**

Q-4. **(a)** Explain, Moment distribution factor and Rotation contribution factor **04**

(b) Calculate the support moments and draw B.M. diagram of beam as shown in fig. 6 using Kani's method. **10**

OR

Q-4. **(a)** Draw influence line diagrams of reaction at A and B for a propped cantilever beam AB of span 5 m with ordinate interval of 1.0 m using muller Breslau principle. **07**

(b) Draw influence line diagrams of reaction at B (R_B) and reaction at C (R_c) for a continuous beam ABC with both span length of 8 m having interval of 2 m using muller Breslau principle. **07**

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Q-5. (a) Differentiate Pre-tensioning and Post-tensioning **06**

(b) Find loss of pre-stress due to elastic shortening of concrete, creep of concrete and shrinkage of concrete for rectangular beam of size 230 mm × 450 mm is prestressed (pre-tensioning) with the use of 10 nos. 10 mm diameter bar with centroidal location at 80 mm below centroidal axis of the beam. Take initial prestress of 1600 N/mm^2, Characteristic cube strength of concrete is 45 N/mm^2, Creep coefficient is 2.2 and E_s = 200 kN/mm^2. **08**

OR

Q-5. (a) Explain:

1. How prestressed concrete differ from reinforced concrete. **04**
2. Loss of prestress due to friction in post tensioning. **03**

(b) A simply supported prestressed concrete beam 10 m span, rectangular section 500 mm × 750 mm is prestressed with force of 5000 kN at an eccentricity of 180 mm below the centroid of section. Find top and bottom fibre stresses at transfer and after application of live load 60 kN/m. Consider losses 10 %. Also draw stress distribution diagram at mid span. Unit weight of concrete 25 kN/m^3. **07**

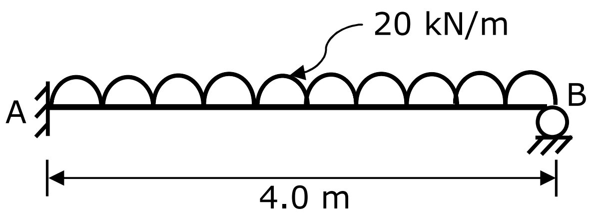

Fig. 1

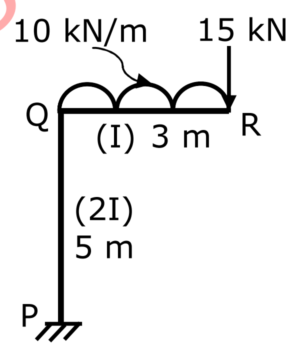

Fig. 3

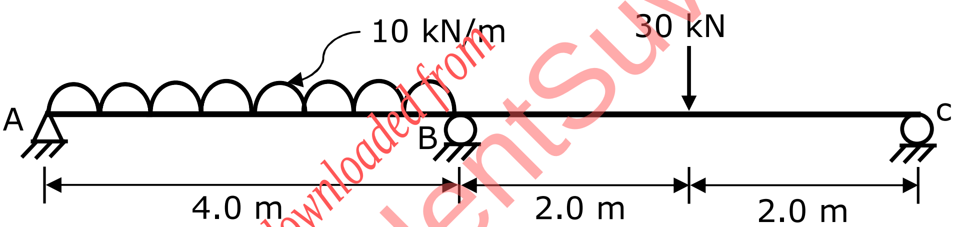

Fig. 2

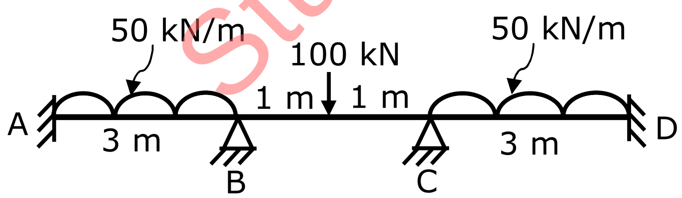

Fig. 4

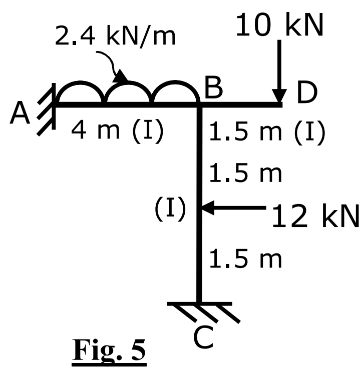

Fig. 5

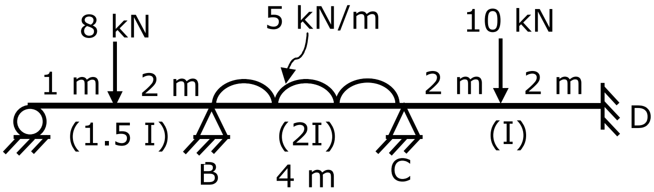

Fig. 6

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