

GANPAT UNIVERSITY

B. Tech. CIVIL ENGINEERING (4th Semester) Regular Examination –April/June:2017

2CI401:STRUCTURAL ANALYSIS-I

Max.Time: 3 Hours

Max. Marks: 60

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

- 1 (A) Find the deflection at the center of the simply supported beam of 7m span on which two point loads of 100 N acts at 2m and 5m from right support and UDL of 6 N/m act on half span from left support of beam using Macaulay's method. The flexural stiffness is 20 MNm² (06)
- (B) Derive an expression for elastic curve. (04)
- 2 (A) A cantilever beam is 4 m long and has a point load of 5 kN and 7.5 kN at 4m and 2m from fixed support respectively. Beam is also subjected to UDL 10kN/m act over an entire span of beam. The flexural stiffness is 53.3MNm². Calculate the slope and deflection at the free end. Take 2I for 2m from the fixed end and 3I for remaining span of the Beam. Using Moment Area Theorem. (05)
- (B) A propped cantilever beam of span 5m subjected to a concentrated load of 30KN, 40KN and 50KN acting at a 1m, 2m and 4m from propped support respectively. Find out all reactions by consistent deformation method. Take E=200 GPa and I=2×10⁶ mm⁴ (05)

OR

- 2 (A) A cantilever beam is 6 m long and has a point load of 20 kN at the free end. The flexural stiffness is 110MNm². Calculate the slope and deflection at the free end. Using Conjugate Beam Method. (05)
- (B) Analyze the Propped cantilever beam of length 5m on which 15 kN point load act at 4m from propped support and 3kN/m UDL act on 3m span from propped support. Take Moment of Inertia for span on which UDL act is 2I and remain span have I. Take E=200 GPa and I=2×10⁶ mm⁴ (05)

- 3 (A) A Simply supported beam ABC of span 6m subjected to a concentrated load of 27 KN at a 3m from the left end and also subjected to uniformly distributed load of 17.5 KN/m acting over 3m from the right end. Take AB =3m and BC=3m. Findout slope at A, B and C point using Conjugate beam method. Consider Moment of Inertia for span AB=I & span BC=3I (05)
- (B) What is Space truss? Compare Space truss and Plane truss. (05)

OR

- 3 (A) A simply supported beam is 6 m long and has a flexural stiffness of 3 MNm^2 . It carries a point load of 800 N at the middle. Calculate the slope at the ends and the deflection at the middle Using Double Integration Method. (05)
- (B) Write down type of space truss and explain it. (05)

SECTION - II

- 4 (A) A parabolic arched rib is hinged at the crown and springing and has a span of 30 m with a central rise of 5 m. It carries a load which varies uniformly from 40 kN/m at the crown and reduced to zero at springing. Calculate the normal thrust, shear force and bending moment at a section 6 m from left hand hinge. (05)
- (B) A circular arched rib of 20 m span with central rise of 4 m is hinged at the crown and springing. It carries a point load of 150 kN at 5 m from left hand hing. Calculate reaction at support, horizontal thrust and maximum bending moment at 4 m (05)
- 5 (A) A simply supported beam AB has a span of 5 m. the beam is subjected to a unit load. Draw influence line for R_A , R_B , F_D and M_D for a section Z at 2 m from left hand support. (05)
- (B) Analyze a fixed beam of span 6m, which is subjected to an UDL 25 kN/m over its entire span along with a point load of 80 kN at its Center. Draw SF and BM diagram for the Fixed beam. Calculation of point of contra flexure is required. (05)

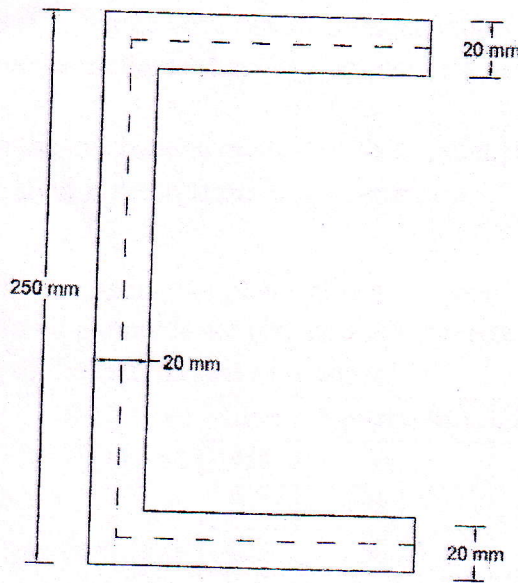
OR

- 5 (A) Derive the equations for one side overhang beam for R_A , R_B , V_x , M_x , V_z and M_z (05)
- (B) Find Fixed End Moments & Reactions at Supports for a fixed beam of span 9m on which two point loads of 150 kN and 100 kN acts at 3m and 6m from left support respectively. Draw SFD and BMD. Also find point of contra flexure. (05)
- 6 (A) Draw influence line diagram for a propped cantilever beam of length 5 m. which is subjected to a unit load. Calculate reaction at support and moment at fixed support at an interval of 1 m. (05)

- (B) Draw influence line diagram for a propped cantilever beam of length 6 m. which is propped at 5 m from fixed support. The beam is subjected to a unit load. Calculate reaction at support and moment at fixed support at an interval of 2 m. (05)

OR

- 6 (A) What is influence line diagram? Explain importance of influence line diagram. (05)
- (B) The vertical shear action on a channel section as shown in figure below is 2500 N. compute the shear flow and locate the shear centre (05)



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