Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: IV Civil Engineering

Regular Examination April – June 2015

2CI401 STRUCTURAL ANALYSIS - I

Time: 3 Hours **Total Marks: 70**

Instruction: 1All questions are compulsory.
2 Figure indicates right full marks.

Section - I

Que. – 1 (A) A beam of length 5 m and of uniform rectangular section is simply supported at its ends. It carries a uniformly distributed load of 10 KN/m run over the entire length. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and slope at end of beam should not exceed 1°. Take E for beam material = 1.05×10^4 N/mm^2 **05**

(B) Determine slope and deflection at any point C as shown in figure 1 below. Use Macaulay's method. Take E =2×10^5 N/mm^2 and I= 5×10^8 mm^4 **07**

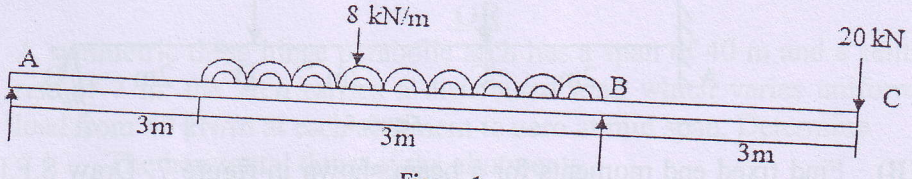

Figure 1

Que. – 2 (A) What is moment-area method? Find the slope and deflection of a simply supported beam and cantilever beam carrying a (i) point load at the centre and (ii) uniformly distributed load over the entire length using moment-area method. **04**

(B) A simply supported beam is 6 m long and has a flexural stiffness of $3MNm^2$. It carries a point load of 800 N at the middle. Calculate the deflection at the ends and middle with Conjugate Beam Method. **04**

(C) Analyses Beam as shown in figure 2 by using Consistent Deformation Method. **04**

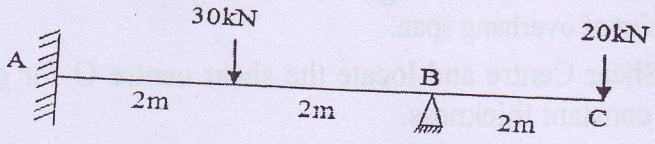

Figure 2

OR

Que. – 2 (A) A cantilever beam is 4 m long and has a point load of 5kN at the free end. The flexural stiffness is $53.3MNm^2$. Calculate deflection at the free end with Moment Area Method. **04**

(B) A Propped cantilever beam of 6 m long and has a point load of 10kN at the mid span of beam. The flexural stiffness is $110MNm^2$. Draw BMD by using Consistent Deformation Method **04**

(C) Find deflection at free end as shown in figure 3 with Conjugate Beam Method. AB=3m, BC=4m, Take EI=40000 kNm^2 04

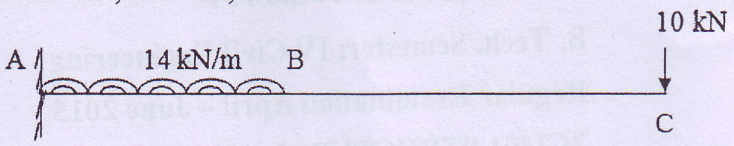

Figure 3

Que. – 3 (A) Analyses the Beam withV_A as redundant as Shown in figure 4. Using Consistent Deformation Method, draw B.M.D. 04

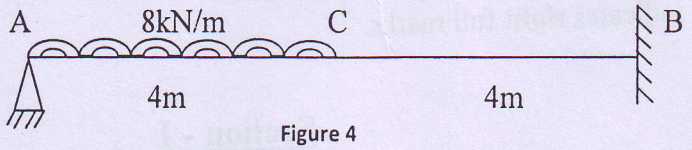

Figure 4

(B) Find fixed end moments for a beam shown in figure 5. Draw S.F.D and B.M.D. 07

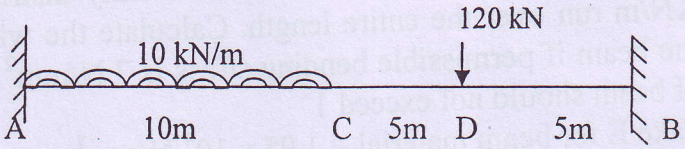

Figure 5

OR

Que. – 3 (A) Analyses the Beam with M_A as redundant as Shown in figure 6. Using Consistent Deformation Method, draw B.M.D. 04

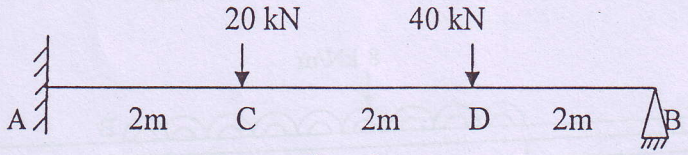

Figure 6

(B) Find fixed end moments for a beam shown in figure 7. Draw S.F.D and B.M.D. 07

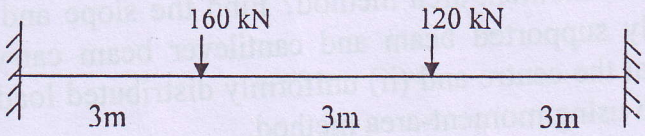

Figure 7

Section – II

Que. – 4 Draw a ILD at reaction at both support and shear and moment at 'x' m for simply supported beam with over hang on both side with of 'L' m span and having unit load at 'z' m. The length of overhang span is 'a' m. Also, draw ILD for end point of overhang span. 12

Que. – 5 (A) Define Shear Centre and locate the shear centre O for given figure no. 8 of constant thickness. 08

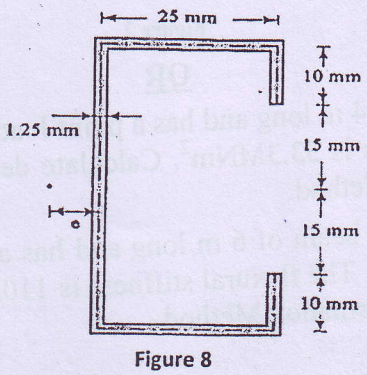

Figure 8

(B) Write down Advantages of spaces truss. 04

OR

Que. – 5 (A) Write down equation for Share Stress and Shear flow. Locate the shear centre O for given figure no. 9 of constant thickness 't'. 08

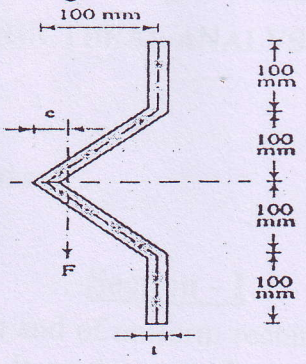

Figure 9

(B) Explain members of space truss. 04

Que. – 6 (A) A three hinged symmetric parabolic arch of span 80 m and rise 16 m is subjected to a concentrated load of 60 kN and acting at 16 m from its left support and uniformly distributed load of intensity 20 kN/m acting over its entire right half portion. Draw the Bending Moment diagram. 06

(B) Define Arch and It's types. 02

(C) Draw ILD at support for a cantilever beam of span length 'L' and also draw ILD for moment at support. 03

OR

Que. – 6 (A) A symmetric three hinge parabolic arch has a span of 40 m and a central rise of 7 m. the arch carries a distributed load which varies uniformly load from 40 kN/m at each abutment to zero at mid span. Determine 06

i. The horizontal thrust at the abutments.
ii. Maximum positive bending moment in the arch.

(B) Define Springing Point and Crown Point. 02

(C) Draw ILD at support for a simply support beam of span length 'L' and also draw ILD for moment at support. 03

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