B.E. Eighth Semester (Civil Engineering) (C.B.S.)

Elective - II : Advanced Structural Analysis

P. Pages : 4 **KNT/KW/16/7530**

Time : Three Hours * 0 3 1 8 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. Write a computer programme for beams on elastic foundation by giving suitable examples. **13**

OR

2. Derive an expression for semi – circular beam subjected to uniformly distributed load 'w' in $^{kN}/_{m}$ and simply supported by three columns spaced equally. Refer Fig. 1. **13**

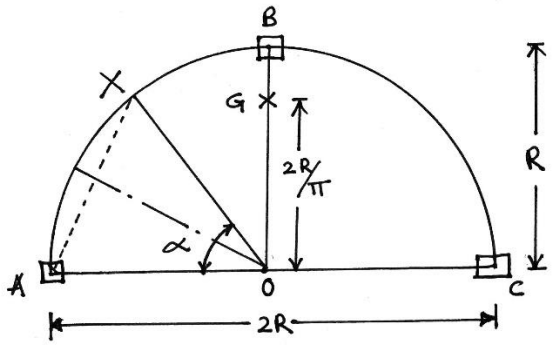

Fig. 1

Find out max. bending moment and max. torsional moment at X.

3. Analyse the plane frame shown in fig. 2. $E = 22 \times 10^6 kN/m^2$, C/S area for $AB = 0.6m \times 0.3m$ and C/S area for $BC = 0.3m \times 0.5m$. **13**

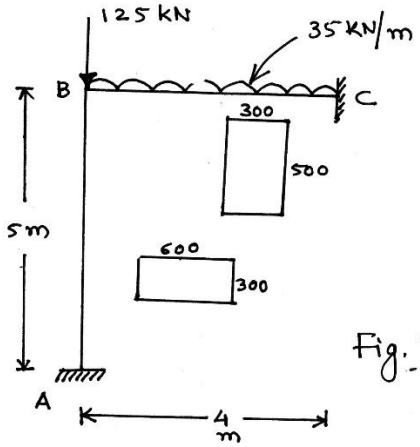

Fig. 2

OR

4. Assemble the global stiffness matrix and joint load vector for the plane frame shown in fig. 3 considering axial deformation. **13**

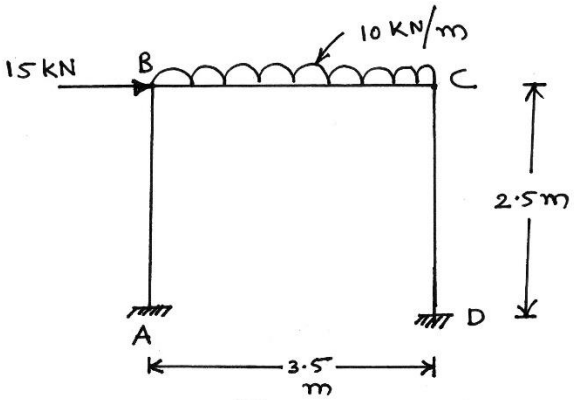

Fig. 3

5. Find displacement at node 2 of the grid structure shown in fig. 4 member 1 is loaded with uniformly distributed load of 20 kN/m and on member 2 concentrated load of 50 kN is acting at centre. **14**

$E = 2.54 \times 10^7 \, kN/m^2$, $G = 8.8 \times 10^6 \, kN/m^2$

$^c/_s$ of beams $= 300 \times 600 \, mm$ and $Ixx = db^3/3$.

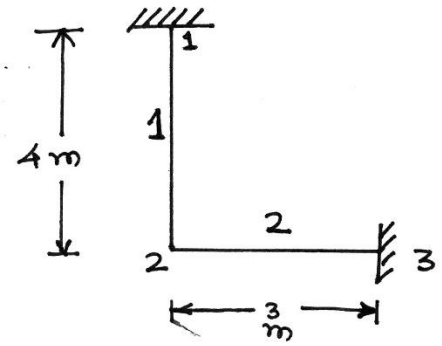

Fig. 4

OR

6. Analyse the plane grid shown in fig. 5 using direct stiffness method. **14**

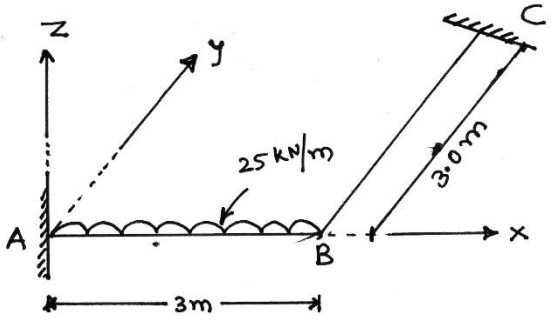

Fig. 5

$E = 2 \times 10^5 \, MPa$, $Iyy = 1500 \, cm^4$

$G = 1 \times 10^5 \, MPa$, $Ixx = 2000 \, cm^4$

7. Explain the following terms in detail.

i) D'Alemberts Principle **3**

ii) Inertia force **3**

iii) Equation of motion **4**

iv) Single degree of freedom system. **4**

OR

8. Explain the following terms in detail.

i) Damping **3**

ii) Natural Frequency **4**

iii) Transmissibility ratio **4**

iv) Effect of Gravitation force **3**

9. a) Explain "DUHAMEL's" integral in references to impulsive loading and derive the expression for DLF for a rectangular load. **7**

b) Draw the first three mode shapes for a beam fixed at one end and free at the other. Use Euler – Bernoulli approach. **6**

OR

10. a) Explain "DUHAMEL's" integral in references to impulsive loading and derive the expression for DLF for triangular load. **7**

b) Explain approximate method for analysis of impulsive loading. **6**

11. a) What are different IS 1893 code based procedure for Seismic Analysis? Explain Codal coefficient method in detail. **7**

b) Explain need of Earthquake analysis of structure and need of standard code. **6**

OR

12. Analyse four storeyed RC building using equivalent static lateral force method confirming to IS 1893. The preliminary data required for the analysis of frame is as follows : **13**

1.	Type of structure	Multistorey rigid jointed plane frame (special RC moment resisting frame)
2.	Seismic Zone	IV (Table 2, IS 1893 (Part 1) : 2002)
3.	Number of Stories	Four, (G + 3)
4.	Floor height	3.5 m
5.	Infill wall	250 mm thick including plaster in longitudinal and 150 mm in transverse direction.
6.	Imposed load	$3.5\,kN/m^2$
7.	Materials	Concrete (M 20) and Reinforcement (Fe 415)

8.	Sizes of columns	$250\,mm \times 450\,mm$
9.	Sizes of beams	$250\,mm \times 400\,mm$ in longitudinal and $250\,mm \times 350\,mm$ in transverse direction.
10.	Depth of slab	100 mm thick
11.	Specific weight of RCC	$25\,kN/m^3$
12.	Specific weight of infill	$20\,kN/m^3$
13.	Type of soil	Rock

Refer fig. 6A & 6 B.

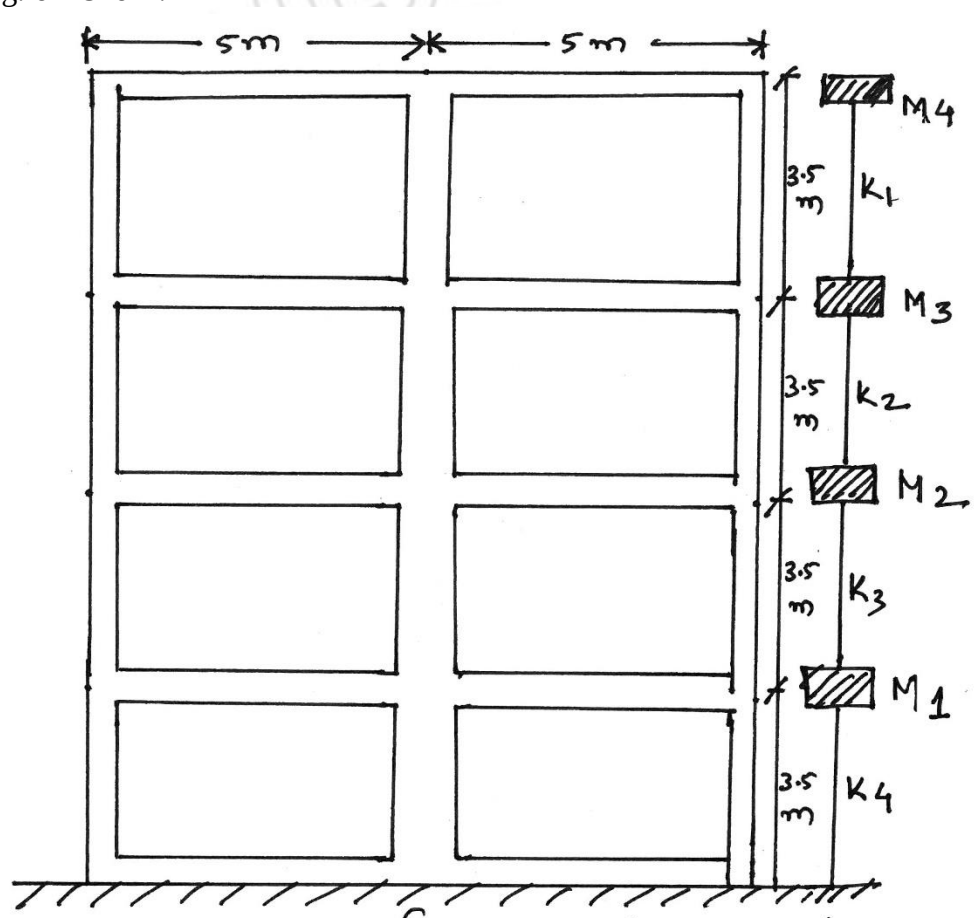

Fig.6A : Plane frame structure and its lumped mass mode

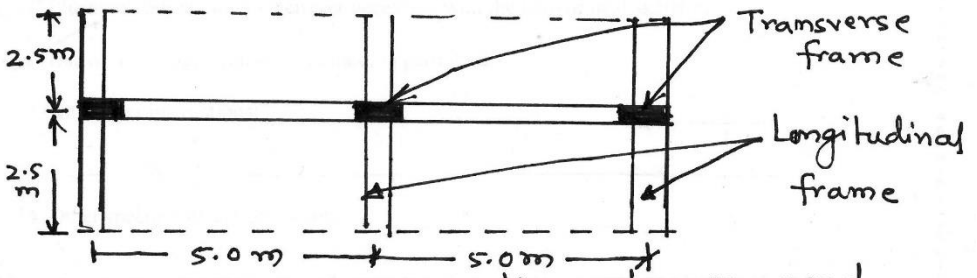

Fig.6B: Plan showing the column and beams at floor levels of plane frame.

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