

B.E. Eighth Semester (Civil Engineering) (CGS)
Professional Elective - II : Advanced Structural Analysis : 8 CE 04

P. Pages : 3

Time : Three Hours



AU - 3541

Max. Marks : 80

- Notes :
1. All question carry equal marks.
 2. Answer **three** question from Section A and **three** question from Section B.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. I. S. 1893 – 2002 may be consulted, use of electronic calculator is permitted.
 6. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Write down the assumptions in portal methods. 2
b) Analysis rigid jointed frame shown in fig. 1 by factor method. Draw B. M. diagram. 12

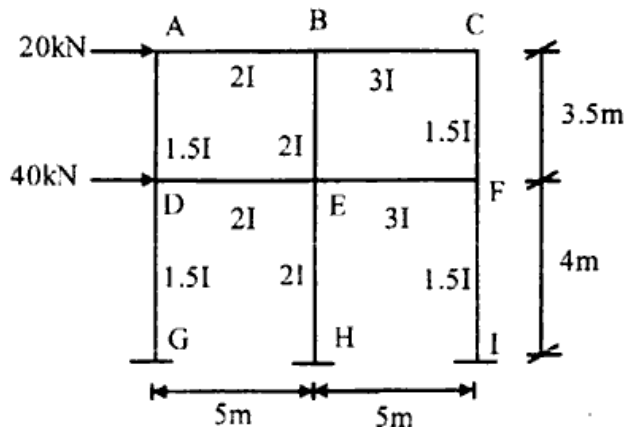


Fig. 1

OR

2. a) Define shear centre. 2
b) Find position of shear centre for beam section shown in fig. 2, Thickness = 1mm. 12

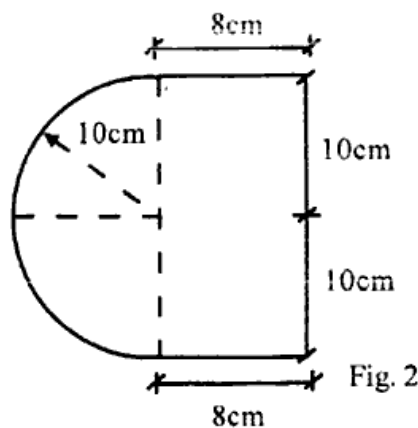


Fig. 2

OR

3. Analyse & draw BMD/SFD for an infinite beam resting on elastic foundation, subjected to a moment M_0 . 13

OR

4. A semi-circular beam curved is plan in fixed at both ends A & B has a radius of curvature R. The beam is subjected to a Udl "W" throughout Analyse by taking $EI/GJ = \alpha$, Draw SFD, BMD & TMD. 13
5. A single bay single storied portal frame ABCD having fixed column base is 5m high. It is subjected to a 60kN lateral (Horizontal) point load at B & C. Another 40kN lateral point load acts at 2m from B & C. All the loads acts from left to right. Draw BMD by using the cantilever moment distribution method. Base width of frame is 4m. Take I everywhere. 13

OR

6. A 4m high simply supported Vierendeel girder has three equal panels of 4m each. Analyse by using the cantilever moment distribution. Method if it is subjected to two symmetrical vertical point loads of 150kN each, placed at panel points. Take $I = I$ for all the vertical members & $I = 3I$ for all the horizontal members. Draw BMD. 13

SECTION – B

7. a) State minimum potential theorem. Differentiate between Rayleigh and Rayleigh – Ritz approaches. 5
- b) For a fixed beam of span L carrying central load P, deflections are expressed as 8
- $$Y = A \left(1 - \cos \frac{2\pi x}{L} \right)$$
- Determine central deflection using minimum potential theorem.

OR

8. A single span prismatic fixed beam AB is 8m long. It is subjected to a points load 'W' at 5m from left support A. Use finite difference technique to obtain deflections at $L/4$ intervals. Draw elastic curve. 13
9. In a 3 – D structure the displacements are given by 13
- $$U = (x^2 + y^2 + xy + yz^2) k$$
- $$V = (z^2 + x^2 + xz + xz^2) k$$
- $$W = (y^2 + xyz + 5x^2) k$$
- where,
- $k = 0.001$ & displacements are in mm find displacements stress & strain at a point P(10, 10, 10) Take, $\nu = 0.3$ & $E = 2 \times 10^5 \text{ N/mm}^2$.

OR

10. a) Derive equilibrium equations for 2D. 7

- b) How are stress related to Airy stress function? Check whether polynomial expression. 6
 $5x^2 + 4xy^2 + x^3$
Can be used as Airy function?

11. a) Derive an expression for Eulerian load. 4
- b) Define: 3
i) Post ii) Column
iii) Stanchion iv) Strut
v) Pier
- c) A straight uniform column of height 'L' is subjected to an axial compressive force 'P' in addition to transverse distribution load 'W' throughout. Calculate central deflection and B.M. if the column ends are hinged. 7

OR

12. a) Define: 3
i) OMRF
ii) Zone factor
iii) Seismic weight
- b) Find the horizontal earthquake forces by using the equivalent static analysis method for a 3 storied building situated in zone 5 for following data: 11
1) Floor height = 3.5m
2) No of bays = 3 in both plan & elevation
3) C/C column distance = 4m in both plan & elevation
4) Member sizes = 230 x 375 for coloum & Beams (Including slab)
5) Assume full brick thick infill walls.
6) Slab thickness = 125mm
7) D. L. due to finishes = $1\text{kN} / \text{m}^2$
8) Imposed load = $2\text{kN} / \text{m}^2$ for all floors including terrace.
9) Building type – Public building
10) Foundation resting over Hard rock.
11) Assume parapet wall of 0.6m at terrace
12) Assume ductile detailing.

Density of full brick thick plastered wall = $19\text{kN} / \text{m}^2$
