Total No. of Questions : 10]

SEAT No. :

**P2964**

[Total No. of Pages : 3

# [5154]-516
## B.E. (Civil)
## ADVANCED STRUCTURAL DESIGN (Elective - III)
## (2012 Pattern) (Semester - II) (End Semester) (401009A)

*Time : 2½ Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

1) ***Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***All relevant IS Codes and Steel Table are allowed in the examinations.***
4) ***If necessary, assume suitable data and indicate clearly.***
5) ***Use of electronic pocket calculator is allowed.***

***Q1)*** Calculate the moment of inertia for deflection calculation for the floor deck shown in Fig. 1. All the dimensions mentioned are in mm. **[10]**

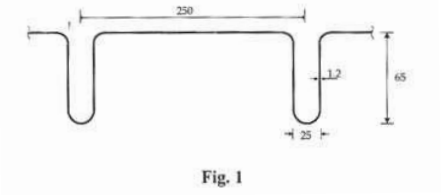


Fig. 1

OR

***Q2)*** Explain the design procedure for cold form light gauge tension members.**[10]**

***Q3)*** Determine the plastic moment and draw the bending moment diagram for the frame shown in Fig. 2. **[10]**

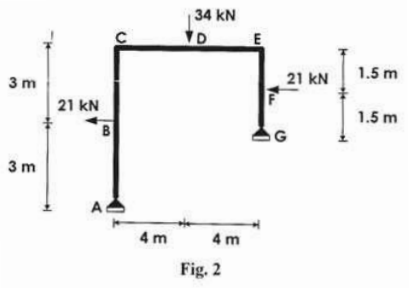


Fig. 2

OR

***Q4)*** Explain how the basic proportioning of the dimensions of a self-supporting steel chimney is done. **[10]**

***Q5)*** A (7 × 4) m two-way slab is simply supported on all four sides. It carries a uniformly distributed load w kN/m$^2$. If the slab is to be isotropically reinforced, calculate the ultimate moment m in terms of w. **[16]**

OR

***P.T.O.***

***Q6)*** The yield line patterns for a rectangular slab simply supported at two opposite edges and free at the other two edges are shown in Fig. 3. The slab is isotropically reinforced in the top and the bottom with ultimate positive and negative moments per unit width $m_u$ and $m_u'$ respectively. Determine the ultimate concentrated load P that the slab can carry. **[16]**

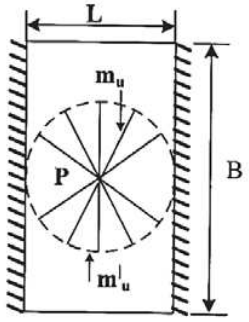


**Fig. 3**

***Q7)*** For the elevated water tank shown in Fig.4, analyze the staging and calculate the resultant moment at the base of the staging for tank-full condition. The tank is located on soft soil in seismic zone III. The staging confirms to the ductile detailing of IS 13920. The weights of various components are given below.

Roof slab = 100 kN; wall = 200 kN; floor slab = 130 kN; floor beam = 65 kN; gallery = 80 kN; columns = 150 kN; braces = 220 kN.

The total stiffness of the columns may be taken as 5,500 kN/m. **[18]**

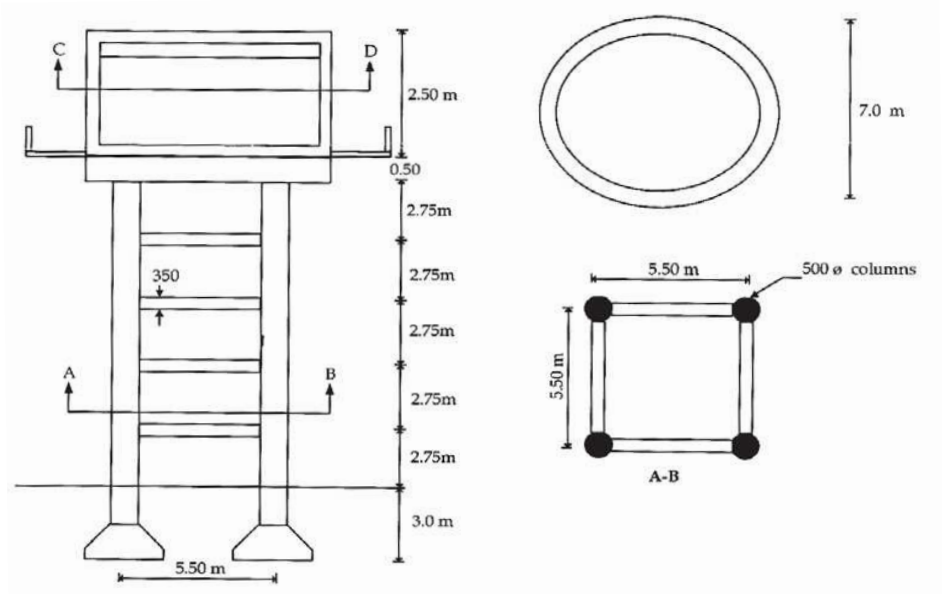


**Fig. 2**

OR

***Q8)*** a) For the elevated water tank in Q.7, analyze the staging for tank empty condition. **[12]**

b) Explain the spring-mass model of an elevated water tank. **[6]**

***Q9)*** The un-factored load combinations on a 5 m wide RC shear wall are as follows:

| Load combination | BM (kNm) | Axial force (kN) | Shear force (kN) |
|---|---|---|---|
| (DL+IL) | 450 | 1,700 | 25 |
| EL | 3,500 | 150 | 450 |

Design the RC shear wall for the given loads and sketch the details of reinforcement. Use M30 grade concrete and Fe 500 grade of steel. **[16]**

OR

***Q10)*** Write short notes on the following: **[16]**

a) Boundary elements in a shear wall

b) Modes of failure of shear walls.

c) Typical reinforcement detailing for a RC shear wall with boundary elements

d) Coupled shear walls.