

Total No. of Questions : 10]

SEAT No. :

**P3661**

**[4959]-1016**

[Total No. of Pages : 3

**B.E.(Civil)**

**ADVANCED STRUCTURAL DESIGN**

**(2012 Course) (Elective-III)(Semester-II) (End Sem)(401009A)**

*Time : 2½Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, and Q9 or Q10.
- 2) Figures to the right indicate full marks.
- 3) All relevant IS codes and steel Table are allowed in the examination.
- 4) If necessary, assume suitable data and indicate clearly.
- 5) Use of electronic pocket calculator is allowed

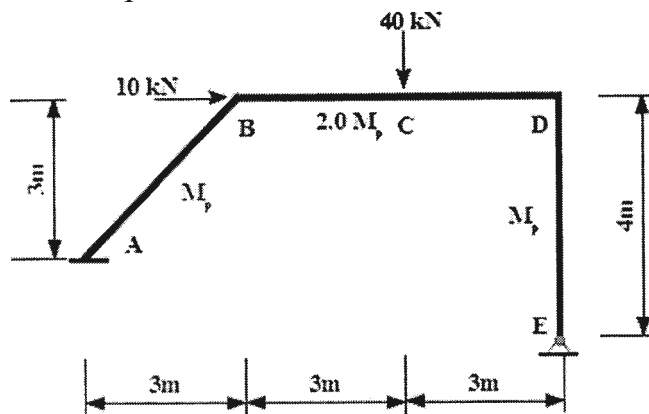
**Q1)** Design a column of effective length 2.1M. The design load on the column is 500 kN. The yield stress of steel is 240 N/mm<sup>2</sup> **[10]**

OR

**Q2)** Explain the following: **[10]**

- a) Collapse mechanism
- b) Lower bound theorem,
- c) Upper bound theorem and,
- d) Uniqueness theorem.

**Q3)** Obtain the plastic moment for the frame shown in Fig.1 **[10]**



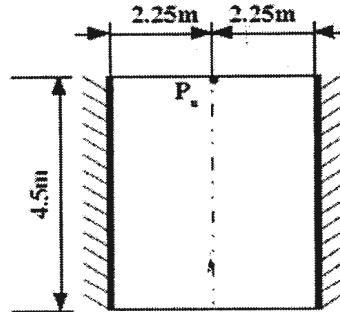
**Fig. 1**

OR

**Q4)** Write a note on forces acting on a steel chimney. **[10]**

**P.T.O.**

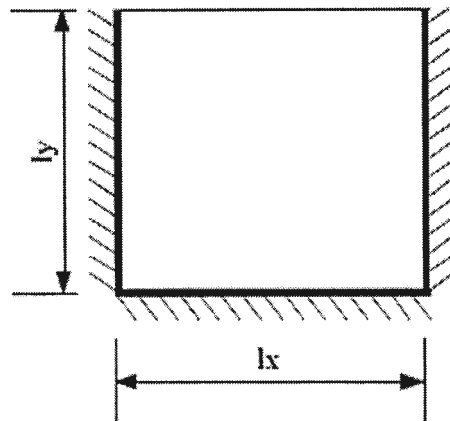
**Q5)** A square slab of span 4.5 m is simply supported at two opposite sides as shown in Fig.2. The slab carries a uniformly distributed load of  $15\text{kN/m}^2$ . The slab is isotropically reinforced with an ultimate positive moment of resistance of  $90\text{ kN-m/m}$ . Calculate the ultimate concentrated load  $P_u$  that can be placed at the center of free edge that would cause a flexural failure. [18]



**Fig. 2**

OR

**Q6)** Design the simply supported rectangular slab shown in Fig.3. The factored load may be taken as  $9\text{kN/M}^2$ . Use M20 grade of concrete and Fe 500 grade of steel. Take  $l_x=4.0\text{ m}$  and  $l_y = 1.9\text{m}$  [18]



**Fig. 3**

**Q7)** An elevated square water tank is 6 m in size and 4 m high. It is supported on a concrete staging of 8 columns. The height of the staging is 16m. Bracings are provided at a vertical spacing of 4m. The circular columns of the staging are 500 mm in diameter. The structure is located in zone III and founded on Type III type of soil. Assume suitable dimensions for various elements and mention them clearly. Analyze the tank for tank full condition . [16]

OR

- Q8)** a) For the problem in Q.7 analyze the tank for tank empty condition. [12]  
b) Explain convective mass and impulsive mass. [4]
- Q9)** a) What are proportionate and non-proportionate shear walls? [8]  
b) Explain the classification of shear walls based on the aspect ratio [8]

OR

- Q10)** a) What are boundary elements in a shear wall? How is load carry capacity calculated? [8]  
b) Explain coupled shear wall with a neat sketch. [8]

