

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**M.Tech., Winter 2017 - 18 Examination**

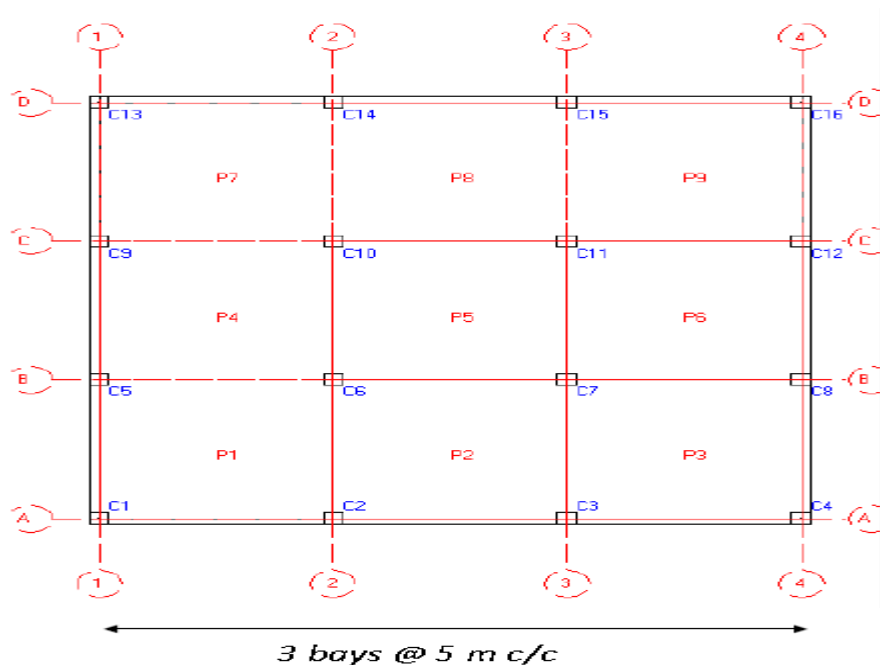
**Semester: 1**  
**Subject Code: 03209102**  
**Subject Name: Advanced Design of Concrete Structures**

**Date: 28/12/2017**  
**Time: 2:00 pm to 4:30 pm**  
**Total Marks: 60**

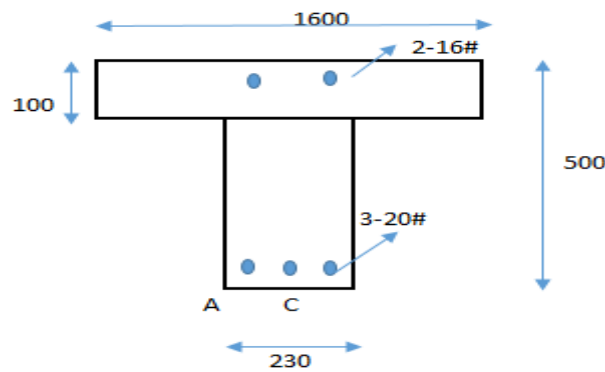
**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.
5. Use of IS 456-2000, SP-16, IS 875 is allowed.

- Q.1** Compute the short term deflection of the beam at mid span under the service loads for simply supported beam of 5m having self weight of 15kN/m and central point load of 20kN. The beam section is 250mm X 600mm and also reinforced with 3 no 16 mm diameter bars at bottom. The material are M<sub>20</sub> grade concrete and HYSD reinforcement of grade Fe<sub>415</sub>. Assume suitable data. **(15)**
- Q.2** Answer the following questions. (Attempt any three) (Each five mark) **(15)**
- A) Differentiate between limit state method and working stress method.
  - B) What is a flat slab? Write structural advantages of it.
  - C) Write the limitations of Direct design method.
  - D) Define limit state and explain different types of limit states.
- Q.3** A) Design corner panel P<sub>7</sub> by DDM flat plate supported on columns 500 mm square, for a Live Load = 3 kN/m<sup>2</sup>, Floor Finish = 1.5 kN/m<sup>2</sup> use M<sub>20</sub> and Fe<sub>415</sub>. Assume clear cover = 20 mm. Effective Column Height = 3.3m. Bay spacing in X and Y direction = 5m c/c **(07)**



- B) A simply supported T beam of span 5 m subjected to moment of 95 kNm at mid span. The section of beam is shown in figure. Calculate the crack width at corner A and center of tension face C as shown in figure. Use M<sub>20</sub> grade concrete and HYSD reinforcement grade of Fe<sub>415</sub>. **(08)**



**OR**

B) Central portion of a marriage hall of 12 m diameter is to be covered with a spherical dome with a 2 m diameter opening at crown to provide skylight. Load from skylight shall be assumed as point load acting at crown. Assume this point load to be  $[15(DL)+3.5(LL)]$  kN. Fix the geometry of the dome. Assume suitable data. (08)

**Q.4** A) Design a pile cap to support a column service load of 1100kN. Size of the column is 450 mm x 450 mm. The cap is supported on four 300 mm diameter piles spaced at 900 mm centres. The cap projects 150 mm beyond the pile face. The materials are  $M_{25}$  grade concrete and HYSD reinforcement of  $Fe_{415}$ . (07)

**OR**

A) Design an interior panel of flat slab having equal panels of 6.5m X 6.5m. The building is braced with shear walls. The panels have drops 3m X 3m size. The depth of drop is 250mm and that of slab is 200mm. The internal columns are 500mm dia and column head is 1000mm in dia. The storey height above and below the slab is 4m. The loading is as follows: (07)

D.L= self weight + 2.7 kN/m<sup>2</sup>

L.L= 4 kN/m<sup>2</sup>

Use  $M_{20}$  concrete and  $Fe_{415}$ .

B) A Square Grid floor 20m wide x 30m long is to be designed for a live load of 3 kN/m<sup>2</sup> and floor finish of 1 kN/m<sup>2</sup>. Spacing of ribs in both the directions is 2 m c/c. Analyze the floor. Determine the maximum Deflection at centre. The materials are  $M_{25}$  grade concrete and  $Fe_{415}$  Steel. (08)