***U.S.N*** | | | | | | | | | | |

# P.E.S. College of Engineering, Mandya - 571 401

***(An Autonomous Institution affiliated to VTU, Belagavi)***

**Seventh Semester, B.E. - Civil Engineering**

**Semester End Examination; Jan. / Feb. - 2021**

**Advanced Design of RC Structures**

*Time: 3 hrs* *Max. Marks: 100*

***Note**: i) Answer **FOUR** full questions, selecting **ONE** full question from each unit.*
*ii) Use of relevant IS codes are permitted.*
*iii) Assume any missing data suitably.*

## UNIT - I

1. Design a RCC grid floor for a hall measuring 9 m x 12 m, with ribs spaced at 1.5 m c/c in both ways. Live load on floor is 3.0 kN/m$^2$, unknown partition wall loads of 1 kN/m$^2$, floor finish as 1.0 kN /m$^2$. Use M20 concrete and Fe 415 steel. Assume the floor slab to be simply supported on all four edges. Sketch details of reinforcements. — 25

2 a. With neat sketches, write yield line patterns for following RC slabs:
i) Square slab
ii) Rectangular slab
iii) Triangular slab
iv) Rectangular slab having fixed support
v) Hexagonal slab
vi) Circular slab and also write notations for yield lines and supports — 7

b. Design a rectangular slab 6 m by 4 m in size and simply supported at the edges for a service live load of 4 kN/m$^2$. Assume coefficient of orthotrophy ($\mu$) as 0.7, M20 grade concrete and Fe 415 $H_y$ SD bars. — 18

## UNIT - II

3. Design the interior panel of a flat slab for a warehouse to suit the following data:
Size of warehouse 24 m x 24m divided into panels of 6 m x 6 m loading class = 5 kN/m$^2$; Materials - M20 grade concrete, Fe 415 grade steel. Adopt diameter of column head = $D$ = 1.5 m, slab drop = 200 mm. Sketch the reinforcement details. — 25

4. A flat floor slab system should be designed for a dining hall system consisting of 8 panels in each direction support. Live load of 5 kN/m$^2$ and floor finish of 1.00 kN/m$^2$, panels are support on 500 x 500 mm column. Adopt direct design method and design an interior panel of size 7 m x 7 m without drops. Use M20 concrete and Fe 415 steel. Sketch the reinforcement details. — 25

Contd…2

**UNIT - III**

5. Design an elevated circular water tank for storing 1 million litres capacity. Tank having flat bottom whose height is fixed as 5 m (including 300 mm of free board) which is supported by a ring beam. The ring beam is further supported by 8 column equally spaced. Design the following components of the water tank; 25

   i) Top dome

   ii) Top ring beam

   iii) Cylindrical wall and bottom slab.

   Use M30 concrete and Fe 500 steel. Sketch the reinforced details.

6 a. What is meant by beam method of analysis of cylindrical shells? 5

b. How shells are classified and list them accordingly? 10

c. Explain the design procedure for the cylindrical shell. Draw typical reinforcement details for cylindrical shell roof? 10

**UNIT - IV**

7. Design a silo for storing corn, with the overall dimensions as shown in Figure 1. The conical dome has central opening of 450 mm diameter. Use Airy's stress theory and the M20 grade concrete and Fe 250 steel, for can take $w$ = 7210 N/m$^3$, $\mu$ = 0.455 and $\mu$` = 0.433 25

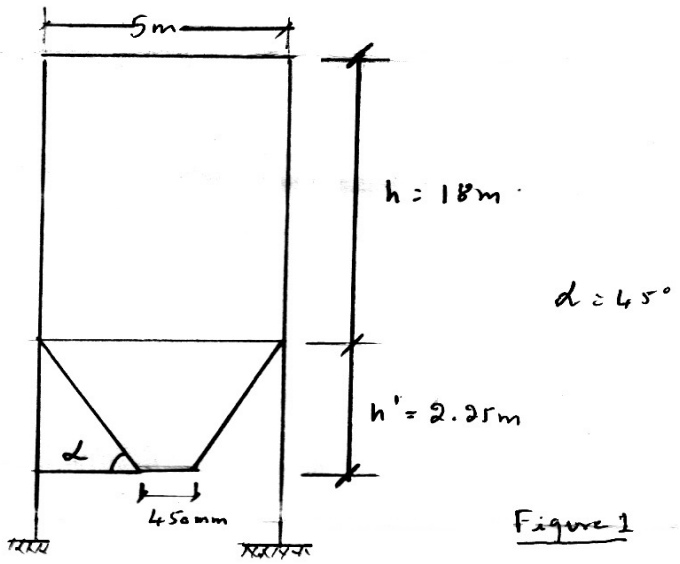


Figure 1

8. A cylindrical silo has an internal diameter of 6 m and 20 m deep (cylindrical portion) with a conical hopper bottom. The material stored is poultry feed having a density of 8 kN/m$^3$. The coefficient of friction between wall and material is 0.444. The ratio of horizontal to vertical pressure intensity is 0.40 angle of repose = 25°. Design the reinforcements in the silo walls. Adopt M20 grade concrete and Fe 415 steel. Adopt Janssen's theory for pressure calculation. 25

* * *