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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; Dec. - 2019

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 IS code are permitted. iii) Missing data, if any, may suitably be assumed.

UNIT - I

1. A RC grid floor is to be designed to cover a floor area of size 12 m × 18 m. The spacings of the ribs in mutually perpendicular directions being 1.5 mc/c. Live load = 1.5 kN/m^2. Adopt M_{20} grade concrete and Fe 415 steel. Analyse the grid floor for moments and shears using Rankine Grashoff theory method. Design suitable reinforcements at critical sections. 25

2 a. Briefly explain characteristic features of yield lines. 7

b. A RC slab 5 m x 5 m is simply supported along the four edges and is reinforced with 10 mm dia Fe 415 steel bars at 150 mm c/c both ways. The average effective depth of the slab is 100 mm and the overall depth of the slab is 130 mm. The slab carries a flooring of 50 mm thick having unit weight of 2.2 kN/m^2. Determine the maximum permissible service load, if M20 concrete is used. 18

UNIT - II

3. A flat floor slab system should be designed for dining hall system consisting of 10 panels in each direction support live load of 5 kN/m^2 and floor finish of 1 kN/m^2. Panels are supported on 500 x 500 mm column. Adopt direct design method and design an interior panel of size 6 m x 6 m without drops. Use M25 concrete and Fe 415 steel. Sketch the reinforcement details. 25

4. A flat floor slab system should be designed for industrial purpose for storage of batteries. The batteries are uniformly stored on floor having an intensity of load 4 kN/m^2 and floor finish of 0.75 kN/m^2.Slab panels are supported on 550 mm x 550 mm column. Adopt direct design method and design an interior panel size 7 m x 7 m with drop. Use M25 concrete and Fe 415 steel. Sketch the reinforcement details. 25

UNIT - III

5. Design an elevated circular water tank having flat bottom whose diameter and height are 8 m and 4 m respectively which is supported by a ring beam. The ring beam is further supported by 6 columns equally spaced. Design the following components of the water tank: 25

(i) Top dome (ii) Top ring beam (iii) Cylindrical wall and bottom slabs.

Use M30 concrete and Fe 415 steel sketch the reinforcement details.

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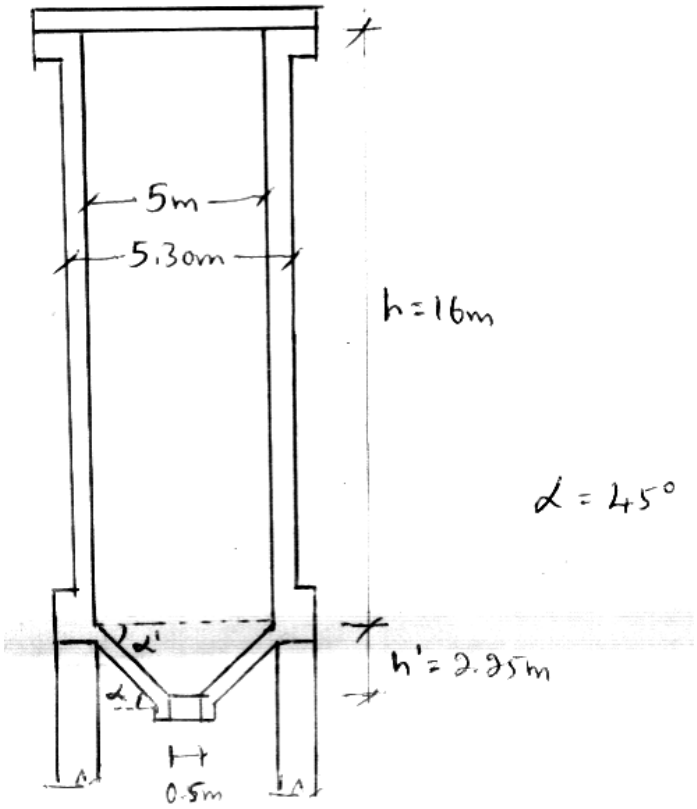
6 a. How do you classify the shell? Explain with suitable sketch. 15

b. Explain the design procedure / criteria for the cylindrical shell. Draw typical reinforcement details for cylindrical shell roof. 10

UNIT - IV

7. 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 wheat with a conical hopper bottom. The material stored is wheat with a density of 8 kN/m^2. The coefficient of friction between wall and material is 0.444. The ratio of horizontal to vertical pressure intensity is 0.40, angle of repos = 25°. Design the reinforcements in the silo walls. Adopt M_{20} grade concrete and Fe 415 steel. Adopt Janssen's theory for pressure calculations. 25

8. Design a silo for storing spelt (dinkel wheat), with the overall dimensions as shown in figure (1). The conical dome has central opening of 500 mm diameter. Use Airy's theory and the concrete mix of M20 grade and mild steel bars. For spelt, take W = 7850 N/m^3, $\mu = 0.466$ and $\mu' = 0.444$. 25



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