

on soil at site = 150 KN/m². Adopt M-25 grade concrete mix and tor steel Fe=415 grade and design the following : (20)

- (a) Base section of chimney
- (b) Foundation for the chimney

6. What is Battery of Bunkers ? Explain the design of Battery of Bunker. (20)

7. Distinguish between a bunker and a silo. Using Airy's theory, show that the height upto which a bin behaves as a shallow one is given by (20)

$$h = b \left[\mu + \sqrt{\frac{\mu (1 + \mu^2)}{\mu + \mu'}} \right]$$

8. What are Marine Structures ? Explain the repair of marine structure. (20)

Roll No.

23521

**M. Tech. 3rd Sem. Civil
Engineering (Specialisation in
Structural Design) Examination-
December, 2016**

DESIGN OF STRUCTURES-III

Paper : MTSD-301

Time : 3 hours

Max. Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note: Attempt any **five** questions. All questions carry equal marks.

1. A cylindrical silo has an internal diameter 6 m and 20 m (cylindrical portion) with a conical hopper bottom. The material stored

is wheat with a density of 8 KN/m^3 . The coefficient of friction between wall and materials is 0.444. The ratio of horizontal to vertical pressure is 0.40. Angle of response = 25 degrees. Design the reinforcements in the silo walls. Adopt M-20 grade concrete and Fe-415 HYSD bars. Adopt Janssen theory for pressure calculation. (20)

2. A coal bunker is to be designed to store 300 KN of coal having a unit weight of 8 KN/m^3 . The bunker should be square with 3 metre sides. The stored coal is to be surcharged at an angle of response which is 30 degrees for coal. Adopt M-25 grade concrete and Fe-415 steel and design the side walls and hopper bottom and sketch the details of reinforcements. (20)

3. Design a silo for storing maize, having unit weight of 6870 N/m^2 . The silo has 6 m internal diameter and height of the cylindrical portion is 15 m. The conical dome has a slope of 40° with horizontal, and has an opening of 60 cm diameter. Use Airy's theory. Take $\mu = 0.521$ and $\mu' = 0.432$. Use M 20 grade concrete. (20)

4. Define in details "Flood patterns" and flood irregularities and their effects. (20)

5. A concrete Chimney of height 80 m with the external diameter of shaft being 4 m at top 5 m at bottom is required in a place where the wind intensity is 1.5 KN/m^2 . Thickness of fire brick lining = 10 cm. Temperature difference between the inside and outside of shaft = 75°C . Permissible bearing pressure