

Roll No. ....

**23521**

**M. Tech. 3rd Semester (Civil Engg.)**

**(Specialisation in Structural Design)**

**Examination – December, 2014**

**DESIGN OF STRUCTURES - III**

**Paper : MTSD-301**

***Time : Three Hours ]***

***[ Maximum 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 examination.*

**Note :** Attempt any *five* Questions. All questions carry equal marks. Use of IS : 456 is allowed. Assume suitable data whenever necessary.

1. Design a bunker to store 300 kN of coal, for the following data; Unit weight of coal =  $8340 \text{ N/m}^3$ ; angle of response =  $30^\circ$ . The stored coal is to be surcharged at its angle of response. Take permissible stress in steel as  $140 \text{ N/mm}^2$ . 20

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2. Using Janssen's theory, derive an expression for horizontal pressure at any depth  $h$  below the top, in a silo. Also derive an expression for total vertical load of the grain transferred to the walls. 20
3. Design a chimney of 30m height, having external diameter of 2.6m throughout the height. The chimney has a fire brick lining of 100mm thickness, provided up to a height of 24m base, with an air gap of 100mm. Assume the temperature of gases above the surroundings air as  $240^{\circ}\text{C}$ . Take  $\alpha$  for R.C.C. as  $11 \times 10^{-6}$  per  $^{\circ}\text{C}$  and  $E_s = 2 \times 10^5 \text{ N/mm}^2$ . Use M20 grade concrete. 20
4. Design the roof slab for a circular room 6 meter in diameter from inside and carrying a super imposed load of  $5 \text{ kN/m}^2$ . Assume that slab is simple supported at the edges. Use M 15 mix. And Fe415 steel. The thickness of wall is 400mm. 20
5. Design a conical dome for a span 10m and rise 2m, has a shell which is 120mm thick. The wind load on the dome is estimated to the equivalent to  $1200 \text{ N/m}^2$ . Examine the stresses in dome and design suitable reinforcement. Also, design the ring beam. 20

6. How to compute the static pressure by Airy's method ? Explain in detail. 20
7. What do you mean by flood attens ? What is flood irregularities and their effect ? Explain. 20
8. Discuss the construction aspects for the design of silos in detail. 20