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Question Paper Code: ACEB42



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech VII SEMESTER END EXAMINATIONS (REGULAR/SUPPLEMENTARY) - DECEMBER 2022

Regulation: R18

## DESIGN OF CONCRETE STRUCTURES II

Time: 3 Hours

(CIVIL ENGINEERING)

Max Marks: 70

Answer FIVE Questions choosing ONE question from each module

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

### MODULE – I

1. (a) Enlist different types of flat slabs with neat sketches. List the assumptions of equivalent frame method. [BL: Understand| CO: 1|Marks: 7]
- (b) Design the interior panel of a flat slab for a warehouse to suite the following data. Size of warehouse 24 m by 24 m divided into panels of 6 m by 6 m. Loading class  $5kN/m^2$ . M20 Grade concrete and Fe-415 grade steel HYSD bars. [BL: Apply| CO: 1|Marks: 7]
2. (a) What is the necessity of flat slab? Discuss about drops provision in flat slabs according to IS code. [BL: Understand| CO: 1|Marks: 7]
- (b) Design the interior panel of a flat slab 5 m by 6 m in size, for a super imposed load of  $8 kN/m^2$ . Provide two-way reinforcement. Use M20 Grade concrete and Fe-415 grade steel HYSD bars. [BL: Apply| CO: 1|Marks: 7]

### MODULE – II

3. (a) Distinguish bunker and silo. Explain the structural elements of a bunker with a neat sketch. [BL: Understand| CO: 2|Marks: 7]
- (b) Design a circular cylindrical bunker to store 20 tonnes of coal. Density of coal –  $9 kN/m^3$ , Angle of repose  $30^\circ$ . Use M20 grade concrete and Fe-415 grade steel HYSD bars. Sketch the details of reinforcement in the bunker. [BL: Apply| CO: 2|Marks: 7]
4. (a) Mention the various forces acting on the walls of a bin. Describe in detail Airy's theory. [BL: Understand| CO: 2|Marks: 7]
- (b) Design the side walls of a 4 m by 3 m bunker to store 45 tonnes of coal. Density of coal  $8.5 kN/m^3$ . Angle of repose  $30^\circ$ . Adopt M20 grade concrete and ribbed tor steel. Sketch the details of reinforcement in the bunker. [BL: Apply| CO: 2|Marks: 7]

### MODULE – III

5. (a) Classify chimneys. What are the different parts of R.C.C chimney along with a neat sketch. [BL: Understand| CO: 3|Marks: 7]

- (b) An R. C. chimney having a mean diameter of 5 metres is reinforced with fifty bars of 16 mm diameter. Assuming an effective wind pressure of  $1500 \text{ N/mm}^2$  on projected areas, determine the maximum stresses in concrete and steel at a section 30 meters from the top. Assume wt. of RCC =  $24 \text{ kN/m}^3$ . [BL: Apply| CO: 3|Marks: 7]
6. (a) Enumerate the stresses in chimney shaft due to self-weight and wind. Interpret the traditional stack inspection methods for concrete chimneys. [BL: Understand| CO: 4|Marks: 7]
- (b) Design a chimney of 45 m height, having external diameter of 4.5 m throughout the height. The chimney has fire brick lining of 110 mm thick, provide up to a height of 50 m above ground level, with an air gap of 100 mm. The temperature of gases above surrounding air is  $180^\circ\text{C}$ . Take the coefficient of expansion of concrete and steel =  $9 \times 10^6$  per degree C, and  $E_S = 1.55 \times 10^5 \text{ N/mm}^2$ . Use M20 grade. [BL: Apply| CO: 4|Marks: 7]

#### MODULE – IV

7. (a) Describe the different types of water tank based-on placement of tank and shape of tank. [BL: Understand| CO: 5|Marks: 7]
- (b) A cylindrical tank of capacity 7,00,000 liters is resting on good unyielding ground. The depth of tank is limited to 5m. A free board of 300 mm may be provided. The wall and the base slab are cast integrally. Design the tank using M20 concrete and Fe415 grade steel. Draw the following  
i) Plan at base. ii) Cross section through centre of tank [BL: Apply| CO: 5|Marks: 7]
8. (a) Draw the deflected shape of the circular tanks resting on ground with flexible and rigid bases. [BL: Understand| CO: 5|Marks: 7]
- (b) Design a rectangular water tank 5m x 4m with depth of storage 3m, resting on ground and whose walls are rigidly joined at vertical and horizontal edges. Assume M20 concrete and Fe415 grade steel. Sketch the details of reinforcement in the tank. [BL: Apply| CO: 5|Marks: 7]

#### MODULE – V

9. (a) Explain different types of retaining walls with neat sketch. Discuss the function of shear keys in the design of retaining walls. [BL: Understand| CO: 6|Marks: 7]
- (b) Design a cantilever retaining wall to retain each embankment 4 m high above ground level. The density of each is  $18 \text{ kN/m}^3$  and its angle of repose is  $30^\circ$ . The embankment is horizontal at top. The safe bearing capacity of soil may be taken as  $200 \text{ kN/m}^2$  and the coefficient of friction between soil and concrete is 0.5. Adopt M-20 grade concrete and Fe415 HYSD bars. [BL: Apply| CO: 6|Marks: 7]
10. (a) Enlist different forces acting on retaining wall. Distinguish between active pressure and passive pressure of earth, in relation to retaining wall structures [BL: Understand| CO: 6|Marks: 7]
- (b) Design a counterfort type retaining wall to suit the following data.  
Height of wall above ground level :- 6 m  
Safe bearing capacity of soil at site :-  $160 \text{ kN/m}^2$   
Angle of internal friction :-  $33^\circ$   
Density of soil –  $16 \text{ kN/m}^3$   
Spacing of counterforts :- 3m c/c Materials: M20 grade concrete and Fe-415 HYSD bars. Sketch the details of reinforcements in the retaining wall. [BL: Apply| CO: 6|Marks: 7]

