40+40+5 = 85

BE Sem VII - Civil
C - Scheme.

26/12/23.

Duration: 4hrs **[Max Marks: 80]**

Instructions:

(1) Question No 1 is **compulsory**.
(2) Attempt any **three** questions out of the **remaining five.**
(3) Each **full** question carries **20** marks.
(4) Use of **relevant IS codes** permitted
(5) Assume suitable data, if required and state it clearly.

Q.1 Attempt any **FOUR**

a Differentiate between one way slab and two-way slab. 05 M

b Explain the differences in the structural behavior of cantilever and counterfort type retaining walls. 05 M

c Calculate the maximum hoop tension for a circular water tank with flexible joint at the base. The tank is of 12m diameter and 4.2m height with a free board of 200mm.Take unit weight of water as 9.81kN/m^3. Also calculate the area of steel reinforcement required to resist the maximum hoop tension if the permissible tensile stress in steel is 150N/mm^2 Apply WSM. 05 M

d What do you mean by degree of freedom? Write the equation of motion for a single degree of freedom system and explain the terms used. 05 M

e A concrete beam is post-tensioned by a cable carrying an initial stress of 1200 N/mm^2. The slip at the jacking end was observed to be 3 mm. The length of the beam is 20 m. Es = 210 kN/mm^2. Friction coefficient for wave effect is 0.0015 per meter. Estimate the percentage loss of stress due to friction and anchorage slip. 05 M

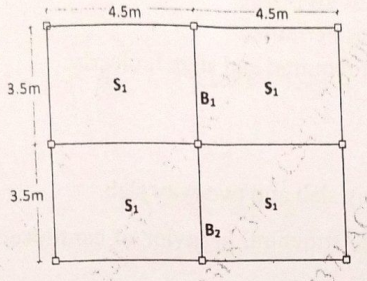
f Why ductile detailing is important for earthquake resistant design of structures? 05M

Q.2 Design a suitable dog legged stair for a stair room having clear dimensions 2.6m x 4.8m. Floor to floor height is 3.2m. The live load is 3kN/m^2 and floor finish load is 1kN/m^2. Stairs are supported at plinth level, midlanding and floor level by 230mm wide beams. Show arrangement of flights with dimensions. Design both the flights and carry out necessary checks. Draw neat sketches showing reinforcement details in each flight. Adopt M25 grade concrete and Fe500 grade steel for the design. Apply LSM. 20M

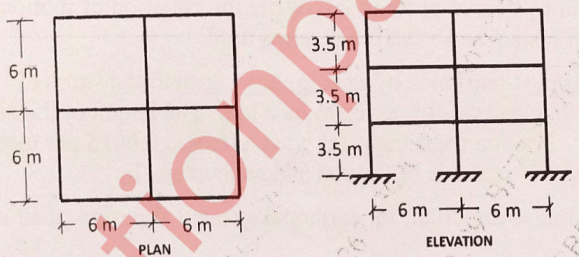
Q.3 A reinforced concrete cantilever retaining wall is supporting a levelled backfill of 3.8m above GL. Density of backfill is 16.5kN/m^3 and its angle of repose is 28^0. The foundation is 1m below GL. SBC of soil 180kN/m^2 and coefficient of friction between concrete and soil is 0.45. Show all stability checks. Design the stem and heel slab of the retaining wall. Draw reinforcement details. Also show curtailment of reinforcement in stem. Adopt grade of concrete M25 and grade of steel Fe 415. 20 M

Q.4 An open rectangular water tank having size 5m x 4m x 3m rests on firm ground. Design the side walls and base slab. Use approximate method. Adopt M25 concrete and Fe 415 steel. Draw neat sketches showing reinforcement details. Adopt WSM. 20 M

Q.5 The typical framing plan for an office building is as shown in the figure below (centre to centre dimensions between columns are given). The slabs (S1) are 120 mm thick. Live load is 3kN/m^2 and floor finish load is 1.0 kN/m^2. All beams are supporting brickwork of 230mm thick. Floor to floor height is 3.2m. Design the **continuous beams B1-B2** and draw reinforcement details. Grade of concrete M25 and grade of steel Fe 500. Apply LSM. (Design of slab S1 not required) **20 M**

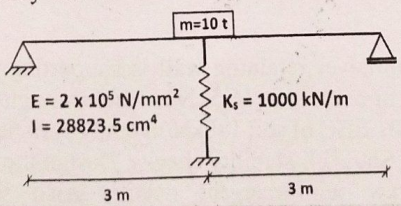


Q.6 a A three storied Government office building at Surat is designed as a special moment-resisting frame. The soil condition is medium stiff. The RC frames are infilled with masonry walls. The lumped weight due to dead load is 12 KN/m^2. The floors need to cater to an imposed load of 4 KN/m^2. Determine the total design base shear on the structure using seismic coefficient method as per IS 1893(Part 1): 2016. Also show the distribution of base shear at different floor levels. **10 M**



b A pretensioned concrete beam, 150 mm wide by 300 mm deep, is prestressed by straight wires carrying an initial force of 150 kN, at an eccentricity of 50 mm. Area of steel wires is 160mm^2. Es = 200 kN/mm^2, Ec = 35 kN/mm^2. Estimate the percentage loss of stress in steel due to elastic deformation of concrete. **05 M**

c Calculate natural frequency and natural time period for the system shown in figure. **05 M**



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