Total No. of Questions : 10]

SEAT No. : ____

P3237

[Total No. of Pages : 3

[5670]-503
B.E.(Civil)
STRUCTURAL DESIGN AND DRAWING - III
(2015 Pattern) (401003) (End Sem.)

Time : 3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; and Q.9 or Q.10***
2) ***Figures in bold to the right, indicate full marks.***
3) ***IS 456, IS 1343, IS 3370, IS 1893 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Can mild steel be used as pre-stressing steel in pre-stressed concrete? Explain with proper reasoning. **[4]**

b) A prestressed simply supported concrete beam is 200 mm wide and 300 mm deep with an effective span of 6 m. The initial prestressing force is 400 kN at an eccentricity of 70 mm by cables of area 400 mm^2. Assuming Es= 200 Gpa and Ec=33 GPa, anchor slip = 1.5 mm, find the loss of prestress due to elastic shortening of concrete and anchorage slip. **[6]**

OR

Q2) a) Explain with help of sketches the principles used in the anchorage systems of post-tensioning systems. **[4]**

b) A post-tensioned bonded prestressed concrete beam is prestressed by 300 mm^2 of high tensile steel located at an eccentricity of 100 mm. The cross section of the beam is 200 mm wide and 400 mm deep. Using the codal provisions of IS 1343, estimate the ultimate moment capacity of the section. Take the characteristic cube compressive strength of concrete as 40 MPa and the characteristic tensile strength of prestressing steel as 1600 N/mm^2. **[6]**

Q3) a) What is end block? What kind of stresses are developed in the end block. Explain the end block design steps in accordance to IS 1343. **[4]**

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b) For a flat slab having panel size 6 m x 6 m with the following details; Thickness of slab-150 mm, Thickness of drop panel-225 mm, Size of columns-(500 × 500) mm, Size of drop panel - 2.0 m, Imposed load - 2 kN/m^2, determine the design moment and distribute it in end span and interior span for a typical floor using direct design method **[6]**

OR

Q4) a) Explain the design of a prestress section for shear using the codal provisions. **[4]**

b) How is the cable zone and cable profile determined in a prestressed flat slab? **[6]**

Q5) a) Explain with neat sketches, the deformation of T shape retaining wall and show the position of the main reinforcement to be provided. **[2]**

b) Propose suitable dimensions and perform the stability analysis for T-shaped retaining wall provided to retain a horizontal leveled backfill of height 3.5 m having unit weight respectively equal to 17 kN/m^3. Angle of repose = 30º, Coefficient of friction between concrete and soil = 0.54, SBC of soil = 150 kN/m^2, depth of foundation = 1.0 m. **[14]**

OR

Q6) Design the base slab of a L-shaped retaining wall of height 5 m to retain a backfill with two different layers. The upper layer of 2 m height is having unit weight equal to 18 kN/m^3 with angle of repose = 31º. The lower layer has unit weight of 18 kN/m^3 and angle of repose equal to 28º. Coefficient of friction between concrete and soil = 0.55, SBC of soil = 150 kN/m^2, depth of foundation = 1.2 m. **[16]**

Q7) a) Explain the analysis and design of circular water tank with rigid base, with proper sketches. **[6]**

b) Design the wall of a square water tank of size 4.0m × 4.0 m × 3.0 m. Use Fe 500 grade of steel and M30 grade of concrete. Provide detailing of reinforcement. **[12]**

OR

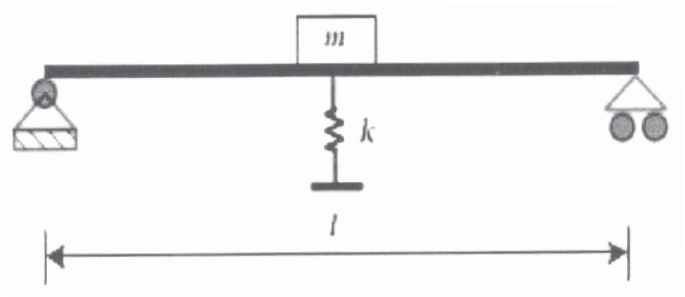
Q8) Design a rectangular water tank open at top resting on ground having a size of 5.5 m X 4.0 m×2.8 m high. Use M 30 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

Q9) a) Write a brief note on Forced Vibration and explain the phenomenon of resonance. **[8]**

b) Determine the seismic forces at each floor level for the commercial RCC structure. The building is located in seismic zone II. The soil investigation revealed a well graded gravel. The special moment resisting RC frames are in-filled with brick-masonry. The lumped weight due to dead loads may be taken as 12 kN/m^2. The floors are to cater a live load of 4 kN/m^2 on floors and 1.5 kN/m^2 on the roof. The building is a three storey structure with four frames placed c/c distance of 7 m with three bay of size 7 m. Storey height of 3 m is provided. **[8]**

OR

Q10)a) Determine the equivalent stiffness for the given system **[8]**



Explain the terms with reference to theory of vibrations

b) i) Vibration ii) Natural Frequency **[8]**

iii) Mathematical model iv) Degrees of freedom