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GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022
B. Tech Degree Examinations, December – 2020
(Fifth Semester)
BCEPC5010 – Design of Concrete Structure
(Civil Engineering)

Time: 2hrs

Maximum; 50 Marks

Answer ALL Questions*Instructions : Use of IS 456 : 2000 and SP 16 (Design Aids) are permitted.***PART – A: (Multiple Choice Questions)****(1 x 10= 10 Marks)****Q.1. Answer ALL questions**

- a. When concrete is subject to axial compression combined with flexure, the ultimate strain is limited to a value between
 - (i) 0.001 and 0.0035
 - (ii) 0.002 and 0.0035
 - (iii) 0.01 and 0.035
 - (iv) 0.02 and 0.035
- b. What is the limiting depth of neutral axis for Fe500 steel bars?
 - (i) 0.53
 - (ii) 0.48
 - (iii) 0.46
 - (iv) 0.40
- c. The side face reinforcement should be provided in RC beams, when the depth exceeds
 - (i) 550 mm
 - (ii) 650 mm
 - (iii) 750 mm
 - (iv) 1000 mm
- d. The maximum spacing of an inclined stirrup is
 - (i) 1.0 d or 300 mm, whichever is less
 - (ii) 0.75 d or 300 mm, whichever is less
 - (iii) 300 mm
 - (iv) 1.0 d
- e. The basic L/d ratio for one-way simply supported slab specified in IS 456 is
 - (i) 20
 - (ii) 20.8
 - (iii) 26
 - (iv) 7
- f. The minimum eccentricity for rectangular column should be taken as
 - (i) $(\text{unsupported length}/400) + (\text{Lateral dimension}/20)$
 - (ii) $(\text{unsupported length}/450) + (\text{Lateral dimension}/25)$
 - (iii) $(\text{unsupported length}/500) + (\text{Lateral dimension}/30)$
 - (iv) $(\text{supported length}/500) + (\text{Lateral dimension}/30)$
- g. When both ends of a column are restrained by beams, the unsupported length should not exceed
 - (i) $60 B^2 D$
 - (ii) $60 BD^2$
 - (iii) $60 D$
 - (iv) $60 B$
- h. Typical SBC of medium stiff clay is of range ____
 - (i) $20 \text{ kN/m}^2 - 30 \text{ kN/m}^2$
 - (ii) $50 \text{ kN/m}^2 - 100 \text{ kN/m}^2$
 - (iii) $20 \text{ kN/m}^2 - 250 \text{ kN/m}^2$
 - (iv) $20 \text{ kN/m}^2 - 300 \text{ kN/m}^2$
- i. The counterforts are usually spaced at a c/c distance of
 - (i) 3 m
 - (ii) one-third to one-half the total height
 - (iii) one-third to two-thirds the total wall height
 - (iv) one-third the projecting height from the ground level
- j. In the water tank, the minimum cover should not be less than
 - (i) 20 mm or diameter of the bar, whichever is greater
 - (ii) 25 mm or diameter of the bar, whichever is greater
 - (iii) 30 mm or diameter of the bar, whichever is greater
 - (iv) 25 mm

PART – B: (Short Answer Questions)

(2 x 5 = 10 Marks)

Q.2. Answer ALL questions

- a. Sketch the stress-strain curve for mild steel.
- b. How will you compute the effective flange for a T- beam as per IS 456 : 2000?
- c. Write the common geometrical configurations of the staircase.
- d. How would you determine the minimum depth of the foundation?
- e. Where will be the critical sections for shear located in the heel slab in the design of a cantilever retaining wall?

PART – C: (Long Answer Questions)

(10 x 3 = 30 Marks)

Answer ANY THREE questions

Marks

- 3.a. State the assumptions that are made in the limit state of collapse for flexure? (03)
- b. A reinforced concrete beam of width 350 mm is reinforced with 2 bars of 28 mm diameter and 2 bars of 25 mm diameter at an effective depth of 700 mm. Compute the moment of resistance of the section. Use M 20 grade of concrete and Fe415 grade of steel. (7)
4. Design the L- beam for an office room floor to suit the following data : (10)
Clear span = 6 m ; width of columns = 300 mm ; spacing of beams = 2.75 m c/c ; load acting on the office floor = 4 kN/m² ; slab thickness = 100 mm ; assume L – beams are monolithic with columns ; adopt M20 grade of concrete and Fe415 grade of steel.
5. Design a column of 300 mm x 400 mm size with an unsupported length of 3 m and effective length of 3.6 m. It is required to support a factored axial load of 1100 kN and a factored moment of 230 kNm with respect to the major axis. Use M25 grade of concrete and Fe415 grade of steel. Sketch the detailing of reinforcement. (10)
- 6.a. How is the check for overturning performed on retaining walls? State the equation for the factor of safety against overturning for level backfill. (4)
- b. Briefly describe the behaviour of the various elements of a counterfort retaining wall. (6)
7. Design the sidewalls of RCC water tank with an open-top is required to store 80,000 litres of water. The inside dimensions of the tank is taken as 6 m x 4 m. The tank rests on walls on all the four sides. Use M20 grade of concrete and Fe415 grade of steel. (10)

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