Ex/CE/T/414/2017(S)

Bachelor of Civil Engineering examination , 2017
(BCE - 4th year - 1st semester-Supplementary)

Design of Concrete Structures II

Time: 3 hours **Full marks : 100**

The figures in the margin indicate full marks

Part- I (50 marks)

Assume reasonable value of any data if required
IS 456 and SP 16 are allowed in the examination hall

Answer any TWO questions

25

1. Design a Cantilever T-type retaining wall to retain a soil of full height 5m and an uniformly distributed surcharged load of 20 KN/m^2 at top surface level . Safe bearing capacity of cohesionless soil = 200 KN/m^2. γ_s = 18 KN/m^2 , ϕ= 30^0 , μ = 0.46. Grade of concrete M25. Grade of steel Fe 415. Show detail of reinforcements through neat sketches.

25

2. Design a short RCC column with a suitable Pile cap against an axial compressive force of P=2200 KN and biaxial moments M_x=130 KN-m and M_y= 120 KN-m. Use 500 dia. RCC piles of capacity 450 KN. Grade of concrete M25. Grade of steel Fe 415. Apply Limit State Method of design as per IS 456. Partial safety factor against load and moments may be considered 1.5. Show detail of reinforcements through neat sketches.

12+13=25

3. (a) Check the stability of a T-shaped RCC retaining wall of height 6 m subjected to a surcharged load of 20 KN / m^2 . Thickness of stem and base slab are 350 mm and 550 mm respectively. Width of base slab= 4m. Projection of Toe slab and Heel slab from face of the stem are 1.15 m and 2.3 m respectively. Frictional coefficient between soil and concrete is 0.47. Safe bearing capacity of soil at base slab level = 200 KN/ m^2. Unit weight of cohesionless soil = 17 KN / m^3 . K_a = 0.33. Presentation of answer may be made in tabular form.

   (b) Design a suitable Pile cap against an axial compressive force of P=1800 KN and biaxial moments M_x=100 KN-m and M_y= 90 KN-m. Column size = 500 x 500. Use 500 dia. RCC piles of capacity 350 KN. Grade of concrete M25. Grade of steel Fe 415. Apply Limit State Method of design as per IS 456. Partial safety factor against load and moments may be considered 1.5. Show detail of reinforcements through neat sketches.

B.C.E Examination ,2017

4th year, 1st semester ref Ex/CE/T/414/2017(S)

Design of Concrete structures –II

Time 3 hours Full Marks 100

Use separate answer script for each part

Part –II

Answer Q1 and any one from Q2 and Q3

Assume reasonable values of any data if required

IS 875, IRC-6 and IRC 21 are allowed in the examination hall

Notations have their usual meaning

Q 1 (a) A G+8 storey RCC hospital building (25m x 25m in plan) is to be constructed at New Delhi. Columns are placed 5m c/c along both direction. Floor to floor height is 3.1m except ground floor which is 3.0 m for parking. The service block is separated structurally from the main building by expansion joint. Determine the design wind pressure and forces in the frame. Calculate also the bending moment and shear fore on an internal frame (with diagram) at 4th floor level only. Take the plinth level is 150 mm above ground level and top of the pile cap is 800mm below Ground level.

(a) What is shear wall? What are the advantages of using shear wall in the tall building?

(b) What is transfer girder? Where is it used in reinforced concrete structures?

(c) List the different components in a single span reinforced concrete T – Beam Bridge with sketches?

20+3+3+4

Q 2 (a) A simply supported pre-stressed concrete beam of cross section 300 mm x 800 mm deep is loaded with a uniformly distributed live load of 100KN/m on a span of 10m. Obtain the distribution of stresses at mid span and at ends for the initial and final conditions. The beam is post-tensioned by 4 tendons of 250 mm^2 each. The tendons are located at 100 mm from bottom. The Initial pre-stress in the tendons is 1800 MPa. Assume 16% loss of pre-stress.

(b) What are the differences between pre tension post tension Pre-stressed concrete?

15+5

Q3. A RCC tee beam (simply supported) bridge is to be constructed over a river . The following data is given:

- Clear width of roadways = 7.5 m
- Span of the bridge = 20 m
- Average thickness of wearing coat = 80 mm
- Thickness of deck slab = 250 mm
- Number of main girders = 3
- Number of cross girders = 6
- Spacing of the main girders = 2.8 m
- Size of kerb= 300mm (depth) X 600 mm (width)

Determine the maximum bending moment for the central girder due to Class AA tracked loading only. **20**