Ref. No.: Ex/CE/T/414/2018(S) (Old)

B.E. CIVIL ENGINEERING

FOURTH YEAR-FIRST SEMESTER-SUPPLEMENTARY EXAM 2018(Old)

Design of Concrete Structures II

Time – 3hours

Full marks – 100

Figures in the margin indicates marks

Part –I

(50 marks)

Assume reasonable values of any data , if required

25

1. Design a Cantilever type RCC Retaining wall of height 6m to retain a soil of its full height and a surcharged load of 15 KN/m^2 . Safe bearing capacity of soil = 200 KN/m^2 . $¥_s$ = 16 KN/m^3 and $\emptyset = 32^0$. Grade of concrete M20. Grade of steel Fe 415. Apply LSM as per IS 456. Show detail of reinforcements through neat sketches.

Or

25

2. Design a Cantilever type RCC Retaining wall of height 5m to retain a soil of its full height and a surcharged load of 25 KN/m^2 . Safe bearing capacity of soil = 250 KN/m^2 . $¥_s$ = 18 KN/m^3 and $\emptyset = 30^0$. Grade of concrete M20. Grade of steel Fe 415. Apply LSM as per IS 456. Show detail of reinforcements through neat sketches.

25

3. Design a RCC short column with a suitable pile cap against an axial compressive force of P=3000KN and biaxial moments M_x =175 KN-m and M_y = 150 KN-m , under (D+S) condition. Use 500mm dia . cast in situ piles of capacity of 900KN. Grade of concrete M20. Grade of steel Fe 415. Apply LSM as per IS 456. Show detail of reinforcements through neat sketches.

Or

25

4. Design a RCC short column with a suitable pile cap against an axial compressive force of P=2000KN and biaxial moments M_x =105 KN-m and M_y = 80 KN-m , under (D+S) condition. Use 450mm dia . cast in situ piles of capacity of 600KN. Grade of concrete M20. Grade of steel Fe 415. Apply LSM as per IS 456. Show detail of reinforcements through neat sketches.

B.E. CIVIL ENGINEERING FOURTH YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2018 (OLD)

Ex/CE/T/414/2018(S) (OLD)

Design of Concrete structures –II

Time 3 hours Full Marks 100

Use separate answer script for each part

Part –II

Answer any two questions

Assume reasonable values of any data if required

IS 1893, IRC-6 and IRC 21 are allowed in the examination hall

Q 1 A G+9 storey RCC Hospital building (25m x 25m in plan) is to be constructed at Kolkata. Columns are placed 5m c/c along both direction. Floor to floor height is 3.2m except ground floor which is 3.0 m for parking. The building is located on a site with Medium soil. The service block is separated structurally from the main building by expansion joint. The lumped weights due to dead load per floor are as follows - 2500 KN (roof level), 4500KN (typical floor level) 3500KN (1st floor level) and 850KN (pile cap level). Live load is 4.0 KN/m^2 on floor and 1.5 KN/m^2 on roof. Determine the seismic load at each floor level and calculate the bending moment and shear fore (with diagram) at 6^{th} floor level only. Take the plinth level is 100 mm above ground level and top of the pile cap is 500mm below Ground level. **25**

Q 2 (a) What is a shear wall ? Why the shear wall in a building are placed symmetrically in general ?

(b) List the load combinations (Limit state Method) for a circular building under DL, LL and EL (assume WL is not significant).

(C) What are the differences between Pretension and pos tension system in Pre-stressed Concrete structures ? What are the different types of losses in pre-stressing?

(d) A simply supported pre-stressed beam of cross section 400 mm x 800 mm deep is loaded with a uniformly distributed load of 50 KN/m (including its self weight) on a span of 10m .Obtain the distribution of stresses at mid span and at ends. The beam is pre-tensioned by 4 tendons of 250mm^2 each. The tendons are located at 200mm from bottom. The stress in the tendons is 1200 MPa. **4+4+4+13**

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 = 24 m
- Average thickness of wearing coat = 100 mm
- Thickness of deck slab = 225mm

- Number of main girders = 3
- Number of cross girders = 6
- Spacing of the main girders = 2.6m
- Size of kerb= 350mm (depth) X 700 mm (width)

Determine the maximum bending moment and shear force due to class AA tracked loading only.

25