Ref. no. :- EX/CE/T/414/2019(old)

BE CIVIL ENGINEERING

4th year-1st semester-2019(old)

Design of Concrete Structures II

Time – 3 hour | Full marks – 100

Figures in the margin indicates marks

Part I (50 marks)

IS 456 and SP16 codes are allowed in the examination hall

Assume reasonable values of any data, if required

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1. Check the stability of a RCC Cantilever type retaining wall which will be retaining a cohesionless soil ($\emptyset=30^0$, $¥=17$ KN/m^2) of height 6m (bottom of base slab) and a surcharged load of 25 KN/m^2 at top surface level. Base width = 5m, thickness of stem slab = 500mm uniform , width of heel slab from the face of stem slab =3.2m and remaining 1.3m from the face of the stem slab is toe slab. Thickness of base slab=500mm. μ=0.45. Safe bearing capacity of soil = 220 KN/m^2.

OR

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2. Check the stability of a RCC Cantilever type retaining wall which will be retaining a cohesionless soil ($\emptyset=32^0$, $¥=18$ KN/m^2) of height 6.5m (bottom of base slab) and a surcharged load of 30 KN/m^2 at top surface level. Base width = 5.5m, thickness of stem slab = 500mm uniform , width of heel slab from the face of stem slab =3m and remaining 2m from the face of the stem slab is toe slab. Thickness of base slab=500mm. μ=0.48. Safe bearing capacity of soil = 250 KN/m^2.

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3. Design a RCC Pile cap against a compressive load of 2200KN and biaxial moments M_x=170KN-m & M_y=120KN-m. Pile diameter=500mm and Vertical compressive load carrying capacity of pile =500KN. Grade of concrete M20 and grade of steel Fe415. Apply LSD. $¥_L$=1.2. Assume column section 550x550.

OR 20

4. Design a RCC Pile cap against a compressive load of 2700KN and biaxial moments M_x=210KN-m & M_y=160KN-m. Pile diameter=500mm and Vertical compressive load carrying capacity of pile =600KN. Grade of concrete M20 and grade of steel Fe415. Apply LSD. $¥_L$=1.2. Assume column section 600x600.

B.E. CIVIL ENGINEERING FOURTH YEAR FIRST SEMESTER EXAM 2019 (Old)

Time 3 hours Full Marks 100

EX/CE/T/414/2019 (old)

Design of concrete structures –II

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 1893 and IRC-6 are allowed in the examination hall

Notations have their usual meaning

Q1. A G+9 storey RCC Hospital building (24m x 24m in plan) is to be constructed at Kolkata. Columns are placed 6m c/c along both direction. Floor to floor height is 3.2 m except ground floor which is 3.0 m for parking. The building is located on a site with Soft soil. The service block is separated structurally from the main building by expansion joint. The lumped weights due to dead load at each floor are as follows - 3000 KN (roof level), 4000KN (typical intermediate floor level) 2900KN (1st floor level) and 600KN (pile cap level). Live load is 4.0 KN/m^2 on floor including light partitions 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 6th 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) " The approximate natural time period as per IS 1893 part-1 is to be considered in the seismic analysis even though one may obtain an exact value of time period , especially for irregular building , by using a standard dynamic analysis through computer program" - Explain

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

(c) " To find out the reaction factor for the central girder of a typical three girder R C C bridges, the live loads are positioned nearer to the kerb" – Explain

(d) 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?

(e) A simply supported pre-stressed beam of cross section 500 mm x 700 mm deep is loaded with a uniformly distributed live load of 50 KN/m on a span of 8m .Obtain the distribution of stresses at mid span and at ends. The beam is pre-tensioned by 4 tendons of 300 mm^2 each. The tendons are located at 200mm from bottom. The Initial pre-stress in the tendons is 1400 MPa. Assume 15% loss of pre-stress. **3+3+3+3+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 = 20 m
- Average thickness of wearing coat = 100 mm
- Thickness of deck slab = 250mm
- Number of main girders = 3
- Number of cross girders = 6
- Spacing of the main girders = 2.6m
- Size of kerb= 300mm (depth) X 600 mm (width)

Determine the maximum bending moment due to Class A Train of loading only. **25**