

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S8 (Hons) Exam May 2020

01CE6122 ANALYSIS AND DESIGN OF SUBSTRUCTURES**Answer any two full questions from each part****Limit answers to the required points.***Assume any missing data suitably.**Use of all IS 2911 codes , IS 456, SP 16 and Brom's Chart are permitted***Max. Marks: 60****Duration: 3 hours****PART A**

1. a. Discuss the features and working of a cantilever footing with the aid of a suitable sketch. At what conditions such foundation is preferred. (4)
- b. A rectangular combined footing is to be designed for an arrangement of two 400 mm square columns carrying service loads of 400 kN and 800 kN. The clear distance of lighter column from the boundary is 0.3 m. The center to center distance between the columns is limited to 1.8 m. Proportion the footing if the allowable SBC of soil is 150 kN/m². (5)
2. a. Proportion and design a reinforced concrete isolated footing for a circular column of size 350 mm transferring an axial load of 1000 kN at service state. The SBC of the soil is 170 kN/m². M20 grade concrete and Fe 415 grade steel are used for the footing. Do necessary checks. (9)
3. a. Design a mat foundation for six RC columns of size 400 mm x 400 mm arranged in two rows of 3 columns. The c/c spacing of all columns is 4.5 m. The axial service loads on the four exterior columns are 750 kN and on two interior columns are 1000 kN. SBC= 100 kN/m². M20 grade concrete and Fe 415 grade steel are used for the footing. (9)

PART B

4. a. How piles are classified in to different groups and list different types of piles in each group. (4)
- b. What are the different methods available to determine the load carrying capacity of piles? Explain the method for piles in granular soil. (5)

5. a. The critical values of axial force, bending moment and shear force on a reinforced concrete pile, having length 12 m and diameter 400 mm, at service conditions are 400 kN, 20 kNm and 15 kN respectively. Design the pile and sketch the reinforcement details. (9)
6. a. Design a pile cap on a group of four friction piles each of 350 mm diameter for supporting a 500 mm diameter column carrying an axial load of 1150 kN at service condition. M25 grade concrete and Fe 415 grade steel are used for the pile cap. Do necessary checks. (9)

PART C

7. a. What is well foundation and its significance? What are the different types of well foundation? (8)
- b. Sketch different types of retaining walls. (4)
8. a. With suitable sketches explain the elements of well foundation. (6)
- b. Write down the design procedure of well cap and well steining. (6)
9. a. Design a reinforced concrete cantilever retaining wall to retain 5m high earth with horizontal surface at the top. The retained soil is well drained medium dense sand of unit weight 18 kN/m^3 and angle of repose of 30° . The material under the base is same as above with SBC of 150 kN/m^2 . Coefficient of friction between the base and the soil is 0.55. M20 grade concrete and Fe 415 grade steel are used for the retaining wall. (12)