

[M19 ST 1105]

**I M. Tech I Semester (R19) Regular Examinations  
 DESIGN OF REINFORCED CONCRETE FOUNDATIONS  
 STRUCTURAL ENGINEERING  
 MODEL QUESTION PAPER**

**TIME: 3 Hrs.**

**Max. Marks: 75 Marks**

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

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|    |     |                                                                                                                                                                                                                                                                                                         | CO  | KL | M  |
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|    |     | <b>UNIT - I</b>                                                                                                                                                                                                                                                                                         |     |    |    |
| 1. | a). | Explain the design requirements of the foundation.                                                                                                                                                                                                                                                      | CO1 | K4 | 5  |
|    | b). | Design a concrete pedestal for supporting a steel column carrying a total factored load of 1700kN. The size of the base plate is 300 mm square. Assume grade 25 concrete and Fe 415 steel.                                                                                                              | CO2 | K6 | 10 |
|    |     | <b>(OR)</b>                                                                                                                                                                                                                                                                                             |     |    |    |
| 2. | a). | Explain the general procedure for design of square or rectangular footing.                                                                                                                                                                                                                              | CO2 | K4 | 5  |
|    | b). | A solid footing has to transfer a dead load of 1000kN and an imposed load 400kN from a square footing 400 X 400 mm (with 16 mm bars). Assuming $f_y = 415 \text{ N/mm}^2$ , $f_{ck} = 20 \text{ N/mm}^2$ , and safe bearing capacity to be $200 \text{ KN/m}^2$ . Design the footing.                   | CO2 | K6 | 10 |
|    |     | <b>UNIT - II</b>                                                                                                                                                                                                                                                                                        |     |    |    |
| 3. | a). | Explain the types of foundations of partitions walls in ground floors                                                                                                                                                                                                                                   | CO1 | K4 | 5  |
|    | b). | A brick wall of 250mm thick of a two-storeyed building is to rest directly on a R.C strip footing. Design the footing assuming the soil is sandy and its safe bearing capacity to be $100 \text{ kN/mm}^2$ .                                                                                            | CO2 | K6 | 10 |
|    |     | <b>(OR)</b>                                                                                                                                                                                                                                                                                             |     |    |    |
| 4. | a). | Explain the different methods of analysis of continuous strip footing for unsymmetric loading.                                                                                                                                                                                                          | CO1 | K4 | 5  |
|    | b). | A series of five columns is to be supported on a $20 \text{ m} \times 2 \text{ m}$ strip foundation. Determine the Shear force and Bending moment for design. Assume safe bearing capacity as $100 \text{ kN/m}^2$ . The loads are 300, 350, 400, 450 and 500kN at 2, 7.5, 11.5, 15, 18 m from one end. | CO2 | K5 | 10 |
|    |     | <b>UNIT - III</b>                                                                                                                                                                                                                                                                                       |     |    |    |
| 5. | a). | Explain about the rigid and Flexible Foundations.                                                                                                                                                                                                                                                       | CO1 | K4 | 7½ |
|    | b). | Explain about the deflection requirements of beams and slabs in rafts.                                                                                                                                                                                                                                  | CO3 | K4 | 7½ |
|    |     | <b>(OR)</b>                                                                                                                                                                                                                                                                                             |     |    |    |
| 6. | a). | Explain the different types of raft foundation.                                                                                                                                                                                                                                                         | CO3 | K4 | 5  |
|    | b). | Design a flat slab raft with edge beam for a layout of column loads by Direct Design Method. Assume the safe bearing capacity from settlement considerations as $50 \text{ kN/m}^2$ . Assume columns are $300 \times 300 \text{ mm}$ enlarged to $600 \times 600 \text{ mm}$ as capital                 | CO4 | K6 | 10 |
|    |     | <b>UNIT - IV</b>                                                                                                                                                                                                                                                                                        |     |    |    |
| 7. | a). | Discuss about the estimation of settlement of piles in detail                                                                                                                                                                                                                                           | CO3 | K3 | 5  |
|    | b). | A bored pile of total length 13.2 m is with enlarged base has a shaft diameter of                                                                                                                                                                                                                       |     |    |    |

|     |     |                                                                                                                                                                                                                                                                                                                 |     |    |    |
|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|----|
|     |     | 600 mm and in the last 1.2m, it is enlarged to 1200 mm diameter. If the SPT ( $N$ ) value of clay in which the shaft is installed is 13 and that of the enlarged portion is 15, estimate the settlement at the ultimate load of the pile.                                                                       | CO3 | K5 | 10 |
|     |     | (OR)                                                                                                                                                                                                                                                                                                            |     |    |    |
| 8.  | a). | Explain abt the conventional analysis of annular rafts.                                                                                                                                                                                                                                                         | CO4 | K4 | 5  |
|     | b). | The load from a circular water tank supported by six columns rests on a ring beam, which in turn, rests on an annular raft. Assuming the mean radius of the centres of column line is 8m and the total load from the tank is 30,000kN. Design the ring beam.                                                    | CO2 | K6 | 10 |
|     |     | UNIT - V                                                                                                                                                                                                                                                                                                        |     |    |    |
| 9.  | a). | Explain abt the significance of under-reamed piles for expansive soils.                                                                                                                                                                                                                                         | CO3 | K4 | 5  |
|     | b). | The main brick wall of a room of a residential building is 225 mm thick and has a loading of 40kN/m at the foundation level. Another cross wall of the same thickness joins it and transmits a concentrated load of 35 kN. Design a layt of under reamed piles and grade beam for the fndation of the main wall | CO3 | K6 | 10 |
|     |     | (OR)                                                                                                                                                                                                                                                                                                            |     |    |    |
| 10. | a). | Discuss abt the significance of Earth pressure on rigid walls                                                                                                                                                                                                                                                   | CO1 | K5 | 5  |
|     | b). | Design a cantilever retaining wall with level backfill to retain 4 m of earth ( $\phi = 30^\circ$ ) of unit weight of 19 kN/m <sup>2</sup>                                                                                                                                                                      | CO2 | K6 | 10 |

CO: Crse tcome

KL: Knowledge Level

M: Marks

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