M.E. Second Semester (Civil (Structural Engineering)) (New-CGS)

13095 : Elective Substructures and Foundation Design : 2 SFSE 5

P. Pages : 1 **AW - 3893**

Time : Four Hours Max. Marks : 80

Notes :
1. Answer **any four** questions.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. I.S. 456 (Revised) may be consulted.
6. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Explain following types of abutments. **8**
- i) Gravity abutments.
- ii) U – abutments.
- iii) Stub abutments.
- iv) Counter fort abutments.

b) Design counterfort retaining wall for the following data. **12**
- i) Height of wall above ground = 8 m.
- ii) Depth of foundation = 1.5m.
- iii) SBC = 200kN/m^2.
- iv) Unit weight of earth fill = 18kN/m^3.
- v) Surcharge angle = 18°.
- vi) Angle of internal frication = 30°.
- vii) Spacing between counterforts = 2m.
- viii) Coefficient of friction between soil and concrete = 0.55.

2. Derive from the first principle the equation for deflection, slope and shear force at point for infinitely long beam resting on elastic foundation subjected to a point load 'p'. **20**

3. Explain the following. **20**
- i) Classification of piles.
- ii) Negative skin friction in piles.
- iii) Handling and erection stresses in piles.
- iv) Design criterion for block type machine foundation.

4. Design a pile cap for a RCC column 400x400mm carrying a load of 600kN is supported on three piles 400x400mm in section. The Centre to Centre distance between piles is 1.5m use m_{20} concrete and Fe 415 steel. **20**

5. Design isolated footing for a column 400x600mm reinforced with 6.25mm bars with Fe 415 and M_{25} concrete subjected to factored load of 1200kN and factored uniaxial moment of 130kN-m with respect to major axis. Assume moments are reversible. SBC = 200kN/m^2 at a depth of 1.25m. **20**
Take M_{25} and Fe 415.

6. a) Explain the term modulus of subgrade reaction. How it is determined? **6**

b) A floor is supported on six columns as shown below. **14**

Column No.	1	2	3	4	5	6
Dead load (kN)	500	600	700	500	600	700
Live load (kN)	100	300	250	360	400	100

If SBC of soil is 150 kN/m^2. Explain and provide the proportioning of footing.

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