BE (CIVIL) | SEM-VIII | FA 20 | R-19 Scheme | 10/04/25

3Hours Max Marks=80

Note 1. Question 1 is compulsory
2. Attempt any 3 out of six questions
3. Assume any suitable data wherever required.

Q.1 Attempt any **four**

a. Enlist and elaborate problems considered in the design of floating foundation. 05

b. What is contact pressure? Sketch pressure distribution of a rigid footing under clayey and cohesionless soil. 05

c. How allowable load is calculated as per IS recommendations pile load test observations? 05

d. Construct a Newmarks's chart consisting of 6 circles for $I_f = 0.005$. Divide circle in 20 equal parts. Tabulate radius of circle. 05

e. Differentiate between forced vibration and free vibration 05

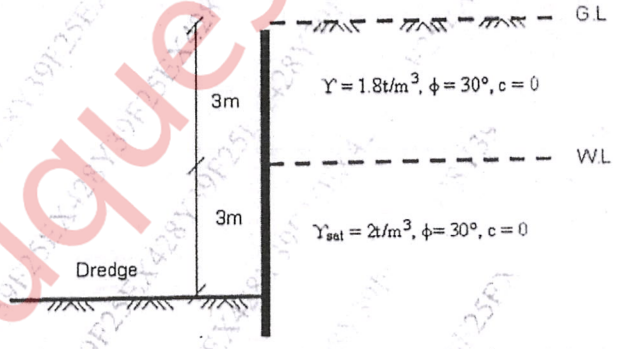
Q.2 a. Enlist the assumptions of Boussinseq Theory and derive the expression for Boussinseq equation of vertical stress under concentrated load 10

b. A rectangular footing 4m wide and 6m long transmits the load of column at a depth of 1.5m. Calculate the safe load which the footing can carry using IS code method given c = 20 kN/m^2, $\phi = 30°$, $\gamma = 18$ kN/m^3, Nc = 30.1, Nq = 18.38, Nγ =15.64. Consider FOS = 2.5 10

Q.3 a. Derive the expression for depth of embedment for anchored sheet in cohesive soil 10

b. A group of 16 piles of 10 m length and 0.5 m diameter is installed in a 10 m thick stiff clay layer underlain by rock. The pile-soil adhesion factor is 0.4; average shear strength of soil on the sides is 100 kPa; undrained shear strength of the soil at the base is also 100 kPa. Calculate (i) base resistance of single pile, (ii) Group side resistance assuming 100% efficiency. 10

Q.4 a. Compute the depth of embedment (D) of the sheet pile as shown in fig. 10



b. A 10-storey building on a raft foundation is to be constructed on clay with $m_v = 0.2$ m^2/MN. If the weight of the sub-soil is 22kN/m^3. Calculate the depth of the foundation, so that the settlement of a raft 10m in width should be limited to 45mm. Also calculate full required strength of clay for a floating foundation and compensated depth for the floating foundation. 10

Q.P Code :- 85235

Program Code : IT00637

Q.5 a. Summarize different factors affecting bearing capacity of soil along with formulas if any 10

b. Estimate load on struts supporting open cuts 10

0-2m – Soft Clay ($c = 10kN/m^2$, $\phi = 0$, $\Upsilon = 17kN/m^3$)

2m-5m – Medium Stiff Clay ($c = 30kN/m^2$, $\phi = 0$, $\Upsilon = 19kN/m^3$)

5m-12m –Stiff Clay ($c = 50kN/m^2$, $\phi = 0$, $\Upsilon = 20kN/m^3$)

The depth of the cut is 6m. Struts are located at 1m, 3m, 5m from G.L. Also, check the stability of cut.

Q.6 a. A spring and dashpot are attached to a body weighing 150 N. The spring constant is 3.2kN/m. The dashpot has a resistance of 0.75 N at a velocity of 0.06 m/s. Determine for free vibration whether the system is over damped, under damped or critically damped. 10

b. An unknown weight W is attached to the end of an unknown spring k and natural frequency of the system was found to be 90 cycles per minutes. If 1 kg weight is added to W, the natural frequency reduced to 75 cycles per minutes. Determine the unknown weight W and spring constant k. 10

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