Roll No. Total No. of Pages : 02

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B.Tech.(Civil Engineering) (2012 to 2017) (Sem.–7, 8)

SOIL DYNAMICS AND MACHINE FOUNDATION

Subject Code : BTCE-811

M.Code : 71870

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1. Write short notes on :

a. Types of Machine foundation

b. Logarithmic decrement

c. Degrees of freedom of block foundation

d. Geometric damping

e. Active isolation

f. Linear weightless spring mass system

g. Stress condition on soil element under earthquake loading

h. Transmissibility

i. Resonance

j. Free, forced and Transient vibration

SECTION-B

Q2. Explain two methods of determining 'damping factor' of single degree freedom system.

Q3. What are different methods of determination of soil spring constants in field? Discuss one method in detail with neat sketches.

Q4. A mass of 2 kg is to be supported on a spring having stiffness of 1000 N/m. The damping coefficient is 8N-s/m. Determine the natural frequency of system. Find also the logarithmic decrement and the amplitude after two cycles if the initial displacement is 0.2mm.

Q5. Derive the expression of natural frequency and amplitude of a block foundation subjected to a horizontal vibration.

Q6. Considering a two degree freedom model, derive the expression of amplitude of anvil and foundation of hammer.

SECTION-C

Q7. A machine weighing 10kN is provided with a foundation block with a base area of $2m^2$ and a weight of 20kN. The C_u = $2.5kg/cm^2$ and damping ratio is 0.15. Determine (a) response curve (b) natural frequency of the system (c) maximum amplitude of system (d) maximum force transmitted to the soil if the force of excitation is vertical and given by $F=0.006\ \omega^2 \sin \omega t$.

Q8. A cyclic plate load test was carried out on a deposit of silty sand to estimate the elastic coefficients for the design of machine foundation. The test was carried out at a depth of 2m, using 45cm × 45cm plate. The data obtained was :

Load Intensity (kN/m^2)	25	0	50	0	80	0	120
Settlement (mm)	0.5	0.4	2	1.5	3.5	2.5	4.0
Load Intensity (kN/m^2)	0	140	0	200	0	250	0
Settlement (mm)	3.0	5.5	4.0	7.0	5.5	10.0	8.0

Determine the values of C_u, C_τ, C_ϕ for $15m^2$ base area.

Q9. Design a suitable foundation for a horizontal compressor driven by an electric motor. The following data was available:

Weight of Compressor = 160kN, Weight of Motor = 60kN, Speed of Compressor = 250 rpm, Horizontal unbalanced force = 75kN acting at a height of 1.0m above top of pedestal. A cyclic plate load test was done on 300mm × 300mm plate and elastic settlement corresponding to load intensity of $250kN/m^2$ was 6.0 mm. The water table at the site was at 2.0m below the proposed depth of foundation 3.0m.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.