

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Civil Engineering) (Sem.-7)
SOIL DYNAMICS AND MACHINE FOUNDATION
Subject Code : BTCE-811
Paper ID : [A2965]

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.
4. Any missing data may be assumed appropriately. Use of IS 2974 (Section A & Section B) and IS 5249 is permitted.

SECTION-A

1. Answer briefly :

- a) What are the stress conditions on soil under dynamic load?
- b) Differentiate between frequency and vibration.
- c) What do you understand by Rayleigh's method?
- d) Give principles of vibration measuring instruments.
- e) Define soil spring constant and its significance.
- f) Differentiate between damping and Magnification factor.
- g) What are different types of machines?
- h) What are problems associated with machine foundation?
- i) Give IS code provisions for Impact machine foundation.
- j) Write note on transmissibility.

SECTION-B

- Q2. What do you understand about wave propagation in elastic half space?
- Q3. Derive an expression for logarithmic decrement in terms of damping factor.
- Q4. Using Barkan's approach determine the coefficient of uniform compression, if a vibration test on a block $1.5\text{m} \times 0.75\text{m} \times 0.7\text{m}$ gave a resonance frequency of 20 Hz in the vertical direction. The mass of the oscillator used was 100 kg. The mass density of the test block material is 2400 kg/m^3 .
- Q5. Explain the resonance and its effect.
- Q6. Discuss methods of isolation for machine foundations.

SECTION-C

- Q7. A cyclic plate load test was carried out on a soil deposit to estimate the elastic coefficients for the design of a compressor foundation. The test was carried out at a depth of 3m using a $0.6\text{m} \times 0.60\text{m}$ test plate. For the data given below, plot the stress versus elastic settlement relationship and determine the coefficient of elastic uniform compression at (i) $0.6 \times 0.6\text{m}$ plate area and (ii) 10m^3 footing area. Take Poisson's ratio = 0.35 and unit weight of soil = 18 kN/m^2 .

Stress (kN/m^2)	50	100	150	200	250	300	350
Elastic settlement (mm)	0.05	0.28	0.52	0.8	1.06	1.34	1.6

- Q8. Derive equation for block foundation subjected to rocking, sliding and vertical vibrations.
- Q9. Design a suitable foundation block for a double acting steam hammer whose data are given below.

Weight of the falling ram = 5.0 t. height of the drop = 1.5 m.

Area of the piston = 0.2 m^2 . Average steam pressure on piston = 120 t/m^2 . Weight of the anvil = 100.0 t. Base area of the anvil = 6.0 m^2 . Weight of the frame = 1.5 t, which is fixed to the foundation block.

The thickness of the pad under the anvil is 0.60 m. 'E' of the material of pad = $5.0 \times 10^4 \text{ t/m}^2$. Coefficient of impact (restitution) = 0.65. Soil properties : coefficient of uniform compression = $C_u = 4.5 \times 10^3 \text{ t/m}^3$. Mass density of soil = 1.9 g/cc. Safe bearing capacity of the soil is 25 t/m^2 .