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B TECH
(SEM VIII) THEORY EXAMINATION 2018-19
MACHINE FOUNDATION

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Define the term natural frequency and period.
b. What is meant by Logarithmic decrement?
c. Name the commonly used vibration absorbers?
d. Explain about hammer foundation?
e. What is coefficient of elastic uniform compression?
f. Distinguish between single degree of freedom and multiple degree of freedom.
g. List the field methods used to determine the dynamic properties of soil?
h. What is machine foundation?
i. Write the difference between rigid foundation and flexible foundation.
j. Mention the types of machine foundation?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Discuss the use of single degree freedom system in the analysis of machine foundations. What are its limitations?
b. What are the various I.S. code classifications of machine foundation? Discuss these classifications with the help of their neat sketches. Also explain the 'tolerance limits of amplitudes' as given by Richart and by Barkan.
c. In a block test according to IS : 5249-1977 (Revised), a resonant frequency of 18 cycle per second was observed in vertical vibrations. Determine the coefficient of elastic uniform compression. A machine weighing 90 kN is to be supported on a block of size 3 m × 4 m × 2 m high. Determine its natural frequency in vertical virbration.
d. Describe criteria for a satisfactory machine foundation. Also explain the methods of decreasing vibrations of exciting foundations.
e. Write the reinforcement and construction details of different types of machine foundations. Explain the suitability of various machine foundations for the different types of machines.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) How will you find the parameters Mass {m)' Spring Stiffness (k) and Damping Constant (c) for the analysis of a machine foundation? Write about the degree of freedom of a "Block Foundation'. Also explain, ho the coefficient of elastic uniform compression is affected by the spring stiffness?
(b) Explain 'Frequency Ratio', Magnification factor' and 'Damping Factor'. The

resonant frequency of a block foundation, excited by an oscillator is observed as 20 Hz. The amplitude of vibration at resonance is 1 mm. The magnitude of the dynamic force at 20 Hz is 5 kN. If the total weight of the block and oscillator is 20 kN, calculate the damping factor associated with it.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Write a critical note on Logarithmic decrement. The exciting force in a constant force amplitude excitation is 120 kN. The natural frequency of the machine foundation is 4 Hz. The damping factor is 0.36. Determine the magnification factor and the transmitted force at an operating frequency of 10 Hz.

(b) How will you determine the machine foundation natural frequencies by Ford and Haddow's analysis?

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the cross–bore wave propagation method of estimating dynamic properties of soil. For a torsional elastic wave in a rod of infinite length, derive the torsional wave propagation velocity given by $V^2_S = (G/\rho)^{½}$.

(b) What are the various geophysical principles for collecting the bore hole seismic data? Explain any one method in detail with the help of its neat sketch.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the methods of vibration isolation with respect to the following :

i. Counter balancing the exciting loads
ii. Stabilisation of soils
iii. Use of structural measures
iv. Isolation by trench barriers.

(b) What do you understand by active isolation and passive isolation? Discuss the different properties of material and media used for vibration isolation.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) List the basic differences in analyzing a reciprocating machine foundation by the two approaches namely; linear weightless spring–mass system and elastic half- space theory.

(b) What are the properties of the good vibrating isolation material? List out and describe the properties of any two vibration isolating materials.