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B.TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

MACHINE FOUNDATION DESIGN

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Explain the following: **10 x 2 = 20**

(a) What is meant by Logarithmic decrement?

(b) Define Damping ratio?

(c) Mention the types of machine foundation?

(d) Explain about hammer foundation?

(e) List the field methods used to determine the dynamic properties of soil?

(f) What is coefficient of elastic uniform compression?

(g) Give the importance of vibration isolation in case of machine foundations ?

(h) List the various isolation materials ?

(i) Write a note on rotary type machines ?

(j) Name the commonly used vibration absorbers ?

SECTION – B

2. Attempt any five of the following questions: **5 x 10 = 50**

(a) Derive general equation of motion for an undamped free vibration of a single degree of freedom system.

(b) Find the response of an SDOF system subjected to Harmonic excitation in the form of a Sine wave. A weight of 13.8 N is vertically suspended on a steel wire of length 125 cm and cross sectional area 6. 5 x 10^{-3} cm^2. Determine the frequency of free vibrations of the weight. If modulus of elasticity of steel is 2.12 x 10^5 N/mm^2. Determine the amplitude of this, vibration if the initial displacement is 0.025 cm and initial velocity is 2.50 cm/sec.

(c) How will you determine the natural frequencies of the machine foundation by using Ford and Haddow's method ?

(d) The coefficient of elastic uniform compression of a soil is found to be 24000kN/m^3 using a plate of diameter 4m. What would be percentage variation in itsvalue if the diameter of the plate is halved?

(e) The following data refers to a block vibration test. Obtain the value of coefficient of uniform elastic compression of the soil. Estimate the spring constant of the system. Weight of machine = 22.50 kN, weight of oscillator = 300 N and size of foundation block is 2.50 m x 3.00 m x 2.00 m height. Determine the value of damping ratio ardmanimum amplitude. What is the prospect of resonance, if the operating frequency of the oscillator is 600 rpm ?

Frequency of vibration(Hz)	30	36	40	46	49	53	55	58
Amplitude (mm)	0.065	0.095	0.150	0.380	0.430	0.375	0.320	0.270

(f) What do you understand by the term vibration isolation? Discuss active and passive isolation methods of vibration ?

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

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(h) Outline the construction guidelines for providing vibration absorbers?

SECTION – C

Attempt any two of the following questions: **2 x 15 = 30**

3. (a) Starting from fundamentals, derive the expression for natural frequency of SDOF system of free vibration subjected to damping.

   (b) A Foundation block of weight 30 kN rest on a soil for which the stiffness may be assumed as 25000 kN/m. The machine is vibrated vertically by an exciting force of 3.0 sin (30t) kN. Find the natural frequency, natural period, natural circular frequency and the amplitude of vertical displacement. The damping factor is assumed to be 0.50.

4. (a) What are seismic wave propagation tests? Explain how the shear modulus is estimated by seismic cross-hole technique?

   (b) Discuss on the vibration isolation techniques for rigid foundation?

5. Summarize the principles of design of foundation for impact type machine with suitable Illustrations?

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