

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 $6.5 \times 10^{-3} \text{ cm}^2$. Determine the frequency of free vibrations of the weight. If modulus of elasticity of steel is $2.12 \times 10^5 \text{ N/mm}^2$. 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 24000 kN/m^3 using a plate of diameter 4m. What would be percentage variation in its value 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 and maximum 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 ?

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