Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**
PCI7J005

7th Semester Regular / Back Examination 2019-20
SOIL DYNAMICS & MACHINE FOUNDATION
BRANCH : CIVIL
Max Marks : 100
Time : 3 Hours
Q.CODE : HRB020

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) Differentiate between damping and frequency ratio.

b) What are the materials used in vibration isolation?

c) A mass of 25 kg when suspended from a spring, which cause a static deflection of 25 mm. Find the natural frequency of the system.

d) What do you mean by coefficient of elastic non uniform shear?

e) What is vibration isolation?

f) What do you understand about wave propagation in elastic half space?

g) Define Logarithmic decrement and Magnification factor.

h) What is viscous damping?

i) Why dynamic soil properties are evaluated? List the various laboratory and field tests for dynamic soil properties.

j) A soil specimen was tested in a resonant column device for determination of shear modulus. Given a specimen length of 90 mm , diameter 35 mm, mass of 160g and a frequency at a normal mode of vibration (n=1) of 800 cps, determine the shear modulus of the specimen

Part- II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Describe the principles involved in a tuned dynamic vibration absorber. Illustrate your answer with neat sketches. Discuss clearly its limitation.

b) A vibration system consists of mass of 7 kg, a spring stiffness of 0.7 N/m and a dashpot with a damping coefficient of 2 N-s/m. Determine damping ration and logarithmic decrement.

c) What do you understand about wave propagation in elastic half space? Discuss the characteristics of body waves and surface waves with neat sketches.

d) Discuss how the Young's modulus and amplitude is estimated using Barkan's analysis.

e) Discuss the characteristics of seismic waves such as P and S waves and also the R and L waves with neat sketches.

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

g) Determine the natural frequency of a machine foundation that has a base area of $6m^2$ and a weight of 178kN including weight of machine. The coefficient of elastic uniform compression of soil is 4×10^4 kN/m^3. Use Barkan's method

h) Explain how the natural frequency of foundation soil system is estimated using the Barken's analysis and IS code method.

i) Assuming Poisson's ratio μ as 0.35 and density of soil as 1800 kg/m^3, determine E,G,v_s and v_r if compression wave velocity is 450 m/s.

j) Explain resonant column test.

k) Derive the expressions of natural frequency and amplitude of a block foundation subjected to vertical vibration.

l) At a particular site, the top 10.0 m soil is medium grained sand having dry unit weight as 17kN/m^3. The water table is 6 m below the ground surface. The value of specific gravity of soil grains is 2.67. The direct shear test gave the value of φ as 36^0. Determine the value of shear modulus of soil at depth of 7 m below ground surface.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Discuss the degree of freedom of rigid block foundation and explain the salient points in linear elastic weightless method and elastic half space method of analysis of rigid block foundation. **(16)**

Q4 What do you understand by active and passive vibration isolation methods? Discuss the importance of vibration isolation in machine foundations. **(16)**

Q5 List the basic differences in analyzing a reciprocating machine foundation by two approaches namely : **(16)**

i) Linear weightless spring-mass system,

ii) Elastic half –space theory.

Q6 Discuss the principles of design of foundation for impact type machine with clear illustrations. **(16)**