Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech.(Soil Mechanics & Foundation Engineering) (Sem.–3)

SOIL DYNAMICS

Subject Code : CESE-3

M.Code : 37211

Time : 3 Hrs. **Max. Marks : 100**

INSTRUCTION TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**
3. **Notations used carry usual meanings.**

1. a) What are the various types of foundations used for different kinds of machinery? Explain the salient features with help of neat sketches. 3+5

   b) A foundation block of weight 30 kN rests 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 (30 t) kN. Find the natural frequency, natural period, natural circular frequency and the amplitude of vertical displacement. The damping factor is 0.50. 12

2. a) A spring mass system is excited by a force $F_0 \sin\omega t$. At response the amplitude was measured to be 100 mm. At 80% resonant frequency, the amplitude was measured as 100 mm. Determine the damping factor of the system. 8

   b) Explain the following term :

      i. Cyclic mobility

      ii. Dynamic compaction

      iii. Resonance 12

3. a) State and Explain Mononobe- Okabe's theory for dynamic earth pressure. Also, enumerate assumption behind it. 7+4

   b) Define and enumerate significance of following terms : 9

      i. Cyclic stress ratio

      ii. Critical damping

iii. Logarithmic decrement

4. a) Why cyclic plate load test is conducted? Describe the procedure for the cyclic plate load test in detail with the help of neat sketches. 2+10

   b) Derive an expression for natural frequency and amplitude of a reciprocating type of foundation undergoing a rocking motion. 8

5. a) List and define the various types of elastic modulus used in the analysis of motion under dynamic loading. 8

   b) What is 'Vibration Isolation'? Describe different methods of active isolation and passive isolation techniques. 2+10

6. a) Describe the salient features of a resonant column apparatus. How is calibration done and the value of shear modulus determined? 6+6

   b) Derive an expression for free vibrations with damping for a single degree freedom system. 8

7. a) Describe the various densification techniques used for soil improvement for mitigation of liquefaction hazards. 10

   b) Derive an expression for the wave propagation in an infinite, homogenous, isotropic and elastic medium. 10

8. Write short notes on the following :

   a) Seismic cross-borehole survey 6

   b) Modified Culmann's construction 7

   c) Seismic bearing capacity of foundation 7

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.