

12900

DEGREE - CIVIL
Term-End Examination
December, 2013

BICEE-013 : ELEMENTS OF SOIL DYNAMICS
AND MACHINE FOUNDATION

Time : 3 hours

Maximum Marks : 70

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- Note : (i) Answer *any seven* questions.
(ii) All questions carry *equal* marks.
(iii) Assume suitable data if *missing*.
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1. A Mass attached to a spring of stiffness of 5N/mm has a viscous damping device. When a mass was displaced and released the period of vibration was found to be 2.0 seconds. and the ratio of consecutive amplitude was 10/3. Determine the amplitude and phase angle when a Force. $F = 3 \sin 4t$ acts on the system. The unit of force is Newton. 10
2. Explain the importance of soil, dynamics. What are the various types of dynamic loads ? 10
3. The vibrating system of a mass of 5kg, a spring stiffness of 5N/mm and a dashpot with a damping coefficient of 0–1 N–s/m. Determine (a) damping ratio and (b) Logarithmic decrement. 10
4. Discuss in brief the various factors affecting the shear modulus (G), Elastic Modulus (E) and Elastic constants (CU, $C\phi$, $C\tau$ and $C\psi$). 10

5. Explain in brief the design criteria and permissible amplitudes for different types of machine foundation as per IS : 2974. 10
6. Write the different types of Machine foundations and their uses. 10
7. Explain the effects of dynamic Loads on earth pressure and bearing capacity of soil. 10
8. Discuss factors affecting the stress--deformation and strength characteristics of cohesive soil under pulsating load. 10
9. Write short notes on **any two** of the following : 2x5=10
- (a) Vibro--flotation
 - (b) Body and surface waves
 - (c) Vibration .Isolation
 - (d) Transmissibility of system
10. A Machine weighing 400kN is mounted on a concrete foundation block resting on a soil layers. The plan area of the foundation block is 25m^2 and its weight is 1000kN. Assume that the system is subjected to some unbalanced force in the vertical direction. The coefficient of elastic uniform compression for the soil is 10^5 kN/M^2 . Calculate the natural frequency of the machine foundation. What will be the natural frequency of the machine foundation if (a) the weight is kept constant and the foundation area is doubled ? (b) the area is kept constant and weight is doubled ? 10
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