Assignment 12

Due on 2020-04-22, 23:59 IST.

1. A spring and dashpot are attached to a body weighing 200 N. The spring constant is 2.0 kN/m. The dashpot has a resistance of 0.55 Ns/m at a velocity of 0.05 m/s. If the system is set to a motion, the system is:
   - (a) Under damped
   - (b) Critically damped
   - (c) Over damped
   - (d) None of above
   **Accepted Answers:**
   (b) Under damped

2. A mass rotating on a frictionless surface is used to produce forced oscillation of a spring-supported mass. By varying the speed of rotation, the resonant frequency of the system was recorded. The resonant frequency was found to be 150 Hz. The amplitude appeared to approach a constant value of 1.5 mm. The damping factor (y) of the system is:
   - (a) 0.01
   - (b) 0.10
   - (c) 0.50
   - (d) 1.00
   **Accepted Answers:**
   (C) 0.50

3. A Duffing system is excited by a sinusoidal force. At resonance the amplitude of displacement was measured to be 4 mm. An accurate frequency is 1.0 Hz away from the natural frequency of the system, the displacement amplitude was measured to be 0.3 mm. The damping factor of the system is:
   - (a) 0.37
   - (b) 3.00
   - (c) 3.70
   - (d) 5.60
   **Accepted Answers:**
   (B) 3.00

4. A body weighing 800 N is suspended from a spring which deflects 10 cm under the load. It is subjected to a damping effect adjusted to a value of 0.4. The undamped natural frequency of the vibrations (in radians per second) is:
   - (a) 36.30
   - (b) 23.66
   - (c) 37.92
   - (d) 41.61
   **Accepted Answers:**
   (A) 36.30

5. The ratio of initial peak amplitudes of the vibrations for the system is 4:1:
   - (a) 0.50
   - (b) 1.00
   - (c) 2.00
   - (d) 5.00
   **Accepted Answers:**
   (C) 2.00

6. In a cyclic plate load test on a plate of 0.60 m x 0.60 m size it settles 0.70 mm under a pressure of 20 kN/m². On unloading observed plate settlement was 0.50 mm. The value of coefficient of elastic uniform compression of the soil (in kN/m²) is:
   - (a) 1 x 10⁵
   - (b) 3 x 10⁵
   - (c) 3 x 10⁶
   - (d) 1 x 10⁷
   **Accepted Answers:**
   (C) 3 x 10⁶

7. A mass attached to a spring of 0.15 m is a viscous damping device. When the mass was displaced and released, ratio of the consequent amplitudes was 1:4. The damping factor of the system is:
   - (a) 0.25
   - (b) 0.67
   - (c) 0.30
   - (d) 0.50
   **Accepted Answers:**
   (A) 0.25

8. A force of 20 N is applied to a bridge pier and the resulting displacement is 2 cm. The damping factor of the system is:
   - (a) 0.20
   - (b) 0.80
   - (c) 0.40
   - (d) 0.60
   **Accepted Answers:**
   (B) 0.80