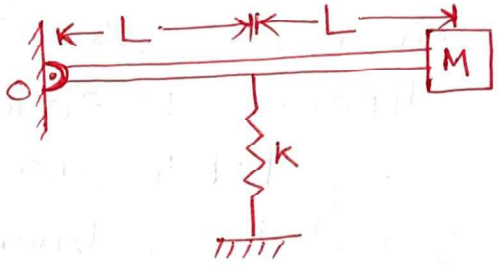
AIRCRAFT STRUCTURES

HAL exam

P1.) A simple spring mass system has a period of 0.25 sec. What will be the new period if spring constant is increased by 50%? keeping the same mass.

A.) 0.158 sec. B.) 0.552 sec. C.) 0.204 sec. D.) 0.25 sec.

P2.) Consider a mass M attached at the free end of a massless rod and a spring of stiffness k at the mid-point as shown in the figure.



The differential equation governing the vibration of mass M about hinge point O is

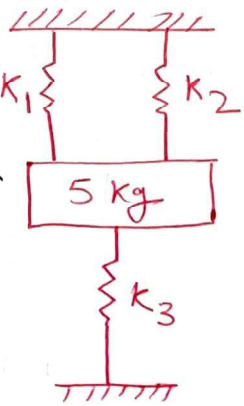
A.) $\ddot{\theta} + \frac{k}{4M}\theta = 0$

B.) $\ddot{\theta} + \frac{k}{M}\theta = 0$

C.) $\ddot{\theta} + \frac{k}{2M}\theta = 0$

D.) $\ddot{\theta} + \frac{2k}{M}\theta = 0$

P3.) Mass 5 kg is attached to 3 springs as shown. If $K_1 = K_2 = 1500$ N/m; and $K_3 = 2000$ N/m, the natural frequency of the system is



A.) 9.5 rad/sec. B.) 12.6 rad/sec.

C.) 10.4 rad/sec. D.) 13.2 rad/sec.

P4.) A harmonic motion is given by $10\sin\left(30t-\frac{\pi}{3}\right)$ mm, where t is in seconds and phase angle in radians. The ratio of maximum velocity to the maximum acceleration is (Absolute)

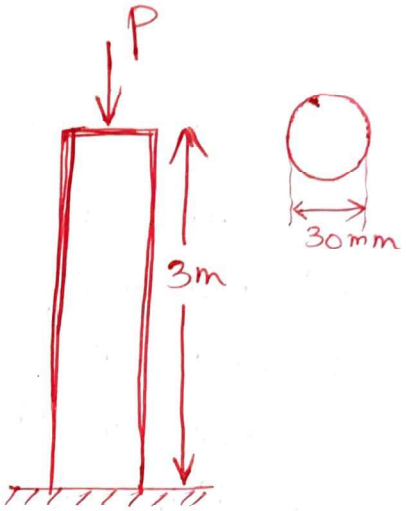
A.) 1.5

B.) 0.03

C.) 0.08

D.) 0.5

P5.) A 3m long column with circular cross section of diameter d = 30 mm is subjected to load P. One end of the column is fixed as shown in the figure. Given E = 50 GPa, the critical load for the column is



A.) 840 N

B.) 820 N

C.) 787 N

D.) 543 N

P6.) For a slender steel column of circular cross-section, the critical buckling load is P_0. If the diameter of the column is doubled (keeping other material and geometrical properties same), the critical buckling load of the column is

A.) $\frac{P_0}{16}$

B.) $8P_0$

C.) $2P_0$

D.) $16P_0$