

## Question 2

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$\frac{6.5}{2.5}$

$g = 1.2$

$m = 10^8 \text{ kg}$   
 $K = 1.5 \times 10^9 \text{ N/m}$   
 $16 \text{ m}$   
 System 1

Natural frequency of system 1  $\rightarrow$   
 $K = 1.5 \times 10^9 \text{ N/m}$   
 $\omega_n = \sqrt{\frac{K}{m}} = \sqrt{\frac{1.5 \times 10^9}{10^8}} = 3.873 \text{ rad/s}$

for system 1 —  
 $T_n = \frac{2\pi}{\omega_n} = 1.622 \text{ sec}$

2. Design acceleration response  
 $PSA = \frac{1}{2} \times \left( \frac{1.80}{1.622} \right) \times 9.81 \text{ m/s}^2$   
 $= 5.443 \text{ m/s}^2$

Design lateral force =  $mA$   
 $= 10^8 \times 5.443 \text{ m/s}^2$   
 $= 544327.9 \text{ kN}$

for system 1  $\rightarrow$   $PSA = 5.443 \text{ m/s}^2$   
 $SD = PSA / \omega_n^2$   
 $= \frac{5.443}{(3.873)^2} = 0.363 \text{ m}$

$\therefore$  peak Design lateral displacement for system 1 = 0.363 m

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