

(7) (b) Natural frequency of machine foundation is given by

$$\omega_m = \sqrt{\frac{C_u A}{m}}$$

$C_u$  = Coefficient of elastic uniform compression.

$A$  = Base area.

$m$  = mass

Given data ;

Base area =  $2.5 \text{ m} \times 2.5 \text{ m}$

Weight = 160 kN

$$\text{Mass} = \frac{160}{9.81} = 16.30 \frac{\text{kN}}{\text{m}} \cdot \text{sec}^2$$

$$C_u = 4.5 \times 10^4 \text{ kN/m}^3$$

$$\omega_m = \sqrt{\frac{4.5 \times 10^4 \times (2.5)^2}{16.30}}$$

$$= 131.36 \text{ rad/sec}$$

$$\text{Frequency (in Hz)} = f = \frac{\omega_m}{2\pi}$$

$$\frac{131.36}{2\pi} = \frac{65.68}{\pi} \text{ Hz}$$

$$f = \frac{65.68}{\pi} \text{ Hz} \quad \text{Ans.}$$