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Question:

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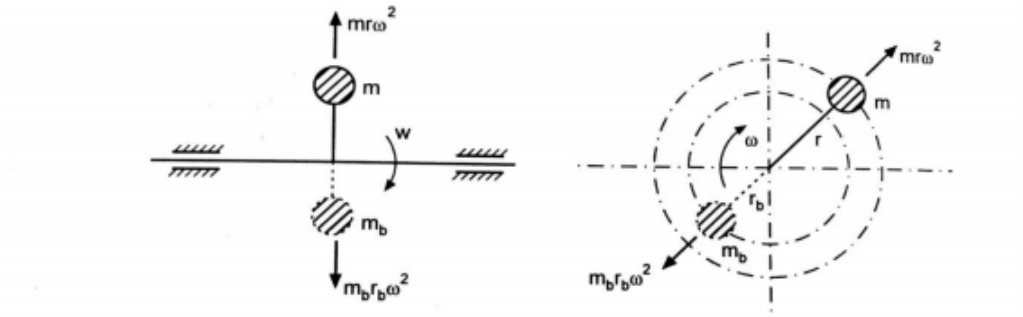
Answer:



(a) Longitudinal positions of masses (b) Angular positions of masses

..... [2M]

Fig. shows single rotating mass 'm' which is attached to a shaft rotating with angular velocity 'ω'.

Let 'r' = distance of centre of gravity of 'm' from axis of rotation of shaft. Due to rotation of shaft, centrifugal force '$mr\omega^2$' acts radially outwards due to inertia of mass. This force is called disturbing force which will produce bending moment on the shaft.

A balance mass m_b is introduced in the plane of rotation of disturbing mass, such that, it neutralizes the effect of inertia force due to disturbing mass.

Thus , the inertia forces of mass 'm' and mass 'm_b' must be equal and opposite.

$$mr\omega^2 = m_b r_b \omega^2$$

$$mr = m_b r_b.$$

Thus the balancing mass m_b is used at convenient radius r_b .Generally, r_b is considered as large as possible so that balance mass m_b required is very small. ....[2 M]