DSE 4A IST INTERNAL

ANSWER ALL THE FOLLOWING QUESTIONS.

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1. Equal forces act along the edges BC, CA, AB, DA, DB, DC of a regular tetrahedron of edge 'a'. The central axis is the perpendicular from D to the plane ABC and the pitch of the equivalent wrench is

a) $\frac{a}{2}$ b) $\frac{a}{3\sqrt{2}}$ c) $\frac{a}{2\sqrt{2}}$ d) $2\sqrt{2}a$

- a
- b
- c
- d

2. A particle moves in a plane with an acceleration which is always directed towards a fixed point O in the plane. It is found that the path is given by $r = a(1 + 2\sin\theta)$. The apsidal distances are equal to

a) 2a and $\frac{a}{2}$ b) 3a and a c) 4a and 2a d) 5a and 3a

- a
- b
- c
- d

3. At vertex C of triangle ABC which is right angled at C, the principal axes are inclined to sides at an angle

a) $\tan^{-1}\frac{ab}{a^2-b^2}$ b) $\tan^{-1}\frac{2ab}{a^2-b^2}$ c) $\frac{1}{2}\tan^{-1}\frac{ab}{a^2-b^2}$ d) None of these

- a
- b
- c
- d

4. Suppose a rigid body is in motion. At any time 't' let $\vec{r}$ be the position vector of mass 'm' of the body and $\vec{F}$ and $\vec{R}$ the external and internal forces respectively acting on it, then

a) $\sum \vec{F} + \sum m\left(\frac{d^2\vec{r}}{dt^2}\right) = \vec{0}$

b) $\sum \vec{F} + \sum -m\left(\frac{d^2\vec{r}}{dt^2}\right) = \vec{0}$

c) $\sum \vec{R} + \sum m\left(\frac{d^2\vec{r}}{dt^2}\right) = \vec{0}$

d) $\sum \vec{R} + \sum -m\left(\frac{d^2\vec{r}}{dt^2}\right) = \vec{0}$

- a
- b
- c
- d

5. If the nearly circular orbit of a particle be $p^2(a^{m-2} - r^{m-2}) = b^m$, then the apsidal angle is

a) $\frac{\pi}{\sqrt{m}}$ b) $\frac{\pi}{\sqrt{2m}}$ c) $\frac{2\pi}{\sqrt{m}}$ d) $\frac{3\pi}{\sqrt{m}}$

- a
- b
- c
- d

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