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Std. 11 Time : 1 hr.
5-12-2015 Second Unit Test in PHYSICS M. Marks: 20

1. A solid disc is having mass 'M' and radius 'R". Write the expression for its moment of inertia and radius of gyration about an axis passing through the center and perpendicular to the plane of the disc. (1)
2. How an inelastic collision is different from perfectly inelastic collision? What happens to the kinetic energy of the system after these types of collisions? (1)
3. A tiny particle of mass 'm' moving with a velocity 'u' under goes an elastic collision with heavy particle of mass 'M'(m<<M). Show that the tiny particle rebounds with the same speed. (2)
4. Derive the expression for center of mass of a two particle system. (2)
5. A solid sphere rolls on a surface without slipping and possesses a total kinetic energy of 'E'. Show that the rotational kinetic energy is $\frac{2}{7}$E. (2)
6. An object of mass 'm' is tied to one end of a string of length 'l'. The object whirls in a vertical circular path. Write the expression for tension in the string when the object is at the lowest
point and highest point; hence show that difference in the tensions is 6mg. (2)
7. Find a unit vector normal to the vectors $\vec{A}$ and $\vec{B}$. Where $\vec{A}$ = 2**i**+3**j**-5**k** and $\vec{B}$= $-$3**i**+4**j**-5**k.**
(2)
8. A grinding stone in the form of a solid cylinder rotates about its own axis with an angular velocity of 90 rpm. It comes to rest in 15s when it is switched off. Calculate the retarding torque acts on the stone. Given that mass of the stone is 5kg and that of radius 20cm.
(2)
9. Derive the expression for work done in stretching a spring of constant 'k' to an elongation of 'x'. Show graphically how the energy changes with elongation. (3)
10. What do you mean by banking of roads? Why it is necessary? Derive an expression for the maximum velocity with which a vehicle can negotiate a banked road. (3)

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