OLD ALPHA ACADEMY

Test No. 4   Physics (Chapter 5)   Class: First Year   Total Marks=40

Name of the Student: _____

Question No. 1 Encircle the correct option.   **(20)**

1. When a body moves along a circular path, it velocity
    (a) remains same   (b) become zero   (c) changes continuously   (d) sometime changes
2. The S.I unit of angular displacement is
    (a) degree   (b)   radian   (c)   revolution   (d)   meter
3. A body rotating in a circle of radius 1m with an angular speed 10 rad/s has the tangential velocity
    (a) 2 m/s   (b)   5 m/s   (c)   10 m/s   (d)   20 m/s
4. One radian is equal to
    (a) 67.3^o (b) 60° (c) 57.3^o (d) 47.3^o
5. The moment of inertia is measured in
    (a) kg m^2 (b)   kg m^{-2} (c)   N s   (d)   rad s^{-1}
6. The moment of inertia for ring or hoop is
    (a) mr^2 (b)   2/5 mr^2 (c)   ½ mr^2 (d)   1/12 mr^2
7. If a person sitting on a rotating stool with his arm outstretched, contracts his arms, his angular speed
    (a) decreases   (b)   increases   (c)   remains constant   (d)   becomes zero
8. Every point of rotating rigid body has same
    (a) angular velocity   (b) linear velocity   (c) linear acceleration   (d) linear distance
9. Angular momentum is maximum, when angle between linear momentum and moment are, is
    (a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0
10. When a body is rotating with constant angular velocity, it tangential acceleration is
    (a) Zero   (b) maximum   (c) minimum   (d) none of these
11. A diver changes his body position to conserve the
    (a) angular velocity (b) linear velocity   (c) linear acceleration   (d) angular momentum
12. A disc rolls down an inclined plane, it has
    (a) translational K.E   (b) rotational K.E   (c) Gravitational P.E   (d) all of these
13. When a body is moving in upward direction with an acceleration 'a', it apparent weight
    (a) increases   (b) decreases   (c) equal to real weight   (d) becomes zero
14. A beaker with water is placed on the rotating table. When water in the beaker is increased then its angular velocity
    (a) increases   (b) decreases   (c) unchanged   (d) becomes zero
15. When a sphere rolls down an inclined plane, its gravitational P.E is converted into
    (a) translation K.E   (b) rotational K.E   (c) both a&b   (d) none of these
16. One Geo Stationary satellite covers a longitude of
    (a) 110^0 (b) 120^0 (c) 125^0 (d) 130^0
17. For normal gravitational field, gravity obeys
    (a) Newton's first law   (b) Newton's second law   (c) Newton's third law   (d) inverse square law
18. If a car moves with a uniform speed of 2 m/s in a circle of radius 0.4 m, its angular speed is
    (a) 5 rad/s   (b) 4 rad /s   (c) 0.8 rad /s   (d) 0.2 rad /s
19. For a particle moving in a horizontal circle with constant angular velocity
    (a) linear momentum is constant but energy varies   (b) energy is constant but linear momentum varies
    (c) both energy and linear momentum are constant   (d) neither energy nor linear momentum are constant
20. The number of satellites which make global positioning system are
    (a) 3   (b) 8   (c) 24   (d) 48

Question No. 2 write the short answers.   **2x6=12**
I.   Show that orbital angular momentum L_0 = mvr.
II.   Why does a diver change his body positions before and after diving in the pool?
III.   What is meant by moment of inertia? Give its physical significance.
IV.   Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V. transmission.
V.   A disc and hoop start moving down from the top of an inclined plane at the same time. Which one will be moving faster on reaching the bottom?
VI.   Describe what should be the minimum velocity for a satellite to orbit close to the earth around it.
VII.   When mud flies off the tyre of a moving bicycle, in what direction does it fly?
VIII. Explain the difference b/w tangential velocity and the angular velocity. If one of these is given for a wheel of known radius, how will you find the other?

Question No. 3
a.   What is geo-stationary orbit? Calculate radius of this orbit.   **(5)**
b.   A 1000 kg car traveling with a speed of 144 km/h rounds a curve of radius 100 m. Find the centripetal force. **(3)**

<center>OR</center>

Question No. 4
a.   Define centripetal force. Also calculate expression for it.   **(5)**
b.   What is least speed at which an aero-plane can execute a vertical loop of 1.0 km radius so that there will be no tendency for the pilot to fall down at the highest point.   **(3)**