STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : **PH/MC/ME44**

B.Sc. DEGREE EXAMINATION APRIL 2007
BRANCH III - PHYSICS
FOURTH SEMESTER

REG. No._____

COURSE   :   **MAJOR – CORE**
PAPER   :   **MECHANICS**
TIME   :   **30 MINS.**   MAX. MARKS : 30

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

SECTION - A

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I   CHOOSE THE CORRECT ANSWER:

1.   The resultant of two velocities 12 m/s cand 4 m/s can never be
       a) 16 m/s   b) 8 m/s   c) 10 m/s   d) 2 m/s

2.   A particle is simultaneously subjected to two velocities 'u' and 'v' inclined at 90º.
       The resultant velocity is given by
       a) $\sqrt{u^2 + v^2}$ b) $\sqrt{u^2 - v^2}$ c) u + v d) u - v

3.   A bomb is released from a horizontally flying aeroplane. The trajectory of the bomb
       is a
       a) straight line   b) parabola   c) hyperbola   d) circle

4.   The angle of projection for which the horizontal range and the maximum height of a
       projectile are equal, is
       a) 45º   b) 60º   c) 76º   d) 30º

5.   The maximum range of a projectile projected with some initial velocity is found to
       be 1000m in the absence of wind and air resistance. The maximum height reached
       by the projectile is
       a) 250m   b) 500m   c) 1000m   d) 2000m

6.   A collision is said to be perfectly elastic when
       a) e = 0   b) e < 1   c) e = 1   d) e > 1

7.   A metal balls falls from a height of 10m on a steel plate and bounces back to a height
       of 2.5m. The coefficient of restitution is
       a) 1   b) 0.75   c) 0.5   d) 0.25

8. The dimensions of impulse are equal to that of
   a) Linear momentum
   b) Force
   c) Pressure
   d) Velocity

9. The M.I of a solid sphere of mass 'M' and radius 'R' about a tangent is

   a) $\frac{2}{5}MR^2$
   b) $\frac{7}{5}MR^2$
   c) $\frac{5}{7}MR^2$
   d) $\frac{MR^2}{4}$

10. A system of mass 'M' and Radius of gyration 'K' is rotating with angular acceleration 'α'. The Torque acting on the system is

    a) $\frac{1}{2}MK^2\alpha$
    b) $MK^2\alpha$
    c) $\frac{MK^2\alpha^2}{2}$
    d) $\frac{MK^2\alpha^2}{4}$

11. The dimensional formula for angular momentum is
    a) ML^2T^{-1}
    b) ML^2T^{-2}
    c) MLT^{-2}
    d) $M^{-1}LT^{-2}$

12. Unit of moment of inertia is
    a) kgm
    b) kg m^2
    c) kg m^{-2}
    d) none

13. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 with the same period. The ratio of their centripetal force is

    a) r_1/r_2
    b) r_1^2/r_2^2
    c) r_2^2/r_1^2
    d) $\sqrt{r_1/r_2}$

14. A cyclist riding at a speed of 9.8 m/s takes a turn round a circular road of radius 19.6m. What is his inclination to the vertical?
    a) 26.5°
    b) 30°
    c) 13°
    d) 36.5°

15. The expression for critical velocity v_c is

    a) $\frac{kr}{\rho\eta}$
    b) $\frac{k\eta}{\rho r}$
    c) $\frac{\eta\rho}{kr}$
    d) $\frac{k}{\eta\rho r}$

II   STATE WHETHER TRUE OR FALSE:

16. Moment of Inertia is a vector quantity.

17. A body can roll on a smooth inclined plane.

18. For a body having C.M, it must necessarily have C.G.

19. μ-space is a 6 - dimensional space.

20. When constraints are present, the number of degrees of freedom of a system is reduced.

III   FILL IN THE BLANKS:

21.   In projectile motion, at the highest point, the direction of velocity is _____.

22.   In a compound pendulum, the period of oscillation is a minimum when _____.

23.   In a compound pendulum, the centre of suspension and the centre of oscillation are _____.

24.   For turbulent flow, the Reynold's number K must be greater than _____.

25.   The equation lx+my+nz=p represents a _____ constraint.

IV   ANSWER IN ONE OR TWO SENTENCES:

26.   Define relative velocity between two moving particles.

27.   State Newton's experimental law.

28.   State the law of conservation of angular momentum.

29.   What is a hodograph?

30.   Define 'phase space'.

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