

D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1**SEMESTER EXAMINATIONS****APRIL – 2019****15CMA6B****DYNAMICS****Time : 3 Hrs****Max. Marks : 75****SECTION-A (10 x 2 = 20)****Answer ALL questions.**

1. Define velocity.
2. Define acceleration.
3. What is meant by trajectory?
4. Find the range on the inclined plane.
5. Define simple harmonic motion.
6. Define impulsive force
7. What is meant by central force?
8. State any two Kepler's laws.
9. Give a short note on Moment of Inertia.
10. State perpendicular axis theorem.

SECTION-B (5 x 5 = 25)**Answer any FIVE of the following questions.**

11. Find the magnitude and direction of the resultant of the velocities \vec{v}_1 and \vec{v}_2 .
12. To a man, walking along a level road at 5km/h., the rain appears to beat into his face at 8km/h. at an angle 60° with the vertical. Find the direction and magnitude of the true velocity of the rain.
13. A particle projected from the top O of a wall AO, 50m. high, at an angle of 30° above the horizon, strikes the level ground through A at B at an angle of 45° . Show that the angle of depression of B from O is $\tan^{-1} \frac{\sqrt{3}-1}{2\sqrt{3}}$.
14. A particle is projected horizontally from a height. To show that the equation of its path can be put in the form $x^2 = \frac{2u^2}{g} y$.
15. The displacement x of a particle moving along a straight line is given by $x = A \cos nt + B \sin nt$, where A, B, n are constants. Show that its motion is S.H. If $A = 3, B = 4, n = 2$, find its period, amplitude, maximum velocity and maximum acceleration.
16. The Velocities of a particle along and perpendicular to radius vector from a fixed origin are a and b . Find the path and the accelerations along and perpendicular to the radius vector.
17. A particle describes an elliptic orbit under a central force towards one focus S. If v_1 is the speed at the end B of the minor axis and v_2, v_3 the speeds at the ends A, A' of the major axis, show that $v_1^2 = v_2 v_3$.
18. Show that the M.I. of a rectangular lamina of mass M and sides $2a$ and $2b$ about a diagonal is

$$M \frac{2a^2b^2}{3(a^2 + b^2)}.$$

SECTION-C (3 x 10 = 30)

Answer ALL questions.

19. (a) Find the components of velocity and acceleration of a particle in the radial and transverse directions.

(Or)

(b) A vertical circular disc of radius a rolls on a ground without slipping along a straight line with a linear velocity u . Find the velocity of any point on its rim.

20. (a) Show that the path of a projectile is a parabola.

(Or)

(b) When two smooth spheres collide directly, to find the impulse imparted to each sphere and the change in the total kinetic energy of the spheres.

21. (a) Obtain the differential equation of a central orbit in polar coordinates.

(Or)

(b) State and prove parallel axis theorem.

* * * * *