Mechanics (CC-2) (F.M. – 20)

Answer any ten questions 2 × 10

1. A particle is acted on by a conservative force $\vec{F} .$ Which of the following relation/s are true?

1. $\vec{F}=\vec{∇}∅. \left(∅ is a scaler quantity\right) $
2. $ \vec{∇}×\vec{F} =0 $
3. $ \vec{∇}.\vec{F}=0 $

$iv) \vec{ ∇}.$ $\vec{∇}×\vec{F} =0 $

2. A force $\vec{F}$ is required to move a particle of mass $m$ along the perimeter of an ellipse given by $\vec{r}=\hat{i} a\cos(ωt)+ \hat{j} b\sin(ωt)$. Calculate the force $\vec{F}$ required.

3. A particle at rest is acted on continuously by a force $\vec{F}=\hat{x} π\sin(2πt) N. $ Calculate the linear momentum of the particle$at t=0.05 s$.

4. Write down the formula for moment of inertia of a uniform cylindrical body about an axis passing through the centre of mass and perpendicular to the base of the cylinder. Mass of the cylinder is M and radius is R.

5. What do you mean by Coriolis force. Write down its expression.

6. What do you mean by central force? State the characteristics of central force.

7. write down the expression of a volume element in spherical polar coordinate.

8. Explain time integral of a force.

9. Under what condition the angular momentum of a body is constant.

10. A particle of mass m is acted on by a force whose potential energy is given by : $V=ax^{2}-bx^{3}$. Find the value of the force.

11. Define centre of mass of a system of particle.

12. Explain the effect of Coriolis force on the formation of cyclone in southern hemisphere.