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I. Fill in the blanks

1. The line integral $\int_C x^2 dx + y^2 dy$, where C is the boundary of the region $x^2+y^2<a^2$ equals <u>a</u>

2. A force field $\vec{F}$ is said to be conservative if $curl\,\vec{F} = 0$

3. If $\vec{F}$ is the velocity of a fluid particle then $\int_C \vec{F}.\vec{dr}$ represents <u>circulation</u>

4. If $\vec{A}$ is such that $\overrightarrow{V} \times \overrightarrow{A} = 0$ then $\vec{A}$ is called <u>irrotational</u>

5. If $\vec{F}$ is a conservative force field, then the value of curl $\vec{F}$ is <u>0</u>

6. The unit vectors $\hat{r}, \hat{\theta}$ and $\hat{\phi}$ are <u>perpendicular</u>

7. A particle is moving in a plane, its velocity $\hat{\upsilon}$ is given by $\dot{r}\,\hat{r} + r\,\dot{\theta}\,\hat{\theta}$

8. Total vector surface area of a closed volume is <u>null vector</u>

9. Two vectors $\vec{A}$ and $\vec{B}$ are collinear if <u>$\vec{A} \times \vec{B} = 0$</u>

10. If $\phi(x, y, z)$ be a scalar function then $\hat{i}\dfrac{\partial \phi}{\partial x} + \hat{j}\dfrac{\partial \phi}{\partial y} + \hat{k}\dfrac{\partial y}{\partial z}$ is called <u>gradient of scalar function</u> $\phi$

11. The integration of a vector along a curve is called its <u>line integral</u>

12. If A be a vector point function at a point in a small element of volume dv, then integral $\iiint_v A.dv$ is called <u>the volume integral of vector A</u>

13. The <u>curl</u> of a vector field is defined as the maximum line integral of the vector per unit area

14. The scalar product or dot product of two vectors A and B is defined as <u>the product of the magnitudes of two vectors</u>

15. If vector r, is a function of a scalar variable t, then we write $\overline{r}$ = <u>r(t)</u>

16. The magnitude of a vector cannot be <u>negative</u>

17. The angle between vectors $(\vec{A} \times \vec{B})$ and $(\vec{B} \times \vec{A})$ is <u>$\pi$</u>

18. If $\hat{n}$ is the unit vector in the direction of $\vec{A}$, the $\hat{n}$ = $\left|\dfrac{\vec{A}}{\hat{A}}\right|$

19. The two vectors $\vec{A}$ and $\vec{B}$ are perpendicular to each other if $\vec{A}\vec{B} = 0$

20. If l, m, n are the direction cosines of a vector, then <u>$l^2 + m^2 + n^2 = 1$</u>

21. Moment of inertia is $\dfrac{2K.E}{\omega^2}$

22. Units of Moment of Inertia are <u>Kg.m$^2$</u>

23. The number of co-ordinates required to describe a collision in centre of mass frame is <u>3</u>

24. In elastic collision there is a conservation of <u>linear momentum</u>

25. The scattering cross-section has the dimensions of <u>area</u>

26. If $\phi$ is the angle of scattering in lab and $\theta$ in c.m system, then for m1 = m2 we have $\phi$ = $\dfrac{\theta}{2}$

27. The path of an $\alpha$-particle in Rutherford scattering is always <u>hyperbola</u>

28. When the velocities get inter charged after collision of two bodies, the collision is <u>perfectly</u> elastic

29. The minimum velocity with a body may be projected to become a satellite of the earth is <u>7.92 km/sec</u>

30. The value of escape velocity is <u>11.2 km/sec</u>

31. The time period of a geostationary satellite is <u>24</u> hours

32. Rocket works on the principle of conservation of <u>linear momentum</u>

33. If the force on a rocket moving with a velocity of 300 m/Sec in 210 H. Then the rate of fuel combustion is <u>0.7 kg/Sec</u>
34. Newton's second law gives the measure of <u>force</u>
35. A body which does not undergo any change in shape or size by the application of external forces is called <u>a rigid body</u>
36. Law of conservation of linear momentum is consequence of <u>homogeneity of space</u>
37. The unit of angular momentum is <u>$Kgm^2S^{-1}$ or Joule second</u>
38. Number of dimensions space has is <u>three</u>
39. If moment of inertia of a wheel, having radius of gyration 60 cm, is 360 $Kgm^2$ then mass of the wheel is <u>1000kg</u>
40. Angular momentum is the vector product of <u>linear momentum and radius vector</u>

II. Short Questions
1. Define the terms i) scalars and ii) vectors
2. What is cross product?
3. What is zero vector or null vector?
4. What is gradient of a scalar field?
5. What is line integral ?
6. What does Newtons's first law states?
7. Define Kinetic Energy?
8. What is potential Energy?
9. What is Linear momentum?
10. What is angular momentum?