

KANDI RAJ COLLEGE

DEPARTMENT OF PHYSICS

Semester – I

Stream : Honours (Core)

Internal Evaluation-2022

PAPER CODE: PHY-HCC-T-01 (Mathematical Physics-I)

FULL MARKS: 10

Answer any five questions

5X2 =10

1. What is the value of the limit : $\lim_{x \rightarrow 0} \frac{(1 - \cos 2x)^2}{x^4}$.
2. Suppose $f(x) = \begin{cases} -6x - 4, & x \leq -1 \\ 3x^2, & x > -1 \end{cases}$.
What can be said of the differentiability of $f(x)$ at $x = -1$.
3. Solve $(x + 1) \frac{dy}{dx} - y = e^{3x}(x + 1)^2$.
4. Solve $x \frac{dy}{dx} + y = x^3 y^6$.
5. Solve $\frac{d^2 y}{dx^2} + \frac{dy}{dx} - 2y = 0$ for complementary function.
6. Solve $\frac{d^4 y}{dx^4} + 4x = 0$ for complementary function.
7. Find Particular Integral of $(D^2 + 5D + 6)y = e^x$.

PAPER CODE: PHY-HCC-T-02 (Mechanics)

FULL MARKS: 10

Answer any ten of the following questions

10X1 =10

1. The period of an artificial satellite in circular orbit is independent of –
(i) mass of the satellite (ii) radius of the orbit (iii) both of these (iv) none of these.
2. Moment of inertia of a spherical shell is—
(i) $\frac{2}{3}M^2r^2$ (ii) $\frac{3}{2}Mr^2$ (iii) $\frac{2}{5}M^2r^2$ (iv) $\frac{2}{3}Mr^2$
3. Gravitational potential inside a spherical shell is –
(i) Equal to that on the surface (ii) Greater than that on the surface (iii) Zero (iv) can not be determined
4. A body appears to be spherical to an observer at rest relative to it. To a moving observer, it will appear to be –

- (i) a circle (ii) an ellipse (iii) an oblate spheroid (iv) none of them.
5. Two photons approach each other . Their relative velocity will be—
(i) Zero (ii) less than c (iii) more than c (iv) equal to c
6. The deflection of a freely falling body from a height of 100m at the 30° N latitude is ---
(i) 1.895 (ii) 18.95 (iii) 0 (iv) 0.1895
7. The dimension of Poisson's ratio is—
(i) $[L]$ (ii) Dimensionless (iii) $[L^{-1}]$ (iv) $[L^2]$
8. When the velocities get interchanged after collision of two bodies , the collision is —
(i) perfectly elastic (ii) nearly elastic (iii) inelastic (iv) none of the above
9. For a small displacements the restoring force is given by $F = -sx$, the reciprocal of s is called—
(i) spring constant (ii) compliance (iii) displacement (iv) reactance
10. Two masses $m_1=85$ gm and $m_2=200$ gm are constrained to move with velocities $u_1=6.48$ cm/s and $u_2=6.78$ cm/s respectively in a horizontal plane, the velocity of centre of mass is —
(i) -2.82 cm/s (ii) -28.2 cm/s (iii) -0.282 cm/s (iv) -282 cm/s.
11. Moment of inertia is a—
(i) vector (ii) scalar (iii) tensor
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PAPER CODE: PHY-HGE-T-01

FULL MARKS: 10

Answer any two questions.

(5×2=10)

1. State Kepler's laws of planetary motion. Explain the idea behind global positioning system.
 2. Deduce an expression for the energy of a harmonic oscillator of mass m , amplitude A and frequency ν . At what displacement is the energy half kinetic and half potential?
 3. Write down Einstein's postulates of special theory of relativity. What is meant by length contraction and time dilation?
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