Yakeen NEET 2.0 (2026)

KPP-06

Physics by Saleem Sir
Basic Maths and Calculus (Mathematical Tools)

Time limit 30 minutes

Solve without answer. When we will discus check your ansewer.

1 If temperature of a body changes wrt time as

$T = \alpha t^2 + \beta t^3$ where $\alpha = 2$, $\beta = -\frac{1}{3}$

Find ratio of temperature to the rate of change of temp wrt time at $t = 2$ sec. (magnitude)

2. If charge flowing through an crossection is given as

$q = 3t^2 + 4t$

find value of current at $t = 2$ sec (use $i = \frac{dq}{dt}$)

3. Tangential acceleration is rate of change of speed. By using this concept find the value of tangential acc. of a particle moving in a circular path of radius 10 m. Such that its spedd $v = 3t^4 + 2t^2$.
Also find value of tangential acc., K.E. of particle at t = 2 sec. (m = 2 kg)

4. Find rate of change of pressure with respect to volume for an ideal gas at constant temp T_0.(Use $PV = nRT$)

5. If potential energy of the system is given by $U = -\frac{A}{x^6} - \frac{B}{x^5}$ (where $A = 3$, $B = \frac{1}{5}$)

Find magnitude of force acting on particle at $x = 1$

$\left(\text{Use } F = -\frac{dU}{dx}\right)$ also find mean position where $F_{net} = 0$

6. For a particle moving in a straight line the position of the particle at time (t) is given by $x = \frac{t^3}{6} - t^2 - 9t + 18m$. What is the velocity of the particle when its acceleration is zero:

(1) 18 m/s (2) –9 m/s
(3) –11 m/s (4) 6 m/s

7. A particle moves along a straight line such that at time t its displacement from a fixed point O on the line is $3t^2 - 2$. The velocity of the particle when $t = 2$ is:

(1) 8 ms^{-1} (2) 4 ms^{-1}
(3) 12 ms^{-1} (4) 0

8. Temperature of a body varies with time as $T = (T_0 + \alpha t^2 + \beta \sin t)$K , where T_0 is the temperature in Kelvin at $t = 0$ sec. and $\alpha = 2/\pi$. K/s^2 and $\beta = -4$ K, then rate of change of temperature at $t = \pi$ sec. is:

(1) 8K (2) 8°K
(3) 8K/sec (4) 8°K/sec

9. The velocity of a particle moving on the x-axis is given by $v = x^2 + x$ where v is in m/s and x is in m. Find its acceleration in m/s^2 when passing through the point $x = 2$m. (Use $a = v\frac{dv}{dx}$)

(1) 0 (2) 5
(3) 11 (4) 30

10. If $y = \sin^2 x - 2\tan^2 x$, then $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is:

(1) –11 (2) –7
(3) –13 (4) –15

11. If $y = x^3 + 2x + 1$ then $\frac{dy}{dx}$ at $x = 1$ is:

(1) 6 (2) 7
(3) 8 (4) 5

12. $y = \frac{1+x}{e^x}$ then $\frac{dy}{dx}$ is equal to:

(1) $\frac{x}{e^x}$ (2) $-\frac{x}{e^x}$
(3) $\frac{(x+1)}{e^x}$ (4) None of these

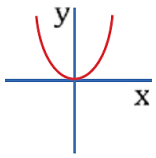
13. If $y = x^2 + x - 1$ then $\frac{dy}{dx}$ at $x = 1$ is equal to:

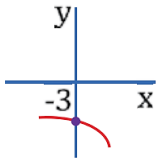
(1) 3 (2) –3
(3) 0 (4) None

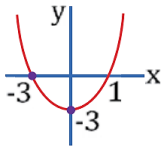
14. Given $s = t^2 + 5t + 3$, find $\frac{ds}{dt}$.

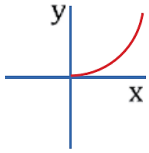
(1) $2t + 5$
(2) $\frac{t^3}{3} + 5t^2 + 3t$
(3) $t + 5$
(4) None

15. If $y = x^2 + 2x - 3$, then y-x graph is:

(1)


(2)


(3)


(4)


16. The sum of the series $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \ldots\ldots\infty$ is:

(1) $\frac{8}{7}$ (2) $\frac{6}{5}$
(3) $\frac{2}{3}$ (4) $\frac{3}{2}$

17. The slope of straight line $\sqrt{3}y = 3x + 4$ is:

(1) 3
(2) $\sqrt{3}$
(3) $\frac{1}{\sqrt{3}}$
(4) $\frac{1}{3}$

18. Find value of $\frac{dy}{dx}$.

(1) $y = \cos(2x + 3)$
(2) $y = \sin(x^2 + x^3)$

19. Find derivative of y w.r.t. x if: $y = \ln(x^3 + 4)$

20. Find value of $\frac{dy}{dx}$.

$y = e^{(3x - 6)}$

21. If position of particle is given by
$x = (3t^2 + 4t - 1)$m.
Find its initial velocity and initial acceleration.
Use $v = \frac{dx}{dt}$, $a = \frac{dv}{dt}$

22. If position of particle is given by
$x = (t^3 - 36t^2 + 30t - 1)$ m.
Find its velocity when acceleration becomes zero.
Use $v = \frac{dx}{dt}$, $a = \frac{dv}{dt}$

23. Find the slope of the tangent of a curve $y = x^2 + 2x + 4$ at $x = 0$ and $x = -1$. (hint slope = $\frac{dy}{dx}$)