

કુલ સમય :- ૬૦ મીનીટ

કુલ પ્રશ્નો : ૫૦

વિદ્યાર્થીએ ટીક કરવાના પ્રશ્નો : ૩૫

નોંધ : વિદ્યાર્થીએ માત્ર ૩૫ પ્રશ્નો જ ટીક કરવાના રહેશે. જો વધારે ટીક કરેલ હશે તો પ્રથમ ૩૫ પ્રશ્નો જ ગણતરીમાં લેવામાં આવશે.

- 1) For Cauchy Mean Value theorem, functions $f(x) = \sin x$, $g(x) = \cos x$; $x \in \left[0, \frac{\pi}{2}\right]$ then $c =$ _____.
 (a) π (b) $\frac{\pi}{4}$ (c) 2π (d) 0
- 2) Real function $f(x)$ and $g(x)$ are differentiable on _____.
 (a) $[a, b]$ (b) (a, b) (c) $[a, b)$ (d) $(a, b]$
- 3) $-x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \dots =$ _____.
 (a) $\log(1 - x^2)$ (b) $\log x$ (c) $\sin x$ (d) $\cos x$
- 4) $1 - \frac{(x-\frac{\pi}{2})^2}{2!} + \frac{(x-\frac{\pi}{4})^4}{4!} - \dots =$ _____.
 (a) $\log(1 - x^2)$ (b) $\log x$ (c) $\sin x$ (d) $\cos x$
- 5) $-\frac{1}{n} \sin^{n-1} x \cos x + \frac{n-1}{n} \int \sin^{n-2} x dx =$ _____.
 (a) $\int \sin^n x dx$ (b) $\int \sin^2 x dx$ (c) $\int \cos^n x dx$ (d) $\int \cos^2 x dx$
- 6) $\int_0^{\pi/2} \sin^8 x dx =$ _____.
 (a) $\frac{32}{105}$ (b) 0 (c) $\frac{256\pi}{35}$ (d) $\frac{35\pi}{256}$
- 7) $\int_0^{\pi/2} \sin^{10} x \cos^4 x dx =$ _____.
 (a) $\frac{9}{4096}$ (b) $\frac{9\pi}{4096}$ (c) $\frac{4096}{9}$ (d) 10
- 8) $\int_0^2 x^3 (4 - x^2)^{5/2} dx =$ _____.
 (a) $\frac{63}{1024}$ (b) 0 (c) $\frac{1024}{63}$ (d) π
- 9) $\frac{n}{n^2+1^2} + \frac{n}{n^2+2^2} + \frac{n}{n^2+3^2} + \dots + \frac{1}{n^2+n^2} + \dots =$ _____.
 (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) 1 (d) 0
- 10) Find the length of arc of asteroid $x^{2/3} + y^{2/3} = a^{2/3}$.
 (a) $6a$ (b) $4a$ (c) $2a$ (d) a
- 11) Find the volume of the paraboloid generated by revolving the area bounded by parabola $y^2 = 4ax$ and straight line $x = 4a$ about X -axis.
 (a) $5\pi^2$ (b) $32\pi a^3$ (c) $\frac{5\pi}{3}$ (d) 2π
- 12) If $\vec{x} = (1, 2, -1)$ and $\vec{y} = (1, 2, 2)$ then $\vec{x} \cdot \vec{y} =$ _____.
 (a) 1 (b) 2 (c) 3 (d) 4
- 13) If $\vec{x} = (2020, 2021, 2022)$ then $\vec{x} \times \vec{x} =$ _____.
 (a) $\vec{0}$ (b) $\vec{1}$ (c) $\vec{6}$ (d) $\vec{5}$
- 14) $[\vec{z}\vec{x}\vec{y}] =$ _____.
 (a) $\vec{0}$ (b) $[\vec{x}\vec{y}\vec{z}]$ (c) $\vec{x}\vec{y}\vec{z}$ (d) $\vec{1}$
- 15) If $\vec{x} = (10, 20, 30)$ and $\vec{y} = (2, 4, 6)$ then $\vec{x} \cdot (\vec{x} \times \vec{y}) =$ _____.
 (a) 30 (b) 1 (c) 0 (d) 20
- 16) $[\vec{a}\vec{b}\vec{c}] = 0$ if and only if $\vec{a}, \vec{b}, \vec{c}$ are _____.
 (a) co-ordinates (b) coplanar (c) constant (d) π
- 17) If $\vec{a}, \vec{b}, \vec{c} \in R^3$ then $\vec{a} \times (\vec{b} \times \vec{c}) =$ _____.
 (a) $[\vec{a}\vec{b}\vec{c}]$ (b) 0 (c) $2[\vec{a}\vec{b}\vec{c}]$ (d) $(\vec{a} \cdot \vec{c})\vec{b} - (\vec{a} \cdot \vec{b})\vec{c}$
- 18) $\vec{a} \times (\vec{b} \times \vec{c}) + \vec{b} \times (\vec{c} \times \vec{a}) + \vec{c} \times (\vec{a} \times \vec{b}) =$ _____.
 (a) $\vec{0}$ (b) $[\vec{a}\vec{b}\vec{c}]$ (c) $\vec{a} \times \vec{b}$ (d) $\vec{c} \times \vec{a}$
- 19) Find the polar co-ordinates of the point having cartesian co-ordinates $(1, -\sqrt{3})$ in R^2 .
 (a) $(2, \frac{\pi}{2})$ (b) $(\sqrt{2}, \frac{\pi}{2})$ (c) $(2, -\frac{\pi}{3})$ (d) $(\sqrt{2}, \frac{\pi}{4})$
- 20) $(\vec{a} - \vec{b}) \times (\vec{a} + \vec{b}) =$ _____.
 (a) $|\vec{a} \times \vec{b}|^2$ (b) $(\vec{a} \cdot \vec{b})^2$ (c) $2(\vec{a} \times \vec{b})$ (d) 0
- 21) $(\frac{\partial \phi}{\partial x}, \frac{\partial \phi}{\partial y}, \frac{\partial \phi}{\partial z}) =$ _____. where ϕ is a scalar function
 (a) 0 (b) $\frac{\pi}{2}$ (c) $\text{curl } \phi$ (d) $\text{grad } \phi$
- 22) $\text{Curl } F =$ _____. where F is a vector function.
 (a) ∇F (b) $\nabla \times F$ (c) ∇^2 (d) 0
- 23) $(\text{grad } \phi)F + \phi(\text{div } F) =$ _____. where ϕ is a scalar function & F is vector functions.
 (a) $\text{grad } (F \times G)$ (b) $\text{Curl}(F \times G)$ (c) $\text{div}(\phi F)$ (d) 0
- 24) $\text{Curl}(\text{grad } \phi) =$ _____. where ϕ is a scalar function

- (a) 0 (b) 1 (c) $\nabla \phi$ (d) $\text{curl} \phi$
- 25) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ & $r = |\vec{r}|$ then $f''(r) + \frac{2}{r}f'(r) = \underline{\hspace{2cm}}$.
- (a) $\vec{r}$ (b) $\nabla^2 f(r)$ (c) $\frac{\vec{r}}{r}$ (d) 0
- 26) If $\phi(x, y, z) = x^2yz^3 + xy^2z^2$ then find $\text{grad } \phi$ at point (1, 3, 2).
- (a) (84, 32, 72) (b) (82, 32, 72) (c) (7, 3, -8) (d) (7, -3, 8)
- 27) Find the radius of the circle $x^2 + y^2 + z^2 - 2y + 2z - 23 = 0$, $x + 2y - 2z + 5 = 0$.
- (a) 0 (b) 1 (c) 3 (d) 5
- 28) If the angle of intersection of two spheres is $\underline{\hspace{2cm}}$ then the spheres are called orthogonal spheres.
- (a) 0 (b) π (c) $\frac{\pi}{2}$ (d) 2π
- 29) The intersection of sphere and a plane is $\underline{\hspace{2cm}}$.
- (a) sphere (b) circle (c) curve (d) cylinder
- 30) If the plane $kx - y - 2z = 4$ touches the sphere $x^2 + y^2 + z^2 + 2x - 6y + 1 = 0$ then find the value of k .
- (a) $-\frac{1}{4}$ (b) $\frac{1}{4}$ (c) 4 (d) -4
- 31) If $y = \sin(ax + b)$; $a \neq 0, b \in \mathbb{R}$ then $y_n = \underline{\hspace{2cm}}$.
- (a) $a^n \sin\left(ax + b + \frac{\pi}{2}\right)$ (b) $a^n \sin\left(ax + b + \frac{n\pi}{2}\right)$ (c) $a^n \sin\left(ax + b + \frac{\pi}{4}\right)$ (d) $a^n \sin\left(ax + b + \frac{\pi}{2}\right)$
- 32) Write name of the following statement? If u and v are functions of x & there n^{th} derivatives exist then $(uv)_n = \binom{n}{0}u_nv + \binom{n}{1}u_{n-1}v_1 + \dots + \binom{n}{r}u_{n-r}v_r + \dots + \binom{n}{n}uv_n$
- (a) Maclaurin's theorem (b) Leibnitz's theorem (c) Euler theorem (d) Taylor's theorem
- 33) Write name of the following statement? For real function $f(x)$,
- (i) $f^{(n-1)}(x)$ is continuous on $[0, x]$ & (ii) $f^{(n-1)}(x)$ is differentiable on $(0, x)$ then
- $$f(x) = f(0) + xf'(0) + \frac{x^2}{2!}f''(0) + \dots + \frac{x^{n-1}}{(n-1)!}f^{(n-1)}(0) + R_n$$
- (a) Maclaurin's theorem (b) Leibnitz's theorem (c) Euler theorem (d) Taylor's theorem
- 34) If $y = \sin(3x + 4)$ then $y_5(0) = \underline{\hspace{2cm}}$.
- (a) 0 (b) $-3^5 \cos 4$ (c) $3^5 \cos 4$ (d) None
- 35) $\frac{1}{\sqrt{n^2}} + \frac{1}{\sqrt{n^2-1^2}} + \frac{1}{\sqrt{n^2-2^2}} + \dots = \underline{\hspace{2cm}}$
- (a) 3π (b) 2π (c) $\frac{\pi}{2}$ (d) 4π
- 36) $n! x^n \sum_{r=0}^n \binom{n}{r}^2 = \underline{\hspace{2cm}}$.
- (a) $(x^{2n})_1$ (b) $(x^{2n})_n$ (c) $(x^n)_1$ (d) $(x^{2n})_{2n}$
- 37) If $y = (2x + 1)^5$ then $y_5 = \underline{\hspace{2cm}}$.
- (a) $5! 2^2$ (b) $5! 2^5$ (c) $5! 2^{25}$ (d) 0
- 38) Find the length of arc of the circle $6y^2 = (2x + 8)^3$.
- (a) $\frac{2}{9}[125 + 13\sqrt{13}]$ (b) $125 - 13\sqrt{13}$ (c) $\log(\sqrt{2} + 1)$ (d) $\frac{2}{9}[125 - 13\sqrt{13}]$
- 39) If the sets $\{\vec{a}_1, \vec{a}_2, \vec{a}_3\}$ and $\{\vec{b}_1, \vec{b}_2, \vec{b}_3\}$ are reciprocal sets of vector then $\vec{a}_1 \cdot \vec{b}_2 = \underline{\hspace{2cm}}$ and $\vec{a}_3 \cdot \vec{b}_3 = \underline{\hspace{2cm}}$.
- (a) 0, 1 (b) 1, 1 (c) 1, 0 (d) 0, 0
- 40) If the sets $\{\vec{a}_1, \vec{a}_2, \vec{a}_3\}$ and $\{\vec{b}_1, \vec{b}_2, \vec{b}_3\}$ are reciprocal sets of vector then $[\vec{a}_1 \vec{a}_2 \vec{a}_3][\vec{b}_1 \vec{b}_2 \vec{b}_3] = \underline{\hspace{2cm}}$
- (a) 0 (b) 1 (c) 3 (d) 5
- 41) If $F(x, y, z) = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ then $\text{Curl } F = \underline{\hspace{2cm}}$.
- (a) 0 (b) 1 (c) 2 (d) 3
- 42) The radius and centers of two spheres are r_1, r_2 and c_1, c_2 respectively. Give the condition that two spheres touch internally.
- (a) $c_1 c_2 < r_1 - r_2$ (b) $c_1 c_2 \neq |r_1 + r_2|$ (c) $c_1 c_2 \leq r_1 + r_2$ (d) $c_1 c_2 = |r_1 - r_2|$
- 43) Polar co-ordinates are $\underline{\hspace{2cm}}$.
- (a) (x, y) (b) (r, θ) (c) $\frac{\pi}{2}$ (d) π
- 44) The equation of cone having vertices at origin curve $x^2 + y^2 = 4, z = 2$ is $\underline{\hspace{2cm}}$.
- (a) $x^2 + y^2 = z^2$ (b) $x^2 + y^2 = 8$ (c) $x^2 + z^2 = 0$ (d) $x^2 + y^2 = 1$
- 45) General equation of sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$, radius = $\underline{\hspace{2cm}}$.
- (a) $\sqrt{u^2 + v^2 + w^2}$ (b) $\sqrt{2u^2 + 2v^2 + 2w^2}$ (c) $\sqrt{u^2 + v^2 + w^2 - d}$ (d) None
- 46) Find the volume of sphere of radius 'a'.
- (a) $4\pi a^3$ (b) $\frac{4}{3}\pi a^3$ (c) $\frac{4\pi}{2}$ (d) π
- 47) If $\vec{a}$ is constant vector then $\text{div}(\vec{a} \times \vec{r}) = \underline{\hspace{2cm}}$.
- (a) 0 (b) $\vec{a}$ (c) $\frac{\pi}{2}$ (d) None
- 48) $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = \underline{\hspace{2cm}}$.
- (a) $[\vec{a}\vec{b}\vec{d}]\vec{c} - [\vec{a}\vec{b}\vec{c}]\vec{d}$ (b) $[\vec{a}\vec{b}\vec{d}]\vec{c} + [\vec{a}\vec{b}\vec{c}]\vec{d}$ (c) $[\vec{a}\vec{b}\vec{c}]\vec{d}$ (d) None
- 49) If $y = \sin^3 x$ then $y_{100}(0) = \underline{\hspace{2cm}}$.
- (a) $\cos x$ (b) 100 (c) 0 (d) None
- 50) $\int \sin^m x \cos^n x dx = \underline{\hspace{2cm}} \sin^{m-1} x \cos^{n+1} x + \frac{m-1}{m+n} \int \sin^{m-2} x \cos^n x dx$
- (a) $\frac{1}{m+n}$ (b) $-\frac{1}{m+n}$ (c) $\frac{n}{m-n}$ (d) None