MCQ with Answers

SUB: Vector Algebra

1. If $\vec{AB} = 2\hat{i} + \hat{j} - \hat{k}$, $\vec{BC} = 3\hat{i} - \hat{j} + \hat{k}$, then $\vec{CA} =$ ____

(a) $-5\hat{i}$ (b) $5\hat{i}$ (c) $2\hat{j}$ (d) $-\hat{k}$

2. If $|\lambda \vec{a}| = 1$, then

(a) $\vec{a} = \frac{1}{\lambda}$ (b) $\vec{a} = \frac{1}{|\lambda|}$ (c) $\lambda = \frac{1}{|\vec{a}|}$

(d) $\lambda = \frac{\pm 1}{|\vec{a}|}$

3. If $\vec{a}, \vec{b}, \vec{c}$ are the position vectors of the points A, B & C respectively, then $\vec{AB} + \vec{BC} + \vec{CA} =$ ____

(a) $\vec{0}$ (b) 0 (c) $\vec{a} + \vec{b} + \vec{c}$ (d) none of these

4. $\hat{i} \cdot (\hat{k} \times \hat{j}) =$ ____

(a) 1 (b) -1 (c) 0 (d) 2

5. Angle between the vectors $\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + \hat{k}$ is

(a) $\cos^{-1}\frac{1}{\sqrt{15}}$ (b) $\cos^{-1}\frac{4}{\sqrt{15}}$ (c) $\cos^{-1}\frac{4}{15}$ (d) $\frac{\pi}{2}$

6. The area of a parallelogram whose two adjacent sides are $\hat{i}$ and $\hat{i} + \hat{j}$ is

(a) 2 (b) $\frac{1}{2}$ (c) 1 (d) $\sqrt{2}$

7. The unit vector perpendicular to the vectors $\hat{i}-\hat{j}$ and $\hat{i}+\hat{j}$ is

(a) $\hat{k}$ (b) $-\hat{k}$ (c) $\frac{1}{\sqrt{2}}(\hat{i}-\hat{j})$ (d) $\frac{1}{2}(\hat{i}+\hat{j})$

8. The scalar projection of the vector $\vec{b} = 3\hat{i}-\hat{j}-2\hat{k}$ on the vector $\vec{a} = \hat{i}+2\hat{j}-3\hat{k}$ is

(a) $\frac{\sqrt{14}}{2}$ (b) $\frac{14}{\sqrt{2}}$ (c) $\sqrt{14}$ (d) 7

9. The area of a parallelogram whose diagonals are $\vec{a} = \hat{i}+\hat{j}-2\hat{k}$ and $\vec{b} = \hat{i}-3\hat{j}+4\hat{k}$

(a) $\sqrt{14}$ (b) $2\sqrt{14}$ (c) $2\sqrt{6}$ (d) $\sqrt{38}$

10. The angle between the vectors $\vec{a}\times\vec{b}$ and $\vec{b}\times\vec{a}$ is

(a) 0° (b) 45° (c) 90° (d) 180°

11. If $\vec{a}$ and $\vec{b}$ are two vectors such that $\vec{a}\cdot\vec{b}=0$ and $\vec{a}\times\vec{b}=\vec{0}$, then the correct statement is

(a) $\vec{a}$ is parallel to $\vec{b}$ (b) $\vec{a}$ is perpendicular to $\vec{b}$

(c) either $\vec{a}=\vec{0}$ or $\vec{b}=\vec{0}$ (d) none of these.

12. $\vec{a}\cdot(\vec{a}\times\vec{b}) =$ ____

(a) $\vec{a}\cdot\vec{b}$ (b) a^2b (c) 0 (d) a^2+ab

ANSWERS

1.(a) 2.(d) 3.(c) 4.(b) 5.(d) 6.(c) 7.(a) 8.(a) 9.(a) 10.(d)
11.(c) 12.(c)

MCQ WITH ANSWERS

SUB: LIMITS & CONTINUITY

1. The value of $\lim_{x \to 0^+} \frac{x}{|x|}$ is

(a) -1 (b) 0 (c) 1 (d) none of these.

2. The value of $\lim_{n \to \infty} \frac{n!}{(n+1)! - n!}$ is

(a) -1 (b) 1 (c) 0 (d) none of these

3. The value of 'a' so that the function $f(x) = \frac{\sin^2 ax}{x^2}$, $x \neq 0$, $f(0) = 1$, is continuous at $x = 0$ is

(a) 1 (b) -1 (c) ± 1 (d) none of these

4. The value of $\lim_{x \to a} \frac{x^2 - a^2}{x - a}$ is

(a) $2a$ (b) a (c) $2^2 a$ (d) none of these

5. The value of $\lim_{x \to 0} \frac{3^x - 1}{4^x - 1}$ is

(a) $\frac{\ln 4}{\ln 3}$ (b) $\frac{\ln 3}{\ln 4}$ (c) $\ln \frac{3}{4}$ (d) none of these

6. The value of $\lim_{x \to 5/2} [x]$ is

(a) 2.5 (b) $\frac{5}{2}$ (c) 2 (d) none of these

ANSWERS

1.(c)	2.(c)	3.(c)	4.(a)	5.(b)	6.(c)

7. The value of constants a and b so that

$$\lim_{x\to\infty}\left[\frac{x^2+1}{x+1}-ax-b\right]=0 \text{ is}$$

(a) $a=0,\ b=0$ (b) $a=1,\ b=-1$

(c) $a=-1,\ b=1$ (d) $a=2,\ b=-1$

8. For what value of 'k' the function $f(x)=\begin{cases}\frac{x^2-1}{x-1}, & x\neq 1\\ k, & x=1\end{cases}$

at $x=1$ is continuous

(a) 1 (b) 2 (c) 3 (d) 4

9. The value of $\lim_{n\to\infty}\frac{1^2+2^2+3^2+\cdots+n^2}{n^3}$ is

(a) $\frac{2}{3}$ (b) $\frac{1}{n}$ (c) $\frac{1}{3}$ (d) none of these

10. The value of $\lim_{h\to 0}\frac{\sin(x+h)-\sin x}{h}$ is

(a) $\sin x$ (b) $\cos x$ (c) secx (d) $\operatorname{cosec} x$

11. The value of a for which $\lim_{x\to\alpha}\frac{\tan a(x-\alpha)}{x-\alpha}=\frac{1}{2}$

(a) $\frac{1}{2}$ (b) 2 (c) $\frac{1}{2\alpha}$ (d) none of these

12. The value of 'a' for which $\lim_{x\to 1}\frac{5^x-5}{(x-1)\log_e a}=5$

(a) $\ln a=5$ (b) $a=5$ (c) $a=e^5$ (d) $a=\ln 5$

ANSWERS

7. (b) 8. (b) 9. (c) 10. (b) 11. (a) 12. (b)

MCQ WITH ANSWERS

TOPIC: Differentiation

1. What is the left hand derivative ~~of~~ of modulus function at origin.

(a) 1 (b) -1 (c) 0 (d) none of these.

2. whose derivative is '0' with respect to x

(a) constant (b) e^x (c) a^x (d) none of these.

3. The function whose derivative is itself

(a) a^x (b) a^a (c) e^e (d) e^x

4. The differential co-efficient of x^6 w.r.t. x^3 is

(a) $2x^2$ (b) $2x$ (c) $2x^3$ (d) none of these

5. If $f(x) = 6x^4 + 9x^3 - 24kx^2 - 36x + 21$ and $f'(x) = 12$ when $x = 2$, then value of k is

(a) 1 (b) 2 (c) 3 (d) = 4

6. If $y = \sin^{-1}x + \cos^{-1}x$, then $\frac{dy}{dx} =$ ____

(a) 0 (b) $\frac{\pi}{2}$ (c) 1 (d) none of these

7. what is the derivative of $\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}$ w.r.t. x

(a) $\cot x$ (b) $-\operatorname{cosec}^2 x$ (c) $\operatorname{cosec}^2 x$ (d) $\tan x$

ANSWERS

1.(b) 2.(a) 3.(d) 4.(c) 5.(b) 6.(a) 7.(b)

8. The derivative of $\sin^{-1}(\sin x)$ w.r.t. x is

(a) -1, (b) 1, (c) 0 (d) none of these

9. The differential co-efficient of $\sin^{-1}\frac{2x}{1+x^2}$ w.r.t. $\cos^{-1}\frac{1-x^2}{1+x^2}$ is

(a) 1, (b) -1, (c) ± 1 (d) none of these.

10. If $y = A\cos nx + B\sin nx$, then $\frac{d^2y}{dx^2} + n^2y =$ ____

(a) 2 (b) -2 (c) 0 (d) ± 2

11. If $y = Ae^x + Be^{-x}$, then $\frac{d^2y}{dx^2} - y =$ ____

(a) 0, (b) 1, (c) -1 (d) ± 1

12. The slope of the tangent to the curve $y = \sin x$ at $x = \frac{\pi}{3}$ is

(a) 2, (b) $\frac{1}{2}$, (c) 60° (d) none of these

13. ~~The derivate of~~ If $f(x, y) = x^y + y^x$ then partial derivative of $f(x, y)$ w.r.t. x is

(a) $x^y \log y$ (b) $y^x \log y$ (c) $yx^{y-1} + y^x \log y$

(d) none of these

ANSWERS

8.(b)	9.(a)	10.(c)	11.(a)	12.(c)	13.(c)

MCQ WITH ANSWERS
TOPIC: Integral Calculus

1. What is the value of $\int 10^x dx$

(a) $10^x \ln 10$ (b) $\frac{10^x}{\ln 10}$ (c) $\frac{10^x}{\ln 10} + c$

(d) none of these

2. The Primitive of $\cos x$ is

(a) $\sin x + c$ (b) $\cos x + c$ (c) $\sin x$ (d) none of these

3. The value of $\int |x| dx$ when $x < 0$ is

(a) $\frac{x^2}{2} + c$ (b) $-\frac{x^2}{2} + c$ (c) $\frac{|x|^2}{2} + c$ (d) none of these

4. The value of $\int e^{\sin^{-1}x + \cos^{-1}x} dx$ is

(a) $e^{\frac{\pi}{2}x} + c$ (b) $e^x + c$ (c) $xe^{\pi/2} + c$ (d) none of these

5. The value of $\int e^x \{x+1\} dx$ is

(a) $xe^x + c$ (b) $e^x + c$ (c) $e^x(x+1) + c$ (d) none of these

6. The value of $\int e^{\ln x} dx$ is

(a) $\frac{x^2}{2} + c$ (b) $-\frac{x^2}{2} + c$ (c) $e^{\ln x} + c$ (d) none of these

7. The value of $\int_0^1 [x] dx$ is

(a) -1 (b) 0 (c) $\frac{1}{2}$ (d) 2

ANSWERS

1.(c)	2.(a)	3.(b)	4.(c)	5.(a)	6.(a)	7.(b)

8. The value of $\int_0^1 \frac{dx}{1+x^2}$ is —

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) 1 (d) 0

9. The value of $\int_{-\pi/2}^{\pi/2} \sin x\,dx$ is —

(a) π (b) 1 (c) 0 (d) none of the above

10. The value of $\int_{-1000}^{1000} x^3\,dx$ is —

(a) 0 (b) 1000 (c) -1000 (d) none of these

11. The area bounded by the curve $y=x$ $x=0$ and $x=1$ is —

(a) 2 sq. unit (b) $-\frac{1}{2}$ sq unit (c) $\frac{1}{2}$ sq. unit (d) none of these

12. The area bounded by x-axis, the curve $y=e^x$ and the ordinates $x=1$ and $x=2$ is —

(a) e^2-e (b) e^2 (c) e (d) e^2+e

13. Every function has anti-derivative is it

(a) False (b) True (c) both (d) none of these

ANSWERS

8.(b)	9.(c)	10.(a)	11.(c)	12.(a)	13.(a)

MCQ WITH ANSWERS
TOPIC:- Differential equation

1. If $y = e^{-x}(A\cos x + B\sin x)$, then y satisfies

(a). $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = 0$ (b) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

(c) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 0$ (d) $\frac{d^2y}{dx^2} + 2y = 0$

2. Solution of $\frac{dy}{dx} + 2xy = y$ is

(a) $y = ce^{x-x^2}$ (b) $y = ce^{x^2-x}$ (c) $y = ce^x$ (d) $y = ce^{-x^2}$

3. order and degree of differential equation $\frac{d^2y}{dx^2} = \left[y + \left(\frac{dy}{dx}\right)^2\right]^{\frac{1}{4}}$ are

(a) 4 and 2 (b) 1 and 2 (c) 1 and 4

(d) 2 and 4

4. Differential equation for $y = A\cos\alpha x + B\sin\alpha x$, where A and B are arbitrary constant is

(a) $\frac{d^2y}{dx^2} - \alpha^2 y = 0$ (b) $\frac{d^2y}{dx^2} + \alpha^2 y = 0$

(c) $\frac{d^2y}{dx^2} + \alpha y = 0$ (d) $\frac{d^2y}{dx^2} - \alpha y = 0$

5. Solution of differential equation $x\,dy - y\,dx = 0$ represents

(a) a rectangular hyperbola (b) straight line passing through origin.

(c) parabola whose vertex is at origin

(d) circle whose centre is at origin.

ANSWERS

1.(c)	2(a)	3(d)	4.(b)	5.(b)

6. Integrating factor of differential equation $\cos x \frac{dy}{dx} + y \sin x = 1$ is

(a) $\cos x$ (b) $\tan x$ (c) $\sec x$ (d) $\sin x$

7. Solution of differential equation $\frac{dy}{dx} + ay = e^{mx}$ is

(a) $(a+m)y = e^{mx} + c$ (b) $ye^{ax} = me^{mx} + c$

(c) $y = e^{mx} + ce^{-ax}$ (d) $(a+m)y = e^{mx} + ce^{-ax}$

8. The integrating factor of the differential equation $\frac{dy}{dx}(x \log x) + y = 2 \log x$ is

(a) e^x (b) $\log x$ (c) $\log(\log x)$ (d) x

9. The order of differential equation $\left(\frac{d^2y}{dx^2}\right)^3 = \left(1 + \frac{dy}{dx}\right)^{\frac{1}{2}}$ is

(a) 2 (b) 3 (c) $\frac{1}{2}$ (d) 6

10. The differential equation obtain from a relation involving two arbitrary constants will be of order

(a) 2 (b) 4 (c) 1 (d) none of these

11. Number of integrating factors of any differential is

(a) 1 (b) Infinite (c) finite but more than one

(d) None of these

ANSWERS

6(c). 7(d) 8.(b) 9.(a) 10(a) 11.(a)