MCQ with Answers

Topic : Vector Algebra

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

   (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 vector of the points A, B & C respectively, then $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} =$ ___

   (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) 0^0 (b) 45^0 (c) 90^0 (d) 180^0

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

Topic : 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) 2^2a (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

7. The value of constants a and b so that $\lim_{x\to\infty}\left[\frac{x^2+1}{x+1}-ax-b\right]=0$ 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 $\lim_{n\to\infty}\frac{1^2+2^2+3^2+.....+n^2}{n^3}$ 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) sec$x$ (d) 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 = ln5

ANSWERS

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

MCQ with Answers

Topic : Differentiation

1. What is the left hand derivative 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) = 6x4 + 4x3 – 24kx2 – 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.
   (a) cot$x$ (b) –cosec^2x (c) cosec^2x (d) tan$x$
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 $\frac{d^2y}{dx^2} + x^2y =$ ____
    (a) 2 (b) -2 (c) 0 (d) ±1
11. If $y = C_1e^x + C_2e^{-x}$, then $\frac{d^2y}{dx^2} - y =$ ____
    (a) 0 (b) 1 (c) -1 (d) ±1
12. The slope at the tangent to the curve $y = \sin x$ at $x = \frac{\pi}{3}$ is
    (a) 2 (b) $\frac{1}{2}$ (c) 60^0 (d) none of these
13. If f(x,y) = xy + yx then partial derivative of f(x, y) w.r.t. x is
    (a) x^ylng (b) y^xlng (c) $yx^{y-1} + y^x$lng

ANSWERS

1(b), 2(a), 3(d), 4(c), 5(b), 6(a), 7(b), 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$x$ (d0 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 $\int e^x \{x+1\} \cdot dx$ is

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

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

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 these

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 (b) $\frac{1}{2}$ sq.unit (d0 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

1(c), 2(a), 3(b), 4(c), 5(a), 6(a),7(b), 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) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx}$ (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 at 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 $xdy - ydx = 0$ 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

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

   (a) cosx (b) tanx (c) secx (d) sinx

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 at the differential equation $\frac{dy}{dx}(xlox) + y = 2\log x$ is

   (a) ex (b) log$x$ (c) log(log$x$) (d) x

9. The order at differential equation

   $\left(\frac{d^2y}{dx^2}\right)^3 = \left(1 + \frac{dy}{d}\right)^{\frac{1}{2}}$ is

   (a) 2 (b) 3 (c) ½ (d) 6

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

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

11. Number of integrating factor at any differential is

(a) 1 (b) Infinite (c) finite but more than one (d) none of these

ANSWERS

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