MATHEMATICS

1) $\int e^x \left(\frac{1-x}{1+x^2}\right)^2 \cdot dx =$ _____ + C

Ch - 7

(A) $-\frac{e^x}{1+x^2}$

(B) $\frac{e^x}{1+x^2}$

(C) $\frac{e^x}{(1+x^2)^2}$

(D) $\frac{e^x}{1+x}$

2) $\int \frac{e^{2025+x} - e^{2025-x}}{e^{2026+x} + e^{2026-x}} \cdot dx =$ _____ + C

Ch - 7

(A) $\log|e^x + e^{-x}|$

(B) $e \log|e^x + e^{-x}|$

(C) $\frac{1}{e} \log|e^x + e^{-x}|$

(D) $\frac{1}{e} \log|e^x + e^{-x}|$

3) Area lying in the first quadrant and bounded by ellipse $4x^2 + 9y^2 = 144$ is _____.

Ch - 8

(A) 12 π

(B) 24 π

(C) 8 π

(D) 6 π

(Space for Rough Work)

4) The area bounded by the curve $y = x|x|$, X-axis and the ordinates $x = -1$ and $x = 1$ is _____.

Ch-8

(A) $\frac{1}{3}$ (B) 0

(C) $\frac{2}{3}$ (D) $\frac{4}{3}$

5) The order and the degree of the differential equation

Ch-9

$$\sqrt{1+\left(\frac{d^2y}{dx^2}\right)^2} = \sqrt[3]{x+\left(\frac{dy}{dx}\right)^3}$$ is respectively _____ and _____

(A) 3, 2 (B) 2, 3

(C) 1, 6 (D) 2, 6

6) The number of arbitrary constants in the particular solution of a differential equation of third order are

Ch-9

(A) 2 (B) 3

(C) 1 (D) 0

(Space for Rough Work)

7) The general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is _____.

(A) $e^x + e^y = C$

(B) $e^x + e^{-y} = C$

(C) $e^{-x} + e^y = C$

(D) $e^{-x} + e^{-y} = C$

Ch- 9

8) If two vectors $\vec{a}$ and $\vec{b}$ are such that $|\vec{a}|=2, |\vec{b}|=3$ and $\vec{a}\cdot\vec{b} = 4$ then $|\vec{a} - \vec{b}| =$ _____

(A) 5

(B) $\sqrt{5}$

(C) 13

(D) $\sqrt{17}$

Ch- 10

9) The area of the triangle with vertices A(1, 1, 2), B(2, 3, 5) and C(1, 5, 5) is _____.

(A) $\sqrt{61}$

(B) $\sqrt{43}$

(C) $\frac{\sqrt{43}}{2}$

(D) $\frac{\sqrt{61}}{2}$

Ch- 10

10) The value of $\hat{i}\cdot(\hat{k}\times\hat{j}) + \hat{j}\cdot(\hat{k}\times\hat{i}) + \hat{k}\cdot(\hat{j}\times\hat{i})$ is _____.

(A) -1

(B) 0

(C) 1

(D) 3

Ch-10

(Space for Rough Work)

Ch - 11

11) The angle between the pair of lines given by $\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$ and $\vec{r} = 5\hat{i} - 2\hat{j} + \mu\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right)$ is _____.

(A) $\cos^{-1}\left(-\frac{19}{21}\right)$

(B) $\cos^{-1}\left(\frac{19}{21}\right)$

(C) $\sin^{-1}\left(\frac{19}{21}\right)$

(D) $\cos^{-1}\left(\frac{\sqrt{19}}{21}\right)$

12) If the lines $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{3-z}{-2}$ and $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ are perpendicular, then the value of p is _____.

Ch - 11

(A) $\frac{35}{11}$

(B) $\frac{11}{70}$

(C) $\frac{70}{11}$

(D) $-\frac{70}{11}$

13) The vector equation of the line passing through the point (1, 2, –4) and perpendicular to the two lines $\frac{x-8}{3} = \frac{y+19}{-16} = \frac{z-10}{7}$ and $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$ is _____.

Ch - 11

(A) $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} + 3\hat{j} - 6\hat{k})$

(B) $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} - 3\hat{j} + 6\hat{k})$

(C) $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} + 3\hat{j} + 6\hat{k})$

(D) $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} - 3\hat{j} - 6\hat{k})$

(Space for Rough Work)

14) The coordinates of the corner points of the bounded feasible region are (0, 10), (5, 5), (15, 15), (0, 20). The minimum of the objective function $z = 3x + 9y$ is _____.

Ch - 12

(A) 90 (B) 180

(C) 30 (D) 60

15) For linear programming problem, the objective function is $z = px + qy$, $p, q > 0$. If at the corner points (0, 10) and (5, 5) the value of z are 90 and 60 respectively, then relation between p and q is _____.

Ch - 12

(A) $q = 3p$ (B) $p = 3q$

(C) $q = 2p$ (D) $p = 2q$

16) Let A and B be two events such that $P(A) = \frac{5}{11}$, $P(B) = \frac{2}{11}$ and $P(A \cup B) = \frac{3}{11}$ then $P(A' \mid B') =$ _____.

Ch - 13

(A) $\frac{1}{2}$ (B) $\frac{8}{9}$

(C) $\frac{3}{5}$ (D) $\frac{2}{9}$

17) If A and B are any two events such that P(A) + P(B) – P(A and B) = P(A) then _____.

Ch - 13

(A) $P(A \mid B) = 1$ (B) $P(B \mid A) = 1$

(C) $P(B \mid A) = 0$ (D) $P(A \mid B) = 0$

(Space for Rough Work)

18) Three cards are drawn successively, without replacement from a pack of 52 well shuffled cards. The probability that first two cards are kings and the third card drawn is an ace is _____.

Ch - 13

(A) $\frac{3}{5525}$

(B) $\frac{1}{135200}$

(C) $\frac{2}{5525}$

(D) $\frac{3}{135200}$

19) Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b < 6\}$ then _____.

Ch - 1

(A) $(8, 3) \in R$

(B) $(6, 8) \in R$

(C) $(8, 7) \in R$

(D) $(2, 4) \in R$

20) Let $f : N \to N$ be defined by $f(n) = \begin{cases} \frac{n+1}{2}; & \text{if } n \text{ is odd} \\ \frac{n}{2}; & \text{if } n \text{ is even} \end{cases}$, for all $n \in N$ then f is _____.

Ch - 1

(A) One - one but not onto

(B) One - one and onto

(C) Many - one and onto

(D) Neither one - one nor onto

(Space for Rough Work)

Ch - 2

21) If $\cos^{-1}x = y$ then _____.

(A) $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$

(B) $0 \le y \le \pi$

(C) $0 < y < \pi$

(D) $-\frac{\pi}{2} < y < \frac{\pi}{2}$

Ch - 2

22) $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$ = _____

(A) $\frac{2\pi}{5}$

(B) $\frac{\pi}{5}$

(C) $\frac{3\pi}{5}$

(D) $\frac{4\pi}{5}$

Ch - 2

23) $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]$ = _____.

(A) $-\frac{\pi}{4}$

(B) $\frac{\pi}{4}$

(C) $\frac{3\pi}{4}$

(D) $-\frac{3\pi}{4}$

(Space for Rough Work)

24) If $A = \begin{bmatrix} a & b \\ c & -a \end{bmatrix}$ is such that $A^2 = I$, then

Ch – 3

(A) $1 - a^2 + bc = 0$

(B) $1 + a^2 + bc = 0$

(C) $1 - a^2 - bc = 0$

(D) $1 + a^2 - bc = 0$

25) If A and B are Skew Symmetric matrices of same order, then AB – BA is a _____.

Ch-3

(A) Symmetric matrix

(B) Skew Symmetric matrix

(C) Zero matrix

(D) Identity matrix

26) If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, then $A^2 + I =$ _____.

Ch – 3

(A) A – I

(B) A – 2I

(C) A + I

(D) I – A

27) If area of triangle is 35 sq. units with vertices (2, –6), (5, 4) and (k, 4). Then k is _____.

Ch – 4

(A) –2

(B) 12

(C) –12, –2

(D) 12, –2

(Space for Rough Work)

28) If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix}$, then $A^2 + B^2 =$ _____.

Ch-3

(A) $\begin{bmatrix} 5 & 0 & 0 \\ 0 & 13 & 0 \\ 0 & 0 & 25 \end{bmatrix}$

(B) $\begin{bmatrix} 5 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 7 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 7 \end{bmatrix}$

29) If inverse matrix of $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ is $A^{-1} = \begin{bmatrix} a & \frac{3}{11} \\ \frac{1}{11} & b \end{bmatrix}$, then $a + b =$ _____.

Ch-4

(A) $-\frac{2}{11}$

(B) $\frac{2}{11}$

(C) $\frac{6}{11}$

(D) $-\frac{6}{11}$

(Space for Rough Work)

30) If function f is continuous at point $x = \pi$ and $f(x) = \begin{cases} kx + 1 & ; x \leq \pi \\ \cos x & ; x > \pi \end{cases}$, then the value of k is _____.

Ch - 5

(A) $\frac{1}{\pi}$ (B) $\frac{2}{\pi}$

(C) $-\frac{2}{\pi}$ (D) 0

31) If $x = at^2$, $y = 2at$ then $\frac{d^2y}{dx^2}$ = _____

Ch - 5

(A) $-\frac{a}{xy}$ (B) $\frac{a}{xy}$

(C) $\frac{ax}{y}$ (D) $-\frac{ax}{y}$

32) If $y = \log_{2026}(\log_{2025}x)$ then $\frac{dy}{dx}$ = _____.

Ch - 5

(A) $\frac{1}{2025x \log x}$ (B) $\frac{1}{x \log x \log 2025}$

(C) $\frac{1}{x \log x \log 2026}$ (D) $\frac{1}{2026x \log x}$

(Space for Rough Work)

33) If $e^y(x+1)=1$ then $\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^2=$ _____.

Ch - 5

(A) $-\frac{1}{x+1}$

(B) e^y

(C) $\frac{1}{x+1}$

(D) 0

34) The total revenue in Rupees received from the sale of x units of a product is given by $R(x)=3x^2+36x+5$. The marginal revenue, when $x=15$ is _____.

Ch - 6

(A) 96

(B) 116

(C) 90

(D) 126

35) The maximum value of the function $f(x)=-|x+1|+3, x \in R$ is _____.

Ch - 6

(A) -2

(B) 2

(C) 3

(D) 4

36) The interval in which $y=x^2 \cdot e^{-x}$ is decreasing is _____.

Ch - 6

(A) $(-2, 0)$

(B) $(-\infty, \infty)$

(C) $(2, \infty)$

(D) $(0, 2)$

(Space for Rough Work)

37) $\int \sec^2 x \cdot \operatorname{cosec}^2 x \cdot dx =$ _____ + C

(A) $\tan x - \cot x$

(B) $\tan x + \cot x$

(C) $\tan x \cdot \cot x$

(D) $\tan x - \cot 2x$

ch - 7

38) $\int \frac{dx}{\sqrt{9x - 4x^2}} =$ _____ + C

(A) $\frac{1}{2}\sin^{-1}\left(\frac{8x-9}{9}\right)$

(B) $\frac{1}{9}\sin^{-1}\left(\frac{9x-8}{8}\right)$

(C) $\frac{1}{3}\sin^{-1}\left(\frac{9x-8}{8}\right)$

(D) $\frac{1}{2}\sin^{-1}\left(\frac{9x-8}{9}\right)$

ch - 7

39) $\int_0^{\pi} \left(\sin^2 \frac{x}{2} - \cos^2 \frac{x}{2}\right) dx =$ _____

(A) 1

(B) 0

(C) −1

(D) 2

ch - 7

40) $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\cot x}} =$ _____

(A) $\frac{\pi}{12}$

(B) $\frac{\pi}{6}$

(C) 0

(D) 1

ch - 7

(Space for Rough Work)