1. $\int_0^{10} | x \times (x-1)(x-2) | \, dx$

(a) 160.05 (b) 1600.5 (c) 16.005 (d) none of these

Sol: Ans [b]

2. The value of $\lim_{x \to 0} \frac{1 + \sin x - \cos x + \log(1-x)}{x^3}$ is

(a) –1 (b) 1/2 (c) –1/2 (d) 1

Sol: Ans [c]

3. The equation of tangent to the curve $\frac{x^2}{3} - \frac{y^2}{2} = 1$ which is parallel to $y = x$ is

(a) $y = x \pm 1$ (b) $y = x - 1/2$ (c) $y = x + 1/2$ (d) $y = 1 - x$

Sol: Ans [a]

4. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$ then A^{-1} is

(a) $\begin{bmatrix} 1/a & 0 & 0 \\ 0 & 1/b & 0 \\ 0 & 0 & 1/c \end{bmatrix}$ (b) $\begin{bmatrix} -1/a & 0 & 0 \\ 0 & -1/b & 0 \\ 0 & 0 & 1/c \end{bmatrix}$

(c) $\begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & 1/c \end{bmatrix}$ (d) none of these

Sol: Ans [a]

5. If $\left| \frac{z+i}{z-i} \right| = 3$ then radius of the circle is

(a) $\frac{2}{\sqrt{21}}$ (b) $\frac{1}{\sqrt{21}}$ (c) $\frac{\sqrt{21}}{2}$ (d) $\sqrt{21}$

Sol: Ans [c]

6. Let $f(x) = \cos x \cos 2x \cos 4x \cos 8x \cos 16x$, then the value of $f'(\pi/4)$ is

(a) $\sqrt{2}$ (b) $-\sqrt{2}$ (c) 2 (d) –2

Sol: Ans [a]

7. Let $(\sin a)x^2 + (\sin a)x + (1 - \cos a) = 0$. The value of a for which roots of this equation are real and distinct.

(a) $(0, 2\tan^{-1} 1/4)$ (b) $(0, 2\pi/3)$ (c) $(0, \pi)$ (d) $(0, 2\pi)$

Sol: Ans [a]

8. The angle of elevation of top of a tower from a point on the ground is 30° and it is 60° when it is viewed from a point located 40 m away from the initial point towards the tower. The height of the tower is

(a) $-20\sqrt{3}$ (b) $\dfrac{\sqrt{3}}{20}$ (c) $-\dfrac{\sqrt{3}}{20}$ (d) $20\sqrt{3}$

Sol: Ans [d]

9. The summation of two unit vectors is a third unit vector, then the modulus of the difference of the unit vectors is

(a) $\sqrt{3}$ (b) $1-\sqrt{3}$ (c) $1+\sqrt{3}$ (d) $-\sqrt{3}$

Sol: Ans [a]

10. A body falls freely from a point A and passes through the points B & C. Given that $AB = 2BC$. The ratio of the time taken by the body to cover the distances AB and BC is

(a) $\dfrac{2+\sqrt{6}}{1}$ (b) $\dfrac{2-\sqrt{6}}{1}$ (c) $\dfrac{1-\sqrt{6}}{2}$ (d) $\dfrac{1+\sqrt{6}}{2}$

Sol: Ans [a]

11. The value of $\sum_{r=0}^{n} r\, {}^nC_r\, x^r\, y^{n-r}$ where $x + y = 1$ is equal to

(a) $1 - nx$ (b) $1 + nx$ (c) $-nx$ (d) nx

Sol: Ans [d]

12. There is a set of m parallel lines intersecting a set of another n parallel lines in a plane. The number of parallelogrammes formed is

(a) ${}^{m-1}C_2 \cdot {}^{n-1}C_2$ (b) ${}^{m}C_2 \cdot {}^{n}C_2$ (c) ${}^{m-1}C_2 \cdot {}^{n}C_2$ (d) ${}^{m}C_2 \cdot {}^{n-1}C_2$

Sol: Ans [b]

13. If in a trial the probability of success is twice the probability of failure. In six trials the probability of at least four successes is

(a) $\dfrac{496}{729}$ (b) $\dfrac{400}{729}$ (c) $\dfrac{500}{729}$ (d) $\dfrac{600}{729}$

Sol: Ans [a]

14. A force vector $m\mathbf{i} + n\mathbf{k}$ is applied to a body at a point $P(1, 2, 3)$. If moment of the force is perpendicular to $3\mathbf{i} + 5\mathbf{j} + 6\mathbf{k}$ then relation between m & n is

(a) $n + 3m = 0$ (b) $n + 3m = 1$ (c) $n + 3m = 2$ (d) $n + 3m = 3$

Sol: Ans [a]

15. If $S_1 = \Sigma n, S_2 = \Sigma n^2, S_3 = \Sigma n^3$ then the value of $\lim_{n\to\infty} \dfrac{S_1\left(1 + \dfrac{S_3}{8}\right)}{{S_2}^2}$ is equal to

(a) 3/32 (b) 3/64 (c) 9/32 (d) 9/64

Sol: Ans [d]

16. The greatest term in the expansion of $(1 + 3x)^{54}$ where $x = 1/3$ is

(a) T_{28} (b) T_{25} (c) T_{26} (d) T_{24}

Sol: Ans [a]

17. The value of $\lim_{x\to 0} \dfrac{(4^x - 1)^3}{\sin \dfrac{x^2}{4} \log(1 + 3x)}$ is

(a) $\frac{4}{3}(\ln 4)^2$ (b) $\frac{4}{3}(\ln 4)^3$ (c) $\frac{3}{2}(\ln 4)^2$ (d) $\frac{3}{2}(\ln 4)^3$

Sol: Ans [b]

18. $\int_0^3 | x^3 + x^2 + 3x | \, dx$ is equal to

(a) $\frac{171}{2}$ (b) $\frac{171}{4}$ (c) $\frac{170}{4}$ (d) $\frac{170}{3}$

Sol: Ans [b]

19. The equation of family of a curve is $y^2 = 4a(x + a)$ then differential equation of the family is

(a) $y = y' + x$ (b) $y = y'' + x$ (c) $y = 2y'x + y^2y'^2$ (d) $y'' + y' + y^2 = 0$

Sol: Ans [c]

20. If A.M. of two numbers is twice of their G.M. then the ratio of greatest number to smallest number is

(a) $7 - 4\sqrt{3}$ (b) $7 + 4\sqrt{3}$ (c) 21 (d) 5

Sol: Ans [b]

21. Let $A = \begin{bmatrix} 1 & 2 \\ -5 & 1 \end{bmatrix}$ and $A^{-1} = xA + yI$, then the value of x and y are

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

Sol: Ans [a]

22. Let $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 - 6x - 4y + 12 = 0$ are two circles, then equation of the circle having diamter as their common chord is

(a) $5x^2 + 5y^2 + 26x - 22y + 54 = 0$ (b) $5x^2 + 5y^2 + 26x + 22y + 54 = 0$

(c) $5x^2 + 5y^2 - 26x - 22y + 54 = 0$ (d) $5x^2 + 5y^2 - 26x - 22y - 54 = 0$

Sol: Ans [c]

23. A plane $x + y + z = -a\sqrt{3}$ touches the sphere $2x^2 + 2y^2 + 2z^2 - 2x + 4y - 4z + 3 = 0$ then the value of a is

(a) $\pm\frac{1}{\sqrt{3}}$ (b) $\frac{1}{2\sqrt{3}}$ (c) $1 - \frac{1}{\sqrt{3}}$ (d) $1 + \frac{1}{\sqrt{3}}$

Sol: Ans [a]

24. For what value of a, $f(x) = -x^3 + 4ax^2 + 2x - 5$ is decreasing $\forall\ x$.

(a) (1, 2) (b) (3, 4) (c) R (d) no value of a

Sol: Ans [d]

25. The common tangent of the parabolas $y^2 = 4x$ and $x^2 = -8y$ is

(a) $y = x + 2$ (b) $y = x - 2$ (c) $y = 2x + 3$ (d) none of these

Sol: Ans [d]

26. The solution of the differential equation $\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{1}{(1+x^2)^2}$ is

(a) $y(1 - x^2) = \tan^{-1}x + c$ (b) $y(1 + x^2) = \tan^{-1}x + c$

(c) $y(1 + x^2)^2 = \tan^{-1}x + c$ (d) $y(1 - x^2)^2 = \tan^{-1}x + c$

Sol: Ans [b]

27. The value of $\sum_{r=3}^{\infty} \frac{{}^rC_3 \cdot 3^r}{r!}$ is equal to

(a) $\frac{6e^2}{2}$ (b) $\frac{6e^3}{2}$ (c) $\frac{9e^2}{2}$ (d) $\frac{9e^3}{2}$

Sol: Ans [d]

28. The value of $\int \frac{1}{[(x-1)^3(x+2)^5]^{1/4}}\,dx$ is

(a) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{1/4}+C$ (b) $\frac{4}{3}\left(\frac{x+1}{x+2}\right)^{1/4}+C$ (c) $\frac{4}{3}\left(\frac{x+1}{x-2}\right)^{1/4}+C$ (d) $\frac{4}{3}\left(\frac{x-1}{x-2}\right)^{1/4}+C$

Sol: Ans [a]

29. Two vertices of a Δ are (5, –3), (–2, 3) and orthocentre is (0, 0) then third vertex is

(a) $\left(\frac{38}{3}, -\frac{133}{9}\right)$ (b) $\left(-\frac{38}{3}, \frac{133}{9}\right)$ (c) $\left(-\frac{38}{3}, -\frac{133}{9}\right)$ (d) none of these

Sol: Ans [c]

30. Let $\cos(2\tan^{-1}x) = 1/2$ then the value of x is

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) $1-\sqrt{3}$ (d) $1-\frac{1}{\sqrt{3}}$

Sol: Ans [b]

31. If in a projectile motion range R is maximum then relation between H and R is

(a) H = R/2 (b) H = R/4 (c) H = 2R (d) H = R/8

Sol: Ans [b]

32. The foci of the conic section $25x^2 + 16y^2 - 150x = 175$ are

(a) (0, ± 3) (b) (0, ± 2) (c) (3, ± 3) (d) (0, ± 1)

Sol: Ans [c]

33. A line passes through the point of intersection of the lines $3x + y + 1 = 0$ and $2x - y + 3 = 0$ and makes equal intercepts with axes. Then equation of the line is

(a) $5x + 5y - 3 = 0$ (b) $x + 5y - 3 = 0$ (c) $5x - y - 3 = 0$ (d) $5x + 5y + 3 = 0$

Sol: Ans [a]

34. The value of $(A\cup B\cup C)\cap(A\cap B^C\cap C^C)^C\cap C^C$ is

(a) $B\cap C^C$ (b) $B^C\cap C^C$ (c) $B\cap C$ (d) $A\cap B\cap C$

Sol: Ans [a]