1. If $2^x + 2^y = 2^{x+y}$, then $\frac{dy}{dx}$ is

(a) 2^{y-x} (b) -2^{y-x} (c) 2^{x-y} (d) $\frac{2^y - 1}{2^x - 1}$

2. If $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then $f'\left(\sqrt{3}\right)$ is

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

3. The right hand and left hand limit of the function $f(x) = \begin{cases} \frac{e^{1/x} - 1}{e^{1/x} + 1}, & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}$ are respectively

(a) 1 and 1 (b) 1 and -1 (c) -1 and -1 (d) -1 and 1

4. If $y = 2x^{n+1} + \frac{3}{x^n}$, then $x^2 \frac{d^2y}{dx^2}$ is

(a) $6n(n+1)y$ (b) $n(n+1)y$ (c) $x\frac{dy}{dx} + y$ (d) y

5. If the curves $2x = y^2$ and $2xy = K$ intersect perpendicularly, then the value of K^2 is

(a) 4 (b) $2\sqrt{2}$ (c) 2 (d) 8

6. If $(xe)^y = e^y$, then $\frac{dy}{dx}$ is

(a) $\frac{\log x}{(1+\log x)^2}$ (b) $\frac{1}{(1+\log x)^2}$ (c) $\frac{\log x}{(1+\log x)}$ (d) $\frac{e^x}{x(y-1)}$

7. If the side of a cube is increased by 5%, then the surface area of a cube is increased by

(a) 10% (b) 60% (c) 6% (d) 20%

8. The value of $\int \frac{1+x^4}{1+x^6} dx$ is

(a) $\tan^{-1} x + \tan^{-1} x^3 + C$ (b) $\tan^{-1} x + \frac{1}{3}\tan^{-1} x^3 + C$

(c) $\tan^{-1} x - \frac{1}{3}\tan^{-1} x^3 + C$ (d) $\tan^{-1} x + \frac{1}{3}\tan^{-1} x^2 + C$

9. The maximum value of $\frac{\log_e x}{x}$, if $x > 0$ is

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

10. The value of $\int e^{\sin x}\sin 2x dx$ is

(a) $2e^{\sin x}(\sin x-1)+C$ (b) $2e^{\sin x}(\sin x+1)+C$

(c) $2e^{\sin x}(\cos x+1)+C$ (d) $2e^{\sin x}(\cos x-1)+C$

11. The value of $\int_{-1/2}^{1/2}\cos^{-1}x\,dx$ is

(a) π (b) $\frac{\pi}{2}$ (c) 1 (d) $\frac{\pi^2}{2}$

12. If $\int\frac{3x+1}{(x-1)(x-2)(x-3)}dx = A\log|x-1|+B\log|x-2|+C\log|x-3|+C$, then the values of A, B and C are respectively

(a) $5,-7,-5$ (b) $2,-7,-5$ (c) $5,-7,5$ (d) $2,-7,5$

13. The value of $\int_0^1\frac{\log(1+x)}{1+x^2}dx$ is

(a) $\frac{\pi}{2}\log 2$ (b) $\frac{\pi}{4}\log 2$ (c) $\frac{1}{2}$ (d) $\frac{\pi}{8}\log 2$

14. The area of the region bounded by the curve $y^2=8x$ and the line $y=2x$ is

(a) $\frac{16}{3}$sq.units (b) $\frac{4}{3}$sq.units (c) $\frac{3}{4}$sq.units (d) $\frac{8}{3}$sq.units

15. The value of $\int_{-\pi/2}^{\pi/2}\frac{\cos x}{1+e^x}dx$ is

(a) 2 (b) 0 (c) 1 (d) –2

16. The order of the differential equation obtained by eliminating arbitrary constants in the family of curves $c_1y=(c_2+c_3)e^{x+c_4}$ is

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

17. The general solution of the differential equation $x^2dy-2xydx=x^4\cos x\,dx$ is

(a) $y=x^2\sin x+cx^2$ (b) $y=x^2\sin x+c$ (c) $y=\sin x+cx^2$ (d) $y=\cos x+cx^2$

18. The area of the region bounded by the line $y=2x+1$, $x-$axis and the ordinates $x=-1$ and $x=1$ is

(a) $\frac{9}{4}$ (b) 2 (c) $\frac{5}{2}$ (d) 5

19. The two vectors $\hat{i}+\hat{j}+\hat{k}$ and $\hat{i}+3\hat{j}+5\hat{k}$ represent the two sides $\overrightarrow{AB}$ and $\overrightarrow{AC}$ respectively of a ΔABC. The length of the median through A is

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

20. If $\vec{a}$ and $\vec{b}$ are unit vectors and θ is the angle between $\vec{a}$ and $\vec{b}$, then $\sin\frac{\theta}{2}$ is

(a) $\left|\vec{a}+\vec{b}\right|$ (b) $\frac{\left|\vec{a}+\vec{b}\right|}{2}$ (c) $\frac{\left|\vec{a}-\vec{b}\right|}{2}$ (d) $\left|\vec{a}-\vec{b}\right|$

21. The curve passing through the point $(1, 2)$ given that the slope of the tangent at any point (x, y) is $\frac{3x}{y}$ represents

(a) Circle (b) Parabola (c) Ellipse (d) Hyperbola

22. If $\left|\vec{a}\times\vec{b}\right|^2+\left|\vec{a}\cdot\vec{b}\right|^2=144$ and $|\vec{a}|=6$ then $\left|\vec{b}\right|$ is equal to

(a) 6 (b) 3 (c) 2 (d) 4

23. The point $(1,-3,4)$ lies in the octant

(a) Second (b) Third (c) Fourth (d) Eighth

24. If the vectors $2\hat{i}-3\hat{j}+4\hat{k}, 2\hat{i}+\hat{j}-\hat{k}$ and $\lambda\hat{i}-\hat{j}+2\hat{k}$ are coplanar, then the value of λ is

(a) 6 (b) -5 (c) -6 (d) 5

25. The distance of the point $(1, 2, -4)$ from the line $\frac{x-3}{2}=\frac{y-3}{3}=\frac{z+5}{6}$ is

(a) $\frac{293}{7}$ (b) $\frac{\sqrt{293}}{7}$ (c) $\frac{293}{49}$ (d) $\frac{\sqrt{293}}{49}$

26. The sine of the angle between the straight line $\frac{x-2}{3}=\frac{3-y}{-4}=\frac{z-4}{5}$ and the plane $2x-2y+z=5$ is

(a) $\frac{3}{\sqrt{50}}$ (b) $\frac{3}{50}$ (c) $\frac{4}{5\sqrt{2}}$ (d) $\frac{\sqrt{2}}{10}$

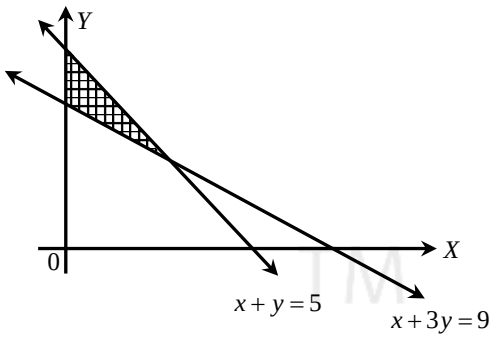
27. If a line makes an angle of $\frac{\pi}{3}$ with each of x and $y-$axis, then the acute angle made by $z-$axis is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

28. Corner points of the feasible region determined by the system of linear constraints are $(0, 3), (1, 1)$ and $(3, 0)$. Let $z=px+qy$, where $p, q>0$. Condition on p and q so that the minimum of z occurs at $(3, 0)$ and $(1, 1)$ is

(a) $p=2q$ (b) $p=\frac{q}{2}$ (c) $p=3q$ (d) $p=q$

29. The feasible region of an LPP is shown in the figure. If $Z = 11x + 7y$, then the maximum value of Z occurs at



(a) $(0, 5)$ (b) $(3, 3)$ (c) $(5, 0)$ (d) $(3, 2)$

30. A die is thrown 10 times, the probability that an odd number will come up atleast one time is

(a) $\frac{1}{1024}$ (b) $\frac{1023}{1024}$ (c) $\frac{11}{1024}$ (d) $\frac{1013}{1024}$

31. If A and B are two events such that $P(A) = \frac{1}{3}, P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{6}$, then $P\left(\frac{A'}{B}\right)$ is

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{12}$

32. Events E_1 and E_2 from a partition of the sample space S. A is any event such that $P(E_1) = P(E_2) = \frac{1}{2}, P\left(\frac{E_2}{A}\right) = \frac{1}{2}$ and $P\left(\frac{A}{E_2}\right) = \frac{2}{3}$, then $P\left(\frac{E_1}{A}\right)$ is

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) 1 (d) $\frac{1}{4}$

33. The probability of solving a problem by three persons A, B and C independently is $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{3}$ respectively. Then the probability of the problem is solved by any two of them is

(a) $\frac{1}{12}$ (b) $\frac{1}{4}$ (c) $\frac{1}{24}$ (d) $\frac{1}{8}$

34. If $n(A) = 2$ and total number of possible relations from set A to set B is 1024, then $n(B)$ is

(a) 512 (b) 20 (c) 10 (d) 5

35. The value of $\sin^2 51° + \sin^2 39°$ is

(a) 1 (b) 0 (c) $\sin 12°$ (d) $\cos 12°$

36. If $\tan A + \cot A = 2$, then the value of $\tan^4 A + \cot^4 A =$

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

37. If $A = \{1, 2, 3, 4, 5, 6\}$, then the number of subsets of A which contain atleast two elements is

(a) 64 (b) 63 (c) 57 (d) 58

38. If $z = x + iy$, then the equation $|z+1| = |z-1|$ represents

(a) a circle (b) a parabola (c) $x-$axis (d) $y-$axis

39. The value of ${}^{16}C_9 + {}^{16}C_{10} - {}^{16}C_6 - {}^{16}C_7$ is

(a) 0 (b) 1 (c) ${}^{17}C_{10}$ (d) ${}^{17}C_3$

40. The number of terms in the expansion of $(x+y+z)^{10}$ is

(a) 66 (b) 142 (c) 11 (d) 110

41. If $P(n): 2^n < n!$. Then the smallest positive integer for which $P(n)$ is true if

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

42. The two lines $lx + my = n$ and $l'x + m'y = n'$ are perpendicular if

(a) $ll' + mm' = 0$ (b) $lm' = ml'$ (c) $lm + l'm' = 0$ (d) $lm' + ml' = 0$

43. If the parabola $x^2 = 4ay$ passes through the point $(2, 1)$, then the length of the latus rectum is

(a) 1 (b) 4 (c) 2 (d) 8

44. If the sum of n terms of an A.P is given by $S_n = n^2 + n$, then the common difference of the A.P is

(a) 4 (b) 1 (c) 2 (d) 6

45. The negation of the statement "For all real numbers x and y, $x + y = y + x$" is

(a) For all real numbers x and y, $x + y \neq y + x$

(b) For some real numbers x and y, $x + y = y + x$

(c) For some real numbers x and y, $x + y \neq y + x$

(d) For some real numbers x and y, $x - y = y - x$

46. The standard deviation of the data 6, 7, 8, 9, 10 is

(a) $\sqrt{2}$ (b) $\sqrt{10}$ (c) 2 (d) 10

47. $\lim\limits_{x \to 0}\left(\dfrac{\tan x}{\sqrt{2x+4}-2}\right)$ is equal to

(a) 2 (b) 3 (c) 4 (d) 6

48. If a relation R on the set $\{1, 2, 3\}$ be defined by $R = \{(1, 1)\}$, then R is

(a) Reflexive and symmetric (b) Reflexive and transitive

(c) Symmetric and transitive (d) Only symmetric

49. Let $f: [2, \infty) \to R$ be the function defined $f(x) = x^2 - 4x + 5$, then the range of f is

(a) $(-\infty, \infty)$ (b) $[1, \infty)$ (c) $(1, \infty)$ (d) $[5, \infty)$

50. If A, B, C are three mutually exclusive and exhaustive events of an experiment such that $P(A) = 2P(B) = 3P(C)$, then $P(B)$ is equal to

(a) $\frac{1}{11}$ (b) $\frac{2}{11}$ (c) $\frac{3}{11}$ (d) $\frac{4}{11}$

51. The domain of the function defined by $f(x) = \cos^{-1}\sqrt{x-1}$ is

(a) $[1, 2]$ (b) $[0, 2]$ (c) $[-1, 1]$ (d) $[0, 1]$

52. The value of $\cos\left(\sin^{-1}\frac{\pi}{3} + \cos^{-1}\frac{\pi}{3}\right)$ is

(a) 0 (b) 1 (c) -0 (d) Does not exist

53. If $A = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$, then A^4 is equal to

(a) A (b) $2A$ (c) I (d) $4A$

54. If $A = \{a, b, c\}$, then the number of binary operations on A is

(a) 3 (b) 3^6 (c) 3^3 (d) 3^9

55. If $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix} A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then the matrix a is

(a) $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$ (c) $\begin{pmatrix} -2 & 1 \\ 3 & -2 \end{pmatrix}$ (d) $\begin{pmatrix} 2 & -1 \\ 3 & 2 \end{pmatrix}$

56. If $f(x) = \begin{vmatrix} x^3 - x & a + x & b + x \\ x - a & x^2 - x & c + x \\ x - b & x - c & 0 \end{vmatrix}$ then

(a) $f(1) = 0$ (b) $f(2) = 0$ (c) $f(0) = 0$ (d) $f(-1) = 0$

57. If A and B are square matrices of same order and B is a skew symmetric matrix, then $A'BA$ is

(a) Symmetric matrix (b) Null matrix

(c) Diagonal matrix (d) Skew symmetric matrix

58. If A is a square matrix of order 3 and $|A| = 5$, then $|A\ adj \cdot A|$ is

(a) 5 (b) 125 (c) 25 (d) 625

59. If $f(x)\begin{cases} \frac{1-\cos Kx}{x\sin x}, & \text{If } x \neq 0 \\ \frac{1}{2}, & \text{If } x = 0 \end{cases}$ is continuous at $x = 0$, then the value of K is

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

60. If $a_1a_2a_3.....a_9$ are in A.P. then the value of $\begin{vmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix}$ is

(a) $\frac{9}{2}(a_1 + a_9)$ (b) $a_1 + a_9$ (c) $\log_e(\log_e e)$ (d) 1