1. The relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)} on set A = {1, 2, 3} is
(a) reflexive but not symmetric
(b) reflexive but not transitive
(c) symmetric and transitive
(d) neither symmetric nor transitive

2. If R is a relation on a finite set having n elements, then the numbers of relations on A is
(a) 2^n (b) 2^{n^2} (c) n^2 (d) n^n

3. Let R be a reflexive relation on a finite set A having n - elements, and let there be m ordered pairs in R. Then
(a) $m \geq n$ (b) $m \leq n$ (c) $m = n$ (d) none of these

4. If $\left(\frac{3}{2}+\frac{i\sqrt{3}}{2}\right)^{50} = 3^{25}(x+iy)$, where x and y are reals then the ordered pairs (x, y) is given by
(a) (0, 3) (b) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ (c) (–3, 0) (d) (0, –3)

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5. If $|z| < \sqrt{2}-1$, then $|z^2 + 2z \cos \alpha|$ is
(a) less than 1 (b) $\sqrt{2}+1$ (c) $\sqrt{2}-1$ (d) none of these

6. If |z| = 3, then the points representing the complex number –1 + 4z lies on a
(a) line (b) circle (c) parabola (d) none of these

7. If $\log_x a$, $a^{x/2}$ and $\log_b x$ are in G.P., then x is equal to
(a) $\log_a(\log_b a)$
(b) $\log_a(\log_e a) + \log_a(\log_e b)$
(c) $-\log_a(\log_b b)$
(b) $\log_a(\log_e b) - \log_a(\log_e a)$

8. Let a, b, c be in AP and |a| < 1, |b| < 1, |c| < 1. If
$x = 1 + a + a^2 + \ldots$ to ∞
$y = 1 + b + b^2 + \ldots$ to ∞
$z = 1 + c + c^2 + \ldots$ to ∞
then x, y, z are in
(a) AP (b) GP (c) HP (d) none of these

9. Let $a_1, a_2, \ldots, a_{10}$ be in AP and $h_1, h_2, \ldots, h_{10}$ be in HP. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ is
(a) 2 (b) 3 (c) 5 (d) 6

10. If a, b, c are in GP, then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root if d/a, e/f, f/c are in
(a) AP (b) GP (c) HP (d) none of these

11. If the product of the roots of the equation $x^2 - 2\sqrt{2}kx + 2e^{2\log k} - 1 = 0$ is 31, then the roots of the equations are real for k equal to
(a) 1 (b) 2 (c) 3 (d) 4

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12. The roots of the equation
$(a + \sqrt{b})^{x^2-15} + (a - \sqrt{b})^{x^2-15} = 2a$, where $a^2 - b = 1$, are
(a) $\pm 2, \pm\sqrt{3}$ (b) $\pm 4, \pm\sqrt{14}$ (c) $\pm 3, \pm\sqrt{5}$ (d) $\pm 6, \pm\sqrt{20}$

13. The quadratic equation whose roots are A.M. and between the roots of the equation $ax^2 + bx + c = 0$ is
(a) $abx^2 + (b^2 + ac)x + bc = 0$
(b) $2abx^2 + (b^2 + 4ac)x + 2bc = 0$
(c) $2abx^2 + (b^2 + ac)x + bc = 0$
(d) none of these

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14. The value of $\sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + 2\sqrt{8}}}}}$ is
(a) 10 (b) 6 (c) 8 (d) 4

15. If $x^2 - 2x\cos\theta + 1 = 0$, then the value of $x^{2n} - 2x^n \cos n\theta + 1$ is equal to
(a) $\cos 2n\theta$
(b) $\sin 2n\theta$
(c) 0
(d) some real number other than 0

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16. If a, b, c $\in$ R and a + b + c = 0, then the quadratic equation $4ax^2 + 3bx + 2c = 0$ has
(a) one positive and one negative roots (b) imaginary roots
(c) real roots (d) none of these

17. The number of ways in which one can post 5 letters in 2 letter boxes is
(a) 35 (b) $^7P_5$ (c) 7^5 (d) None of these

18. The value of $1^2 . C_1 + 3^2 . C_3 + 5^2 . C_5 + ...$ is
(a) $n(n-1)2^{n-2} + n . 2^{n-1}$ (b) $n(n-1)2^{n-2}$
(c) $n(n-1) . 2^{n-3}$ (d) none of these

19. If in the expression of $(1 + x)^m (1 - x)^n$, the coefficients of x and x^2 are 3 and –6 respectively, then m is
(a) 6 (b) 9 (c) 12 (d) 24

20. If $g(f(x)) = |\sin x|$ and $f(g(x)) = \left(\sin\sqrt{x}\right)^2$, then
(a) $f(x) \sin^2 x$, $g(x) = \sqrt{x}$
(b) $f(x) = \sin x$, $g(x) = |x|$
(c) $f(x) = x^2$, $g(x) = \sin \sqrt{x}$
(d) f and g cannot be determined

21. The sum of n terms of the series $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+....$ is
(a) $2^n - n - 1$ (b) $1 - 2^{-n}$
(c) $n + 2^{-n} - 1$ (d) $2^n - 1$

22. If the equations $x^2 + px + q = 0$ and $x^2 + p'x + q' = 0$ have a common root, then it is equal to
(a) $\frac{p-p'}{q-q'}$ (b) $\frac{p+p'}{q+q'}$ (c) $-\left(\frac{q-q'}{p-p'}\right)$ (d) $\frac{q+q'}{p+p'}$

23. The number of ways in which n distinct objects can be put into two differet boxes so that no box ramains empty, is
(a) $2^n - 1$ (b) $n^2 - 1$ (c) $2^n - 2$ (d) $n^2 - 2$

24. The coefficient of x^5 in the expression of $(1 + x^2 - x^3)^8$ is
(a) 80 (b) 84 (c) 88 (d) 92

25. If $^nC_4$, $^nC_5$, $^nC_6$ are in A.P., then n is equal to
(a) 12 (b) 11 (c) 7 (d) 8

26. If A is a square matrix or order n × n, then adj (adj A) is equal to
(a) $|A|^n A$ (b) $|A|^{n-1}A$ (c) $|A|^{n-2}A$ (d) $|A|^{n-3}A$

27. If $X = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, the value of X^n is

(a) $\begin{bmatrix} 3n & -4n \\ n & -n \end{bmatrix}$ (b) $\begin{bmatrix} 2+n & 5-n \\ n & -n \end{bmatrix}$ (c) $\begin{bmatrix} 3^n & (-4)^n \\ 1^n & (-1)^n \end{bmatrix}$ (d) none of these

28. If ω be one of the roots of unity, then $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & 1 & \omega^2 \\ \omega^2 & \omega & 1 \end{vmatrix} =$

(a) ω (b) ω^2 (c) 0 (d) 1

29. If $0 < \theta < \frac{\pi}{2}$ and $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0$ then θ is equal to

(a) $\frac{\pi}{24}, \frac{5\pi}{24}$ (b) $\frac{5\pi}{24}, \frac{7\pi}{24}$ (c) $\frac{7\pi}{24}, \frac{11\pi}{24}$ (d) none of these

30. If A and B are two matrices such that AB = B and BA = A, then $A^2 + B^2 =$
(a) 2AB (b) 2BA (c) A + B (d) AB

31. The circle whose equations are $x^2 + y^2 + c^2 = 2ax$ and $x^2 + y^2 + c^2 - 2by = 0$ will touch on another externally if

(a) $\frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a^2}$ (b) $\frac{1}{c^2} + \frac{1}{a^2} = \frac{1}{b^2}$

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

32. The two circle $x^2 + y^2 - 2x - 3 = 0$ and $x^2 + y^2 - 4x - 6y - 8 = 0$ are such that
(a) they touch each other
(b) they intersect each other
(c) one lies inside the other
(d) each lies outside the other

33. The equation of the normal to the parabola $y^2 = 8x$ having slope 1 is
(a) $x + y + 6 = 0$ *(b) $x - y - 6 = 0$ (c) $x - y + 6 = 0$ (d) $x + y - 6 = 0$

34. The line $y = mx + 1$ is a tangent to the parabola $y^2 = 4x$ if m = 1
(a) 1 (b) 2 (c) 3 (d) 4

35. P is a variable point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with AA' as the major axis. Then the maximum value of the area of the triangle AP'A is
(a) ab (b) 2ab (c) ab/2 (d) none of these

36. An ellipse is described by using an endless string which is passed over two pins. If the axes are 6 cm and 4 cm, then necessary length of the string and the distance between the pins respectively in cms, are
(a) $6, 2\sqrt{5}$ (b) $6, \sqrt{5}$ (c) $4, 2\sqrt{5}$ (d) none of these

37. If e and e_1, are the eccentricities of the hyperbolas $xy = c^2$ and $x^2 - y^2 = c^2$, then $e^2 + e_1^2$ is equal to
(a) 1 (b) 4 (c) 6 (d) 8

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38. The combined equation of the asymptotes of the hyperbola $2x^2 + 5xy + 2y^2 + 4x + 5y = 0$
(a) $2x^2 + 5xy + 2y^2 + 4x + 5y + 2 = 0$
(b) $2x^2 + 5xy + 2y^2 + 4x + 5y - 2 = 0$
(c) $2x^2 + 5xy + 2y^2 = 0$
(d) none of these

39. If $f : R \to R$ is given by $f(x) = 3x - 5$, then $f^{-1}(x)$
(a) is given by $\frac{1}{3x-5}$
(b) is given by $\frac{x+5}{3}$
(c) does not exist because if is not one-one
(d) does not exist becasue f is not onto.

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40. Let $f(x) = \begin{cases} x^n \sin\frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

Then f(x) is continuous but not differentiable at x = 0, if
(a) $n \in (0, 1]$ (b) $n \in [1, \infty)$ (c) $n \in (-\infty, 0)$ (d) $n = 0$

41. Let g(x) be the inverse of the function f(x) and $f'(x) = \frac{1}{1+x^3}$. Then g'(x) is equal to
(a) $\frac{1}{1+(g(x))^3}$ (b) $\frac{1}{1+(f(x))^3}$ (c) $1 + (g(x))^3$ (d) $1 + (f(x))^3$

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42. If $f(x) = \cot^{-1}\left(\frac{x^x - x^{-x}}{2}\right)$, then f'(1) equals

(a) −1 (b) 1 (c) log2 (d) − log 2

43. If f(x) = $\log_x(\ln(x))$, then f'(x) = at x = e is

(a) e (b) −e (c) e^2 (d) e^{-1}

44. If $F(x) = \frac{1}{x^2}\int_4^x (4t^2 - 2F'(t))dt$, then F'(4) equals

(a) $\frac{32}{9}$ (b) $\frac{64}{3}$ (c) $\frac{64}{9}$ (d) none of these

45. If $x^p y^q = (x + y)^{p+q}$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{y}{x}$ (b) $\frac{py}{qx}$ (c) $\frac{x}{y}$ (d) $\frac{qy}{px}$

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46. If $y = \sec^{-1}\left(\frac{x+1}{x-1}\right) + \sin^{-1}\left(\frac{x-1}{x+1}\right)\frac{dy}{dx}$ is

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

47. Let f(x) = x − [x], fore every real number x, where [x] is integral part of x. Then $\int_{-1}^{1} f(x)dx$ is

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

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48. If $I_1 = \int_e^{e^2} \frac{dx}{\log x}$ and $I_2 = \int_1^2 \frac{e^x}{x} dx$, then

(a) $I_1 = I_2$ (b) $2I_1 = I_2$ (c) $I_1 = 2I_2$ (d) none of these

49. The value of the integral $\int_0^{\pi/2} \log|\tan x + \cot x|\, dx$ is

(a) π log 2 (b) −π log 2 (c) π log 3 (d) none of these

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50. If f(x) is a function satisfying $f\left(\frac{1}{x}\right)+x^2f(x)=0$ for all non-zero x, then $\int_{\sin\theta}^{\operatorname{cosec}\theta} f(x)dx$ equals

(a) $\sin\theta + \operatorname{cosec}\theta$ (b) $\sin^2\theta$ (c) $\operatorname{cosec}^2\theta$ (d) none of these

51. The order and degree the differential equation of all tangent lines to the parabola $x^2 = 4y$ is

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

52. A solution of the differential equation

$$\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0 \text{ is}$$

(a) $y = 2$ (b) $y = 2x$ (c) $y = 2x - 4$ (d) $y = 2x^2 - 4$

53. The differential equation representing the family of curves $y^2 = 2c\left(x+\sqrt{c}\right)$, where c is a positive parameter, is of

(a) order 1 (b) order 2 (c) degree 3 (d) both a and c

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54. If $\vec{\alpha} = x(\vec{a}\times\vec{b}) + y(\vec{b}\times\vec{c}) + z(\vec{c}\times\vec{a})$ and $[\vec{a}\,\vec{b}\,\vec{c}] = \frac{1}{8}$, they x + y + z =

(a) $8\vec{\alpha}.(\vec{a}+\vec{b}+\vec{c})$ (b) $\vec{\alpha}.(\vec{a}+\vec{b}+\vec{c})$ (c) $8(\vec{a}+\vec{b}+\vec{c})$ (d) none of these

55. If the vector $-\hat{i}+\hat{j}-\hat{k}$ bisects the angle between the vector $\vec{c}$ and the vector $3\hat{i}+4\hat{j}$, then the unit vector in the direction of $\vec{c}$ is

(a) $\frac{1}{15}\left(11\hat{i}+10\hat{j}+2\hat{k}\right)$ (b) $-\frac{1}{15}\left(11\hat{i}-10\hat{j}+2\hat{k}\right)$

(c) $-\frac{1}{15}\left(11\hat{i}+10\hat{j}-2\hat{k}\right)$ (d) $-\frac{1}{15}\left(11\hat{i}+10\hat{j}+2\hat{k}\right)$

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56. If $\vec{a},\vec{b}$ are unit vectors such that the vector $\vec{a}+3\vec{b}$ is perpendicular to $7\vec{a}-5\vec{b}$ and $\vec{a}-4\vec{b}$ is perpendicular to $7\vec{a}-2\vec{b}$, then the angle between $\vec{a}$ and $\vec{b}$ is

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

57. Twelve balls are distributed among three boxes. The probability that the first box contains 3 balls is

(a) $\frac{110}{9}\left(\frac{2}{3}\right)^{10}$ (b) $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$ (c) $\frac{{}^{12}C_3}{12^3}$ (d) $\frac{{}^{12}C_3}{3^{12}}$

58. If A and B are two events such that P(A) > 0 and P(B) $\neq$ 1, then $P(\bar{A}/\bar{B})$ is equal to

(a) 1 - P (A/B)
(b) 1- P($\bar{A}$/B)
(c) $\frac{1-P(A \cup B)}{(\bar{B})}$
(d) $\frac{P(\bar{A})}{P(\bar{B})}$

59. A coin is tossed (m + n) times, (m > n). Then the probability of at least m consecutive heads is

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

60. Let ABC be a triangle such that $\angle A = 45°$, $\angle B = 75°$, then $a + c\sqrt{2}$ is equal to
(a) 0 (b) b (c) 2b (d) –b

61. In any triangle ABC, if $\sin^2 A + \sin^2 B = \sin^2 C$, then the triangle is
(a) equilateral (b) right - angled (c) isosceles (d) none of these

62. The smallest angle of the triangle whose sides are $6+\sqrt{12}, \sqrt{48}, \sqrt{24}$ is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) none of these

63. $\int [f(x)g''(x) - f''(x)g(x)]dx$ is equal to

(a) $\frac{f(x)}{g'(x)}$
(b) f'(x) g(x) – f(x) g'(x)
(c) f(x) g'(x) – f'(x) g(x)
(d) f(x) g'(x) + f'(x) g(x)

64. $\int e^{3\log x}(x^4+1)^{-1}dx$ is equal to

(a) $\log(x^4+1) + C$ (b) $\frac{1}{4}\log(x^4+1)+C$ (c) $-\log(x^4+1) + C$ (d) none of these

65. $\int \frac{x+2}{(x^2+3x+3)\sqrt{x+1}}dx$ is equal to

(a) $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{x}{\sqrt{3(x+1)}}\right)$
(b) $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{x}{\sqrt{3(x+1)}}\right)$

(c) $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{x}{\sqrt{(x+1)}}\right)$ (d) none of these

66. If $\lim_{x\to a}\frac{a^x - x^n}{x^x - a^a} = -1$, then the value of a is

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

67. Evalute the following limits $\lim_{x\to 0}(\cos x)^{\cot x}$:

(a) 0 (b) 1
(c) –1 (d) none of these

68. If $(1 + x)^n = C_0 + C_1x + C_2x^2 + ... + C_nx^n$, then $C_1^2 + C_2^2 + ... + C_n^2$ is equal to

(a) 2^{2n-2} (b) 2^n (c) $\frac{(2n)!}{2(n!)^2}$ (d) $\frac{(2n)!}{(n!)^2}$

69. If the radius of the circumcircle of an isosceles triangle PQR is equal to PQ = (=PR), then the angle P is

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

70. Identify the curve $y^2 - x^2 + 2ax - 1 = 0$

(a) Pair of straight line (b) circle (c) ellipse (d) Parabola

71. The value of $\tan^{-1}(1) + \sin^{-1}\left(\frac{-1}{2}\right) + \cos^{-1}\left(\frac{-1}{2}\right) = ?$

(a) $\frac{3\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{5\pi}{4}$ (d) none of these

72. Period of function $f(x) = |\sin \pi x|$ is

(a) π (b) π^2 (c) 1 (d) 2

73. Domain of the function $2^x + 2^y = 2$ is

(a) $(-\infty, 0]$ (b) $(-\infty, 1)$ (c) $(0, \infty)$ (d) $(1, \infty)$

74. The digit of unit place of

$1! + 2! + 3! + 4! + \ldots\ldots$

(a) 3 (b) 4 (c) 7 (d) 8

75. The no. of values of x in the interval $[0, 5\pi]$ satisfying the equation

$3\sin^2 x - 7\sin x + 2 = 0$

(a) 5 (b) 6 (c) 0 (d) 8

76. The solution of the trignometric equation

$1 - \cos\theta = \sin\theta/2 \,.\, \sin\theta$

where θ = ?

(a) $\theta = k\pi, k \in I$
(b) $\theta = 2k\pi, k \in I$
(c) $\theta = 2k\pi + \pi/2$
(d) None of these

77. If $\frac{dy}{dx} = e^{-2y}$, given y = 0 when x = 5 then the value of X for y = 3 is

(a) e^5 (b) $e^6 + 1$ (c) $\frac{e^6 + 9}{2}$ (d) $\log_e 6$

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78. $\int x\log\left(1+\frac{1}{x}\right)dx = f(x)\log(1+x) + g(x)x^2 + Lx + c$

(a) $f(x) = \frac{x^2}{2}$ (b) $g(x) = \log x$ (c) $L = 1$ (d) none

79. Range of the function $|\sin 2x - \cos 2x|$

(a) $(-\infty, \infty)$ (b) $(-4, 4)$ (c) $[-2, 2]$ (d) $[-1, 1]$

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80. If $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = -(a+b+c)(a+bk+ck^2)(a+bx^2+ck)$ then the value of k, where ω is complex cube root of unity (a, b, c $\in$ R)

(a) ω (b) ω^2 (c) i (d) $-\omega$

81. $\int_{\pi/4}^{3\pi/4} \frac{1}{1+\cos x}dx = ?$

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

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Odd One Out

82.
(a) MATHS (b) TRIGNOMETRY (c) GEOMETRY (d) ALGEBRA

83.
(a) ARC (b) TANGENT (c) DIAGONAL (d) DIAMETER

84. INFLUENZA : VIRUS :: TYPHOID : ?
(a) BACILLUS (b) PARASITE (c) PROTOZOA (d) BACTERIA

85. What is the angle between hour hand and minute hand at 10 past 5 ?
(a) 90° (b) 95° (c) 98° (d) 100°

86. If number of boys in a class is 3 times the number of girls which cannot be the total number of student
(a) 44 (b) 48 (c) 42 (d) 40

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87. If 2 workers complete work in 10 days and 15 days respectively than in how many days will they complete the work together
(a) 6 (b) 5 (c) 7 (d) 9

88. The next term of the series
7, 13, 25, 49, ...?
(a) 96 (b) 97 (c) 98 (d) 99

89. How many such pairs of letter are there in the word "COMPUTERS" each of which have as many letters between them in the word as in the alphabet.
(a) 1 (b) 2 (c) 3 (d) more than 3

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90. In what ratio water and 66% solution of wine is mixed to get the 55% solution of wine
(a) 2 : 5 (b) 1 : 4 (c) 1 : 5 (d) 1 : 6

91. How much does a watch loose per day if its hands coincides every 64 minutes.
(a) 90 minute (b) 96 minutes (c) $32\frac{8}{11}$ (d) $36\frac{5}{11}$

92. If $x = 2 + \sqrt{3}$ and xy = 1 than find the value of $\frac{x}{\sqrt{2}+\sqrt{x}} + \frac{y}{\sqrt{2}-\sqrt{y}}$ is
(a) 1 (b) 0 (c) $\sqrt{2}$ (d) none of these

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93. Two trains start from station A at 9 : 00 am and 8.30 am with the speed of 90 km/h and 80 km/h respectively then how much distance from station A the both trains will meet together
(a) 270 km (b) 820 km (c) 360 km (d) 400 km

94. A bag contains coins of 25 paise, 50 paise and 1 rupees and the sum of money is rupees 35 then find the total number of coins of each type.
(a) 20 (b) 25 (c) 30 (d) 33

95. If 4th day after 6th January is SATURDAY then what will be the day on 1st December in the previous year.
(a) THURSDAY (b) FRIDAY (c) SATURDAY (d) SUNDAY

96. If Curd : milk then which of the following show similar relationship
(a) Clot : Blood (b) Flow : River (c) Decant : wine (d) Coffee : Brew

97 A man is facing south be turns 135° anticlock-wise than 180° clock-wise. How in which direction is he facing ?
(a) NORTH - EAST (b) NORTH - WEST (c) SOUTH - EAST (d) SOUTH - WEST

98. Solution of equation $\begin{vmatrix} \cos\theta & \sin\theta & \cos\theta \\ -\sin\theta & \cos\theta & \sin\theta \\ -\cos\theta & -\sin\theta & \cos\theta \end{vmatrix} = 0$ then θ equal to

(a) $2n\pi \pm \frac{\pi}{2}$ (b) $n\pi$ (c) $n\pi + \frac{\pi}{2}$ (d) none of these

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99. A wheel has circumference $4\frac{2}{7}$ m and it makes 7 revolution in 4 seconds than find the speed of car in km/h ?
(a) 27 (b) 67 (c) 37 (d) 47

100. The sum of the coefficient of all the integral powers of x in the expansion of $\left(1+2\sqrt{x}\right)^{40}$, is

(a) $3^{40}+1$ (b) $3^{40}-1$ (c) $\frac{1}{2}\left(3^{40}-1\right)$ (d) $\frac{1}{2}\left(3^{40}+1\right)$

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101. $\int \frac{1}{x(x^n+1)} dx$ is equal to

(a) $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right)+C$ (b) $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right)+C$

(c) $\log\left(\frac{x^n}{x^n+1}\right)+C$ (d) none of these

102. In order that a relation R defined on a non-empty set A is an equivalence relation, it is sufficient, if R
   (a) is reflexive
   (b) is symmetric
   (c) is transitive
   (d) possess all the above three properties

103. If $f(x) = \begin{cases} xe^{-\left(\frac{1}{|x|}+\frac{1}{x}\right)}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ then f(x) is
   (a) continuous for all x but not differentiable, at x = 0
   (b) neither differentiable nor continuous at x = 0
   (c) discontinuous everywhere
   (d) continuous as well as differentiable at x = 0

104. There are n different books and p copies of each. The number of ways in which a selection can be made from them is
   (a) n^p (b) p^n (c) $(p + 1)^n - 1$ (d) $(n + 1)^p - 1$

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105. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satisfying the equation $AA^T = 9I$, where I is 3 × 3 identity matrix, then the a + b is equal to :
   (a) –3 (b) 3 (c) 2 (d) 1

106. If z is a complex number having least absolute value is |z – 2 + 2i| = 1, then z =
   (a) $\left(2-\frac{1}{\sqrt{2}}\right)(1-i)$ (b) $\left(2-\frac{1}{\sqrt{2}}\right)(1+i)$ (c) $\left(2+\frac{1}{\sqrt{2}}\right)(1-i)$ (d) $\left(2+\frac{1}{\sqrt{2}}\right)(1+i)$

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107. A number is selected from a first 120 natural number. Then the probability that the number is divisible by 5 or 15 is
   (a) $\frac{1}{5}$ (b) $\frac{1}{6}$ (c) $\frac{23}{120}$ (d) $\frac{1}{8}$

108. Inverse of which function is exist :
   (a) $f(x) = \frac{1}{1-x}$ for all $x \in R$
   (b) $f(x) = x^2$ for all $x \in R$
   (c) $f(x) = x^2$ for all $x \geq 0$
   (d) $f(x) = x^2$ for all $x \leq 0$

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109. sec 4θ – sec 2θ = 2 then value of θ equal to

(a) $n\pi + \frac{\pi}{2}$ (b) $n\pi + \frac{\pi}{4}$ (c) $2n\pi \pm \frac{\pi}{2}$ (d) none of these

110. If $x^3 + 3x^2 - 9x + c$ is of from $(x - \alpha)^2 (x - \beta)$ then c =
(a) –5 (b) 27 (c) –27 (d) 0

111. Pointing to a man, a woman said that, "he is the, son of the brother of my mother". How is that man related to woman.
(a) Brother (b) cousin (c) uncle (d) None

112. Pointing to a man, Nilesh said that, "his wife is the daughter of my uncle". How is Nilesh related to that man.
(a) Father (b) Father-in-law (c) Son-in-law (d) none

113. A drawn contains 5 brown socks and 4 blue socks well mixed. A man reaches the drawer and pulls out 2 shocks at random. What is the probability that they match ?
(a) 4/9 (b) 5/8 (c) 5/9 (d) 7/12

114. The equation of the curve satisfying the differential equation $y_2(x^2 + 1) = 2xy_1$ passing through the point (0, 1) and having slope of tangent at x = 0 as 3 is
(a) $y = x^3 + 3x + 2$ (b) $y = x^3 - 3x - 2$ (c) $y = x^2 + 3x + 1$ (d) $y = x^2 + 3x - 1$

115. The area of the quadrilateral formed by the tangents at the end-points of latusracta to the ellipse $\frac{x^2}{9} + \frac{y^2}{5} = 1$, is

(a) $\frac{27}{4}$ sq. units (b) 9 sq. units

(c) $\frac{27}{2}$ sq. units (d) 27 sq. units

116. A problem in Mathematics is given to four students A, B, C and D their respective probability of solving the problem are $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ and $\frac{2}{7}$. Probability that the problem is solved is

(a) $\frac{158}{168}$ (b) $\frac{5}{168}$ (c) $\frac{163}{168}$ (d) none of these

117. If O is the origin and OP, OQ are tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, the circumcentre of triangle OPQ is

(a) $(-g, -f)$ (b) (g, f) (c) $(-f, -g)$ (d) none of these

118. A man is known to speak truth 3 out of 4 times. He throws of die and report that it is 6. Then find the probability that it is actually a 6.

(a) 1/4 (b) 5/8 (c) 3/8 (d) 1/6

119. Question based on pipe & cistern.........