NDA MATHS PAPER – 3

1. Let $f: R \to R$ defined by $f(x) = 2x^3 + 2x^2 + 300x + 5\sin x$, then f is
(a) One – One onto (b) One – One into
(c) Many – one onto (d) Many – one into

2. Let $f: [-3,3] \to R$ where $f(x) = x^3 + \sin x + \left[\frac{x^2+2}{a}\right]$ be an odd function, then the value of a is $[\cdot] \to gif$
(a) less then 11 (b) 11
(c) greater then 11 (d) None

3. The Euler's form of $\frac{2+6\sqrt{3}i}{5+i\sqrt{3}}$ is
(a) $2\,e^{i\frac{\pi}{6}}$ (b) $e^{i\frac{\pi}{3}}$ (c) $e^{-2\frac{\pi}{3}}$ (d) $2e^{i\frac{\pi}{3}}$

4. $\left(\frac{1+i\sin\frac{\pi}{8}+\cos\frac{\pi}{8}}{1-i\sin\frac{\pi}{8}+\cos\frac{\pi}{8}}\right)^8$ equals
(a) 2^8 (b) 0 (c) -1 (d) 1

5. The complex number $Z = x + iy$ which satisfies the equation $\left|\frac{z-7i}{z+7i}\right| = 1$ lies on
(a) x – axis (b) y – axis (c) On a circle (d) the line $y = 7$

6. The value of $\left(\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^6 + \left(\frac{1-i\sqrt{3}}{1+i\sqrt{3}}\right)^6$ is
(a) -2 (b) 0 (c) 2 (d) 1

7. If $amp\left(\frac{z-1}{z+2}\right) = \frac{\pi}{3}$, then Z represent a point on
(a) a circle (b) a straight line
(c) an ellipse (d) a hyperbola

8. The roots of the equation $z^5 + z^4 + z^3 + z^2 + z + 1 = 0$ are given by
(a) $z = -1$ (b) $\frac{-1}{2} + \frac{i\sqrt{3}}{2}$ (c) $\frac{1}{2} + \frac{i\sqrt{3}}{2}$ (d) $\frac{-1-i\sqrt{3}}{2}$

9. If $z^2 + z + 1 = 0, Z$ is a complex number the value of $\left(z+\frac{1}{z}\right)^2 + \left(z^2+\frac{1}{z^2}\right)^2 + \cdots + \left(z^6+\frac{1}{z^6}\right)^2$ is
(a) 18 (b) 54 (c) 6 (d) 12

10. The harmonic mean of the roots of the equation $(2+\sqrt{3})x^2 - (3+\sqrt{5})x + (6+2\sqrt{5}) = 0$ is
(a) 2 (b) 7 (c) 8 (d) 4

11. If the roots of the equation $x^2 - wx + V = 0$ differ by 2, then
(a) $V^2 = 4(1+W)$ (b) $V^2 = 4(1-W)$
(c) $W^2 = 4(1+V)$ (d) $W^2 = 4(1-V)$

12. The difference between the corresponding roots of the equation $x^2 + ax + 6 = 0$ and $x^2 + bx + a = 0$ is same, then
(a) $a+b+4=0$ (b) $a+b-4=0$
(c) $a-b+4=0$ (d) None

13. Sum of real roots of $x^2 + |x| - 6 = 0$ is
(a) 4 (b) -6 (c) -1 (d) 0

14. If the roots of the equation $x^2 - bx + C = 0$ be two consecutive integers, then $b^2 - 4C$ equals
(a) 3 (b) -2 (c) 1 (d) 2

15. The value of λ for which the homogeneous system of equations possesses a nontrivial solution

$$x + \lambda y + 2z = 0$$
$$3x + 2\lambda y + z = 0$$
$$2x + 3y - 4z = 0$$

(a) 0 (b) 15 (c) $\frac{15}{2}$ (d) $\frac{-15}{2}$

16. If x, y, z are in A.P., then the value of determinant

$$\begin{vmatrix} P+2 & P+3 & P+4 \\ P+3 & P+4 & P+5 \\ P+2x & P+2y & P+2z \end{vmatrix} =$$

(a) $4a$ (b) 0 (c) $-4a$ (d) 1

17. If $A = \begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ and $B = \begin{bmatrix} a^2 & ab & ac \\ ab & b^2 & bc \\ ac & bc & c^2 \end{bmatrix}$ then $|AB| =$
(a) A^3 (b) B^2 (c) 1 (d) None

18. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & +1 & 2 \\ 3 & -1 & 9 \end{bmatrix}$, then the value of $\det\left(Adj\left(Adj\left(A\right)\right)\right)$ equals
(a) 11 (b) 121 (c) 1331 (d) 14641

19. If $A^2 - A + I = 0$, then A^{-1} equals
(a) A^{-2} (b) $I - A$ (c) $A - I$ (d) $A + I$

20. If A and B are square matrix of same order 2×2 and $|A| = -2$, $|B| = 3$, then $|3AB|$ equals
(a) 54 (b) -27 (c) 18 (d) -54

21. If $\begin{vmatrix} a+b & b+c & c+a \\ c+a & a+b & b+c \\ b+c & c+a & a+b \end{vmatrix} = t$ (det of circulate matrix) then t equals
(a) 5 (b) 6 (c) -2 (d) 2

22. If ${}^nC_r + 3.\,{}^nC_{r+1} + 3.\,{}^nC_{r+2} + {}^nC_{r+3} = 15_{c_9}$, then which of the following is not true.
(a) $n = 12$ (b) $r = 6$ (c) $r = 3$ (d) Only a, b are correct

23. The rank of the word 'FLOWER' is
(a) 165 (b) 155 (c) 145 (d) None

24. The expression $45_{c_8} + \sum_{k=1}^{7} 52 - K_{C_7} + \sum_{i=1}^{5} 57 - i_{C_{50-i}}$ equals
(a) 55_{C_7} (b) 57_{C_8} (c) 57_{C_7} (d) None

25. The number of permutation that can be formed by arranging all the letters of the word 'NINETEEN', in which no two $E's$ occur together is
(a) $\frac{8!}{3!3!}$ (b) $\frac{5!}{3!}6_{C_3}$ (c) $\frac{5!}{3!} \times 8_{C_3}$ (d) $\frac{8!}{5!} \times {}^6C_3$

26. A five digit number divisible by 3 to be formed by using the number 0, 1, 2, 3, 4 and 5 without repetition. The total number of ways in which this can be done is
(a) 720 (b) 240 (c) $5_{C_1} \times 5_{P_2}$ (d) 216

27. Numerically the longest term in the expansion of $(3+2x)^{50}$, when $x=\frac{1}{5}$ is
(a) 5th (b) 8th (c) 7th (d) None

28. Middle term in the expansion of $(1-3x+3x^2-x^3)^{2n}$ is
(a) $\frac{6n!}{3n!3n!}x^n$ (b) $\frac{6n!}{3n!}x^{3n}$ (c) $\frac{6n!}{3n!3n!}(-x)^{3n}$ (d) None

29. The coefficient of x^8 in the expansion of $(1+2x+3x^2+\cdots)^{1/2}$ is
(a) 1 (b) -1 (c) 0 (d) None

30. Number of terms in the expansion of $(1-x)^{51}(1+x+x^2)^{50}$ is
(a) 50 (b) 51 (c) 100 (d) 102

31. If one $A.M.$ A and two $G\ M's$ P and Q be inserted between two numbers a and b, then which of the following hold good
(a) $a^3+b^3=2A\,pq$ (b) $p^3+q^3=2A\,ab$
(c) $a^3+b^3=2A\,ab$ (d) None

32. Sum to n terms of the series $\frac{3}{4}+\frac{15}{16}+\frac{63}{64}+\cdots$ is
(a) $n+\frac{4^{-n}}{3}-\frac{1}{3}$ (b) $n-\frac{4^{-n}}{3}+\frac{1}{3}$
(c) $n-\frac{4^{-n}}{3}-\frac{1}{3}$ (d) None

33. If the ratio of H.M to the G.M of two numbers is 6 : 10 then the ratio of the numbers is
(a) 5 : 3 (b) 3 : 1 (c) 1 : 9 (d) None

34. If $x > 1$ and x^{-a}, x^{-b}, x^{-c} in $G.P, a, b, c$ are in
(a) $A.P$ (b) $H.P$ (c) $G.P$ (d) None

35. If a, b, c are in $H.P$, then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in
(a) $A.P$ (b) $H.P$ (c) $G.P$ (d) None

36. The number of terms common between the two series
$2 + 5 + 8 + \cdots$ upto 50 terms and the series
$3 + 5 + 7 + \cdots$ upto 60 terms,
(a) 24 (b) 26 (c) 25 (d) None

37. Let $P = \frac{3}{17} + \frac{33}{17^2} + \frac{333}{17^3} + \cdots$ is, then P equals
(a) $3/17$ (b) $7/17$ (c) $3/7$ (d) $51/112$

38. If the sides of a right angle triangle form an $A.P.$, then the sine of the acute angles are
(a) $\frac{3}{5}, \frac{4}{5}$ (b) $\frac{\sqrt{3}}{2}, \frac{1}{2}$ (c) $\sqrt{3}, \frac{1}{3}$ (d) $\frac{\sqrt{\sqrt{5}-1}}{2}, \frac{\sqrt{\sqrt{5}+1}}{2}$

39. If $\lim_{x\to\infty}\left(1 + \frac{a}{x} + \frac{b}{x^2}\right)^{2x} = e^2$, then
(a) $a = 2, b = 1$ (b) $a = 1, b = 2$ (c) $a = 1, b \in R$ (d) $a = b = 1$

40. $\lim_{x\to\infty} \frac{(1^4+2^4+3^4+\cdots+x^4)}{x^2(1^2+2^2+\cdots+x^2)}$ equals
(a) $1/5$ (b) $2/5$ (c) $3/5$ (d) None

41. $\lim_{x\to\infty} \frac{[x]+[2x]+[3x]+\cdots+[nx]}{n^2}$ is, $[\cdot] \to gif$
(a) $x/3$ (b) $x/6$ (c) does not exist (d) $x/2$

42. Let $f(x) = |\sin x|$, then $f(x)$ is
(a) continuous everywhere
(b) non – differentiable at odd and even multiple of
(c) everywhere continuous but non – differentiable at $x = n\pi, x \in z^+$
(d) All of these

43. Which of the following is differentiable at x

(a) $\cos(|x|) - |x|$ (b) $\sin(|x|) - |x|$

(c) $\sin(|x|) + |x|$ (d) $\cos(|x|) + |x|$

44. Number of points at which the function $f(x) = \frac{1}{\log|x|}$ is discontinuous

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

45. If $f(x) = \cos x \cos 2x \cos 4x \cos 8x \cos 16x$, then $f'\left(\frac{\pi}{4}\right)$ equals

(a) $-\sqrt{2}$ (b) 0 (c) $1/\sqrt{2}$ (d) $\cos\left(\frac{\pi}{4}\right)$

46. If $f(x) = |x - 8|$ and $g(x) = f(f(x)) \forall x > 8$ then $g'(x)$ equals

(a) 1 (b) -1 (c) 0 (d) None

47. The function $y = a \log|x| + bx^2 + x$ has its extreme values at $x = -1$ and $x = 2$, then

(a) $a = 2, b = -1$ (b) $a = 2, b = -\frac{1}{2}$

(c) $a = -2, b = 1/2$ (d) None

48. The function $f(x) = x.e^{(x-x^2)}$ attains the maximum value at $x =$?

(a) -1 (b) $1/2$ (c) $-1/2$ (d) 1

49. $\int x\, e^{2x}(1 + x)dx$, equals

(a) $\frac{x\, e^x}{2} + C$ (b) $\frac{(e^x)^2}{2} + C$ (c) $\frac{(1+x)^2}{2} + C$ (d) $\frac{(xe^x)^2}{2} + C$

50. $\int (x^x)^2(1 + \log x)\, dx$

(a) $\frac{(x^x)^2}{2} + k$ (b) $x^x + k$ (c) $\frac{x^x}{2} + k$ (d) None

51. $\int \frac{1}{x^2(x^4+1)^{3/4}} dx$, equals

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

(c) $\left(1 + \frac{1}{x^4}\right)^{1/4} + C$ (d) $\left(1 + \frac{1}{x^4}\right)^{1/4} + C$

52. $\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1+a^x} dx =$
(a) $5/2$ (b) $3/2$ (c) 2 (d) 1

53. $\int_0^{1004} [\tan^{-1} x] dx$ equals, $[\cdot]$gif
(a) $\tan 1$ (b) $1004 - \tan 1$ (c) $\pi/4$ (d) None

54. $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+a^2)(x^2+b^2)} dx$ equals
(a) $\frac{\pi}{2(a+b)}$ (b) $\frac{\pi}{a+b}$ (c) $\frac{\pi^2}{a+b}$ (d) None

55. $\int_{10}^{11} \frac{[x^2]dx}{[x^2-42x+441]-[x^2]}$ equals
(a) $1/2$ (b) 0 (c) $21/2$ (d) None

56. The area bounded by the curves $y = \sin x$ and $y = \cos x, \forall\, x \in [0, \pi/2]$
(a) $2-\sqrt{2}$ (b) $2\sqrt{2}\left(\sqrt{3}-1\right)$ (c) $2\left(\sqrt{2}+1\right)$ (d) $\sqrt{3}-1$

57. The area bounded by the curves $y = |x-1|$ and $y = 3 - |x|$ is
(a) 1 (b) 2 (c) 3 (d) 4

58. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{2/3} + 4 - \frac{3dy}{dx} = 0$ is
(a) 2 (b) 1 (c) 3 (d) None

59. The solution of the $D \cdot E$ $x\,dy + y\,dx = xy\,dx$ when $y(1) = 1$, is
(a) $y = \frac{e^x}{x}$ (b) $\frac{e^x}{e^x}$ (c) $y = x\frac{e^x}{e}$ (d) N

60. If $y = e^{4x} + e^{-3x}$ satisfies the relation $\frac{dy^3}{dx^3} + A\frac{dy}{dx} + By = 0$, then $(A, B) =$
(a) $(12,13)$ (b) $(-12,13)$ (c) $(12,-13)$ (d) $(-13,-12)$

61. The curve of $y + e^{xy} + x = 0$ has a tangent parallel to $y-$ axis at a point
(a) $(-1,0)$ (b) $(1,0)$ (c) $(1,1)$ (d) $(0,0)$

62. A line passing through (2,2) and perpendicular to the line $3x + y = 3$. Its $X-$ intercept is given by

(a) $4/3$ (b) $-4/3$ (c) -4 (d) 4

63. If the vertices of a triangle is $\left(4,\frac{1}{4}\right),\left(3,\frac{1}{3}\right)$, $(1,1)$ then orthocenter of the triangle is
(a) $\left(\frac{1}{12},12\right)$ (b) $\left(12,\frac{1}{12}\right)$ (c) $\left(\frac{-1}{12},-12\right)$ (d) None

64. The circumcenter of the triangle, whose vertices are $(0,0),(4a,0),(0,6a)$ is
(a) $(29,0)$ (b) $(0,3a)$ (c) $(3a,0)$ (d) $(2a,3a)$

65. The angle between the pair of tangents drawn from the point $(2,4)$ the circle $x^2+y^2=4$ is
(a) $\tan^{-1}\left(\frac{3}{8}\right)$ (b) $\tan^{-1}\left(\frac{4}{3}\right)$ (c) $90°$ (d) None

66. If the two circles $x^2+y^2-16x-20y+64=r^2$ and $(x-4)^2+(y-7)^2=36$ intersect in two distinct points then
(a) $1<r<11$ (b) $r<1$ (c) $r=11$ (d) $r>1$

67. Length of intercept made by the circle $x^2+y^2-16x+4y-36=0$ on $x-$axis is
(a) 20 (b) 10 (c) 5 (d) None

68. The area of the triangle formed by positive part of x – axis and tangent and normal to circle $x^2+y^2=4$ at the point $(1,\sqrt{3})$ is
(a) $2\sqrt{3}$ (b) $\sqrt{3}$ (c) $4\sqrt{3}$ (d) None

69. Equation of tangent at the vertex of parabola $x^2+8x+4y=0$ is
(a) $x=4$ (b) $x=-4$ (c) $y=4$ (d) $y=-4$

70. The focus of an ellipse is at origin, the directrix is the line $x=4$ and its eccentricity is $1/2$, then length of its semi – major axis is
(a) 2/3 (b) 4/3 (c) 5/3 (d) 8/3

71. The ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ passing through the point $(1,-2)$ and eccentricity $\frac{1}{\sqrt{2}}$ then its latus rectum is equal to
(a) $\sqrt{2}$ (b) 3 (c) 2 (d) $\sqrt{3}$

72. The equation of the tangent to the hyperbola $4x^2-qy^2=1$, which is parallel to the line $4y=5x+7$ is
(a) $y=30x\pm 161$ (b) $24y=30x\pm\sqrt{161}$
(c) $24y=x\pm 161$ (d) None

73. The image of $P(1,2)$ on $y=-x$ is Q and image of Q on the line $y=x$ is Q', then mid – point of QQ' is
(a) Origin (b) (3,3) (c) $\left(\frac{3}{2},\frac{3}{2}\right)$ (d) $(-1,1)$

74. The angle between the planes $\vec{r}\cdot(\hat{\imath}+2\hat{\jmath}+\hat{k})=4$ and $\vec{r}\cdot(-\hat{\imath}+\hat{\jmath}+2\hat{k})=9$ is
(a) 30° (b) 60° (c) 45° (d) None

75. The co – ordinates of the point of intersection of $\frac{x-1}{1}=\frac{y+3}{3}=\frac{z-2}{2}$ with plane $3x-2y+z=7$ is
(a) (10,5,8) (b) (5,10,8) (c) (5,9,10) (d) None

76. The plane $ax+by+cz-3=0$ meet the co – ordinate axes in A,B,C. The centroid of the triangle is
(a) $(3a,3b,3c)$ (b) $\left(\frac{3}{a},\frac{3}{b},\frac{3}{c}\right)$ (c) $\left(\frac{a}{b},\frac{b}{3},\frac{c}{3}\right)$ (d) $\left(\frac{1}{a},\frac{1}{b},\frac{1}{c}\right)$

77. The ratio of yz – plane divide the line joining the points $A(3,1,-5),B(1,4,-6)$ is
(a) $3:1$ (b) $-1:3$ (c) $1:3$ (d) $-3:1$

78. The image of the point (1,3,4) in the plane $2x-y+z+3=0$ is
(a) $(-1,4,3)$ (b) $(-3,5,2)$ (c) $(1,-4,-3)$ (d) $(3,-5,-2)$

79. The angle between the lines $2x=3y=-z$ and $6x=-y=-4z$ is
(a) 90° (b) 0° (c) 30° (d) 45°

80. If $\vec{a} \perp \vec{b}$ then $\vec{a} \times \left\{\vec{a} \times \left\{\vec{a} \times \{\vec{a} \times \vec{a} \times (\vec{a} \times \vec{b})\}\right\}\right\}$

(a) $-|\vec{a}|^2\vec{b}$ (b) $|\vec{a}|^6\vec{b}$ (c) $-|\vec{a}|^6\,\vec{b}$ (d) $|\vec{a}|^2\vec{b}$

81. If the sum of two unit vectors is also an unit vector, then the angle between the two vectors is

(a) $\pi/3$ (b) $\pi/2$ (c) $\pi/4$ (d) $2\pi/3$

82. Given $(\vec{\alpha} + \vec{\beta})$ is perpendicular to $\vec{\beta}$ and $\vec{\alpha}$ is perpendicular to $3\vec{\beta} + \vec{\alpha}$. This implies

(a) $|\vec{\alpha}| = \sqrt{2}\,|\vec{\beta}|$ (b) $\vec{\alpha}\,| = \sqrt{3}\,|\vec{\beta}|$ (c) $|\vec{\alpha}| = |\vec{\beta}|$ (d) $|\vec{\alpha}| = \frac{1}{|\vec{\beta}|}$

83. If $ABCDEF$ is a regular Hexagon with its centre at O. Then $\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF} =$

(a) $5\,\overrightarrow{AO}$ (b) $6\,\overrightarrow{AO}$ (c) $4\,\overrightarrow{AO}$ (d) None

84. The adjacent sides of the parallelogram ae along $\vec{a} = \hat{\imath} + 2\hat{\jmath}$ and $\vec{b} = 2\hat{\imath} + \hat{\jmath}$. The angle between the diagonals are

(a) $30°$ and $150°$ (b) $45°$ and $135°$
(c) are at right angles (d) None

85. The standard deviation for variables x and y be 3 and 4 respectively and their co – variance is 8, then coefficient of correlation between them is

(a) $2/3$ (b) $3/2\sqrt{2}$ (c) $\frac{2\sqrt{2}}{3}$ (d) $2/9$

86. The median of 11, 18, 22, 19, 10, 15, 21, 7, 5 are

(a) $9/2$ (b) 15 (c) 11 (d) 18

87. The $S.D$ of the first 50, natural number sis

(a) $\sqrt{\frac{833}{4}}$ (b) $\sqrt{\frac{833}{12}}$ (c) $\frac{833}{4}$ (d) None

88. The variate of a distribution takes the value $1, 2, 3, \ldots, n$ with frequencies $n, n-1, \ldots, 3, 2, 1$, then

(a) $\frac{n(n+2)}{3}$ (b) $\frac{n(n+1)(n+2)}{6}$ (c) $\frac{n+2}{3}$ (d) $\frac{(n+1)(n+2)}{6}$

89. If mean of n – items is $\overline{x}$, if each item is successively increased by $3, 3^2, 3^3, \dots, 3^n$, the new mean equals
(a) $\overline{x} + \frac{3^{n+1}}{n}$ (b) $\overline{x} + 3\left(\frac{3^n-1}{2n}\right)$ (c) $\overline{x} + \frac{3^n}{n}$ (d) $\overline{x} = \left(\frac{3^n-1}{2n}\right)$

90. The marks obtained by 60 students are shown as

Marks:	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
No. of students:	8	7	f_1	15	5	f_2	7

The mean marks are 64, then $f_1 : f_2$ is
(a) 7 : 4 (b) 4 : 5 (c) 5 : 4 (d) None

91. If mean of the set of numbers $x_1, x_2, x_3, \dots, x_n$ is $\overline{x}$, then mean of numbers $x_i + 2i \forall\ i = 1, 2, 3, \dots, n\ s.t\ 1 \le i \le n$, is
(a) $\overline{x} + n$ (b) $\overline{x} + n + 1$ (c) $\overline{x} + 2$ (d) $\overline{x} + 2n$

92. If the two lines of regression are $x + 4y = 3$ and $3x + y = 15$, then the value of x for given value of $y = 3$ is
(a) $-a$ (b) 4 (c) 5 (d) None

93. If two lines of regression are $x + 3y = 1$ and $4x + 3y - 8$, then coefficient of correlation between $x \& y$ is
(a) $1/2$ (b) $1/4$ (c) $-1/4$ (d) $-1/2$

94. The angle θ between the two lines of regression $x + y = 3$ and $3x + y = 15$ is given by
(a) $\tan^{-1}\left(\frac{7}{11}\right)$ (b) $\tan^{-1}\left(\frac{4}{11}\right)$ (c) $\tan^{-1}\left(\frac{11}{7}\right)$ (d) None

95. If two events A and B are such that $P(A') = 2, P(B) = 3$ and $P(AB') = 4$, then $P\left(\frac{B}{A \cup B'}\right)$ equals
(a) $\frac{1}{11}$ (b) $\frac{4}{11}$ (c) $1/4$ (d) None

96. The probability that a man can lift a target is $3/4$. He tries 5 times, the probability that he will hit the target at most one time is
(a) $\left(\frac{1}{4}\right)^3$ (b) $\left(\frac{3}{4}\right)^5$ (c) $\left(\frac{1}{2}\right)^2\left(\frac{3}{4}\right)^3$ (d) None

97. Three of six verities of a regular hexagon are chosen at random. The probability that the triangle formed by there vertices is equilateral
(a) $1/12$ (b) $1/5$ (c) $1/10$ (d) None

98. A coin is tossed $(2n+1)$ times, the probability that he appear odd number of times is
(a) $\frac{n}{2n+1}$ (b) $\frac{n+1}{2n+1}$ (c) $1/2$ (d) None

99. 7 boys and 3 girls are seated in a row randomly the probability that ne boy sit between two girls is
(a) $\frac{71\times31}{10!}$ (b) $1/15$ (c) $\frac{8!}{10!.3!}$ (d) $\frac{81}{10!7!}$

100. The numbers are selected randomly from digit 1 to 9 if their sum is even, the probability that both the number are odd is
(a) 4/9 (b) 5/9 (c) 3/4 (d) None

101. A problem in mathematics is given to three students A, B and C and their chance of solving the problem are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ then probability that problem will be solved is
(a) $3/4$ (b) $1/2$ (c) $2/3$ (d) $1/3$

102. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{\pi}{2}$ then value of $x^2+y^2+z^2+2xyz$ equals
(a) 2 (b) 0 (c) -1 (d) 1

103. If the angles of a triangle are in the ration of 2 : 3 : 7, the ration of sides opposite to the angles are in the ratio of
(a) $\sqrt{2}:2:\sqrt{3}+1$ (b) $2:\sqrt{2}:\sqrt{3}+1$
(c) $\frac{1}{2}:\sqrt{2}:\frac{2}{\sqrt{3}-1}$ (d) $\frac{1}{\sqrt{2}}:\frac{1}{2}:\frac{\sqrt{3}+1}{2}$

104. The solution of the equation $\forall\, \theta \in (0,\pi)\ \tan\theta + \tan 2\theta + \tan 3\theta = \tan\theta + \tan 2\theta + \tan 3\theta$ is give
(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\pi/6$ (d) $5\pi/6$

105. Two verticals poles of 20m and 80m high stand apart on horizontal plane. The height of the point of intersection of the lines joining the top of each pole to the fast of the other is
(a) 12m (b) 15m (c) 16m (d) 18m

106. If each side of length $'a'$ of an equilateral triangle subtend an angle of 60° st the top of a tower $'h'$ metres high situated at the centre of the triangle then
(a) $3a^2 = 2h^2$ (b) $2a^2 = 3h^2$ (c) $a^2 = 3h^2$ (d) $3a^2 = h^2$

107. The expression $\frac{(a+b+c)(b+c-a)(c+a-b)(a+b-c)}{4b^2\,c^2}$ equals
(a) $\cos^2 A$ (b) $\sin^2 A$ (c) $\sin 2A$ (d) $\cos 2A$

108. Domain of $\sin^{-1}\log_3\left(\frac{x}{3}\right)$ is
(a) $[1,9]$ (b) $[-1,9]$ (c) $[-9,1]$ (d) $[-9,-1]$

109. In a $\Delta ABC, a\cos^2\frac{c}{2} + C\cos^2\frac{A}{2} = \frac{3b}{2}$, then a, b, c satisfies
(a) $G.P$ (b) $H.P$ (c) $a+b+c$ (d) $A.P$

110. The value of $\cot\left(\operatorname{cosec}^{-1}\frac{5}{3} + \tan^{-1}\frac{2}{3}\right)$ is equal to
(a) $5/17$ (b) $3/17$ (c) $4/17$ (d) $6/17$

111. Let the two numbers have AM is 9 and $G.M.$ is 4. Men these numbers are roots of the equation
(a) $x^2 + 18x - 16 = 0$ (b) $x^2 - 18x + 16 = 0$
(c) $x^2 + 18x + 16 = 0$ (d) $x^2 - 18x - 16 = 0$

112. If $\left(\frac{3}{2} + i\frac{\sqrt{3}}{2}\right)^{100} = 3^{50}(x - iy), i = \sqrt{-1}$, then value of y/x equals
(a) $-\sqrt{3}$ (b) $1/2$ (c) $\sqrt{3}$ (d) $\sqrt{3}/2$

113. The value of $\left(\sin(\log i^i)\right)^3 + \left(\cos(\log i^i)\right)^3$ equals
(a) 3 (b) 2 (c) 1 (d) None

114. The sum of the series $i + 2i^2 + 3i^3 + \cdots$ upto 200 terms equal
(a) $(100)(i-1)$ (b) $100(1-i)$ (c) $200i$ (d) None

115. Number of numbers can be formed by using all the digit 1, 2, 3, 4, 3, 2,1 so the odd digit always occupy odd places is
(a) 18 (b) 26 (c) 6 (d) 3

116. The digit in the units position of the sum $1! + 2! + 3! + \cdots + 98!$ is
(a) 0 (b) 3 (c) 4 (d) 5

117. The maximum value of $(7-x)(2+x)^5$ is
(a) $(4 \times 5)^{4+5}$ (b) $4^5 5^4$ (c) $4^4 5^5$ (d) None

118. The greatest value of $f(x) = \int_{-1/2}^{x} |t| dt$ on the internal $[-1/2, 1/2]$ is
(a) $3/8$ (b) $-1/4$ (c) $1/4$ (d) $-3/8$

119. $\int e^x (\log x + 1/x^2) dx$ equals
(a) $\frac{e^x}{x} + \frac{\log x}{x} + C$ (b) $e^x(\log x - 1/x) + C$
(c) $e^x\left(\log x + \frac{1}{x}\right)$ (d) None

120. $\int \left(t + \frac{1}{t}\right)^{n+5} \left(\frac{t^2-1}{t^2}\right) dt$ equals
(a) $\left(\frac{t^2+1}{t^2}\right)^{n+6} (n+6) + C$ (b) $\frac{\left(t+\frac{1}{t}\right)^{n+6}}{n+6} + C$
(c) $\frac{t^{n+6}}{(1+t^2)^{n+6}} \times (n+6) + C$ (d) None