TARGET DEFENCE ACADEMY

A Commitment to excellence

12/3, Krishna Nagar, Metro Station, Lucknow, UP

NDA Maths Mock Test- 1

Time: 02:30 Hr **Marks:** 300

Instruction

All questions are compulsory.

1) *Each question carries equal marks. (2.5 Marks)*
2) *There is total 120 questions in this question paper.*
3) *Negative Marking for each wrong question will be 0.83.*

1. If A is matrix of size $n \times n$ such that A^2 + A + $2l$ = 0, then
(a) A is non-singular (b) A is symmetric
(c) $|A| \neq 0$ (d) $A^{-1} = -\frac{1}{2}(A + l)$

2. The value of x satisfying $\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix}$ = is
(a) 0 (b) $a + b + c$
(c) $-(a + b + c)$ (d) None of these

3. Let $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$. Then
(a) $A^2 - 4A - 5l_3 = 0$ (b) $A^{-1} = \frac{1}{5}(A - 4l_3)$
(c) A^3 is not invertible (d) A^2 is not invertible

4. If A and B are invertible square matrices of the same order, then
Which of the following statements is correct?
I. adj (AB) = (adj B) (adj A)
II. adj (adj B) = $|B|^{n-2}$ B, where n is the order of matrix B
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

5. The number of real roots of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ are
(a) 1 (b) 2
(c) Infinite (d) None

6. The number of real solutions of the equation $|x|^2 - 3|x| + 2 = 0$ are
(a) 1 (b) 2
(c) 3 (d) 4

7. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$, then the trace of the matrix A is equal to
(a) 1 (b) – 1
(c) 0 (d) a + b

8. Let A and B are the non-singular square matrices, then which of the following is always correct?
(a) $(AB)^{\theta} = A^{\theta} B^{\theta}$ (b) $(AB)' = B'A'$
(c) A(adj B) = B (adj A) (d) $|adj\ A| = |A|^{n-2}$

9. If α, β are the roots of the equation $6x^2 - 5x + 1 = 0$. Then the value of $tan^{-1}a + tan^{-1}\beta$ is
(a) $\pi/4$ (b) 1
(c) 0 (d) $\pi/2$

10. If $3p^2 = 5p + 2$ and $3q^2 = 5q + 2$ where $p \neq q$, then the equation whose roots are $3p - 2q$ and $3q - 2p$ is
(a) $3x^2 - 5x - 100 = 0$ (b) $5x^2 + 3x + 100 = 0$
(c) $3x^2 - 5x + 100 = 0$ (d) $5x^2 - 3x - 100 = 0$

11. The sum of two non-integral roots of $\begin{vmatrix} x & 2 & 5 \\ 3 & x & 3 \\ 5 & 4 & x \end{vmatrix}$: = 0 is
(a) 5 (b) – 5
(c) – 18 (d) None of these

12. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$ then A^2 is equal to
(a) Unit matrix (b) Null matrix
(c) A (d) $-A$

13. The values of x for which the matrix $\begin{bmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{bmatrix}$ is non-singular are
(a) R – {0} (b) R – {– (a + b + c)}
(c) R – {0, – (a + b + c)} (d) None of these

14. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, then A^{-1} is equal to
(a) A (b) 2A
(c) $\frac{1}{2}$ A (d) $\frac{1}{19}$ A

15. If A and B are sets, then A ∩ (B – A) is
(a) ϕ (b) A
(c) B (d) None of these

16. 20 teachers of a school either terach mathematics or physics. 12 of them teach mathematics while 5 teach both the subjects. Then the number of teachers teaching physics only is
(a) 12 (b) 8
(c) 16 (d) None of these

17. Let R be the set of real numbers. If f: R ⟶ R is a function defined by $f(x) = x^2$, then f is:
(a) Injective but not surjective
(b) Surjective but not injective
(c) Bijective
(d) None of these

18. If f [[1, ∞) → [2, ∞) is given by $f(x) = x + \frac{1}{x}$ then $f^{-1}(x)$ equals

(a) $(x + \sqrt{x^2-4})/2$ (b) $x/(1+x^2)$
(c) $(x - \sqrt{x^2-4})/2$ (d) $1 + \sqrt{x^2-4}$

19. Range of the function $f(x) = \frac{x^2+x+2}{x^2+x+1}$; $x \in$ R is
(a) $(1, \infty)$ (b) $(1, 11/7)$
(c) $(1, 7/3)$ (d) $(1, 7/5)$

20. If all the words (with or without meaning) having five letters, formed using the letters of the word SMALL and arranged as in a dictionary, then the position of the word SMALL is:
(a) 52nd (b) 58th
(c) 46th (d) 59th

21. The number of integers greater than 6,000 that can be formed, using the digits 3,5,6,7 and 8, without repetition, is:
(a) 120 (b) 72
(c) 216 (d) 192

22. Let T_n be the number of all possible triangles formed by joining vertices of an n-sides regular polygon. If $T_{n+1} - T_n = 10$, then the value of n is:
(a) 7 (b) 5
(c) 10 (d) 8

23. If x^4 occurs in the rth term in the expansion of $\left(x^4 + \frac{1}{x^3}\right)^{15}$, then r =
(a) 7 (b) 8
(c) 9 (d) 10

24. In the expansion of $\left(\frac{a}{x} + bx\right)^{12}$, the coefficient of $x^{-}10$ will be
(a) $12a^{11}$ (b) $12b^{11}a$
(c) $12a^{11}$ b (d) $12a^{11}b^{11}$

25. $n_{C_{r-1}} = 36$, $n_{C_r} = 84$ and $n_{C_{r+1}} = 126$ then r is:
(a) 1 (b) 2
(c) 3 (d) None of these

26. The value of the expression $^{47}C_4 + \sum_{j=1}^{5} {}^{52-J}C_3$ is equal to
(a) $^{47}C_5$ (b) $^{52}C_5$
(c) $^{52}C_4$ (d) None of these

27. How many different nine digit numbers can be formed from the number 223355888 by rearranging its digits so that the odd digits occupy even positions?
(a) 16 (b) 36
(c) 60 (d) 180

28. The number of arrangements of the letters of the word BANANA in which the two N's do not appear adjacently is
(a) 40 (b) 60
(c) 80 (d) 100

29. If $z = \left(\frac{\sqrt{3}+i}{2}\right)^5 + \left(\frac{\sqrt{3}-i}{2}\right)^5$, then
(a) Re $(z) = 0$ (b) Im $(z) = 0$
(c) Re (z), Im $(z) > 0$ (d) Re $(z) > 0$, Im $(z) < 0$

30. If $x + \frac{1}{x} = 1$, then $x^{2000} + \frac{1}{x^{2000}}$ is equal to
(a) 1 (b) – 1
(c) 0 (d) None of these

31. If $z = x + iy$, $z^{1/3} = a - ib$ and $\frac{x}{a} - \frac{x}{b} = \lambda\,(a^2 - b^2)$, then λ is equal to
(a) 1 (b) 2
(c) 3 (d) 4

32. If $z = re^{i\theta}$, then $|e^{iz}|$ is equal to
(a) $e^{-r\cos}\theta$ (b) $e^{r\cos}\theta$
(c) $e^{r\sin}\theta$ (d) $e^{-r\sin}\theta$

33. If α, β, γ are the cube roots of p, $(p < 0)$, then for any x, y, $x\,\frac{\alpha x+\beta y+\gamma z}{\beta x+\gamma y+\alpha z}$ is equal to
(a) $\alpha\omega + \beta\omega^2 + \gamma$ (b) $\alpha\beta\gamma$
(c) ω, ω^2 (d) None of these

34. If $(a_1 + ib_1)\,(a_2 + ib_2)\ldots(a_n + ib_n) = $ A + iB, then $\sum_{j=1}^{n} tan^{-1}\left(\frac{b_j}{a_j}\right)$ is equal to equal to
(a) B/A (b) tan (B/A)
(c) $tan^{-1}\left(\frac{B}{A}\right)$ (d) $tan^{-1}\left(\frac{A}{B}\right)$

35. The G.M. of the numbers 3, 3^2, 3^3,….., 3^n is
(a) $3^{\frac{2}{n}}$ (b) $3^{\frac{n+1}{2}}$
(c) $3^{\frac{n}{2}}$ (d) $3^{\frac{n-1}{2}}$

36. H.M. between the roots of the equation $x^2 - 10x + 11 = 0$ is
(a) $\frac{1}{5}$ (b) $\frac{5}{21}$
(c) $\frac{21}{20}$ (d) $\frac{11}{5}$

37. If the harmonic mean between a and be H, then $\frac{H+a}{H-a} + \frac{H+b}{H-b} =$
(a) 4 (b) 2
(c) 1 (d) a + b

38. If z lies on the circle $|z| = 1$, then 2/z lies on a
(a) Circle (b) Straight line
(c) Parabola (d) None of these

39. The points representing complex number z for which $|z - 3| = |z - 5|$ lie on the locus given by
(a) Circle (b) Ellipse
(c) Straight line (d) None of these

40. If $y = x + x^2 + x^3 + \ldots\ldots \infty$, then x =
(a) $\frac{y}{1+y}$ (b) $\frac{1-y}{y}$
(c) $\frac{y}{1-y}$ (d) None of these

41. $lim_{x\to0} \sin\left(\frac{1}{x}\right)$ is
(a) 0 (b) 1
(c) – 1 (d) Does not exist

42. $lim_{x\to4}\left[\frac{x^{3/2}-\theta}{x-4}\right] =$
(a) 3/2 (b) 3
(c) 2/3 (d) 1/3

43. $\lim_{x\to0}\frac{e^{\frac{1}{x}}}{e^{\left(\frac{1}{x}+1\right)}} =$
(a) 0 (b) 1
(c) Does not exist (d) None of these

44. $\lim_{x\to0}\frac{In\,(\cos x)}{x^2}$ is equal to
(a) 0 (b) 1
(c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

45. If function $f(x) = \begin{cases}\frac{x^2-1}{x-1} & when\ x \neq 1\\ k, & when\ x\ 1\end{cases}$ is continuous at x = 1, then the value of k will be
(a) – 1 (b) 2
(c) – 3 (d) – 2

46. If $f(x) = \begin{cases}\frac{1}{x}\sin x^2, & x \neq 0\\ 0, & x = 0\end{cases}$, then
(a) $\lim_{x\to0+} f(x) \neq 0$ (b) $\lim_{x\to0-} f(x) \neq 0$
(c) $f(x)$ is continuous at x = 0 (d) None of these

47. If $x = a\cos^4\theta$, $y = a\sin^4\theta$ then $\frac{dy}{dx}$, at $\theta = \frac{3\pi}{4}$, is

(a) – 1 (b) 1
(c) $-a^2$ (d) a^2

48. If $y = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx}$ equals

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

49. $\int \frac{1}{\sqrt{x}} \tan^4\sqrt{x}\sec^2\sqrt{x}\,dx =$

(a) $2\tan^5\sqrt{x} + c$ (b) $\frac{1}{5}\tan^5\sqrt{x} + c$
(c) $\frac{2}{5}\tan^5\sqrt{x} + c$ (d) None of these

50. If $\int e^x \sin x dx = \frac{1}{2}e^x . a + c$, then $a =$

(a) $\sin x - \cos x$ (b) $\cos x - \sin x$
(c) $-\cos x - \sin x$ (d) $\cos x + \sin x$

51. If $x^y = y^x$, then $\frac{dy}{dx} =$

(a) $\frac{y(x\log_e y+y)}{x(y\log_e x+x)}$ (b) $\frac{y(x\log_e y-y)}{x(y\log_e x-x)}$
(c) $\frac{x(x\log_e y-y)}{y(y\log_e x-x)}$ (d) $\frac{x(x\log_e y+y)}{y(y\log_e x+x)}$

52. The differential of e^{x^3} with respect to $\log x$ is

(a) e^{x^3} (b) $3^{x^2}e^{x^3}$
(c) $3^{x^3}e^{x^3}$ (d) $3^{x^2}e^{x^3} + 3^{x^2}$

53. The 2nd derivative $a\sin^3 t$ with respect to $a\cos^3 t$ at $t = \frac{\pi}{4}$ is

(a) $\frac{4\sqrt{2}}{3a}$ (b) 2
(c) $\frac{1}{12a}$ (d) None of these

54. The differential coefficient of $f(\sin x)$ with respect to x, where $f(x) = \log x$, is

(a) $\tan x$ (b) $\cot x$
(c) $f(\cos x)$ (d) $1/x$

55. $\int e^x \frac{(x^2+1)}{(x+1)^2}dx =$

(a) $\left(\frac{x-1}{x+1}\right)e^x + c$ (b) $e^x\left(\frac{x+1}{x-1}\right) + c$
(c) $e^x(x+1)(x-1) + c$ (d) None of these

56. The value of $\int_0^1 \frac{x^4+1}{x^2+1}dx$ is

(a) $\frac{1}{6}(3\pi - 4)$ (b) $\frac{1}{6}(3 - 4\pi)$
(c) $\frac{1}{6}(3\pi + 4)$ (d) $\frac{1}{6}(3 + 4\pi)$

57. If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis then $f'(3)$ is equal to

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

58. If $y = 4x - 5$ is tangent to the curve $y^2 = px^3 + q$ at (2, 3), then

(a) $p = 2, q = -7$ (b) $p = -2, q = 7$
(c) $p = -2, q = -7$ (d) $p = 2, q = 7$

59. If $y = \sec^{-1}\frac{2x}{1+x^2} + \sin^{-1}\frac{x-1}{x+1}$, then $\frac{dy}{dx}$ is equal to

(a) 1 (b) $\frac{x-1}{x+1}$
(c) Does not exist (d) None of these

60. The function $f(x) = 2x^3 - 3x^2 + 90x + 174$ is increasing in the interval

(a) $\frac{1}{2} < x < 1$ (b) $\frac{1}{2} < x < 2$
(c) $3 < x < \frac{59}{4}$ (d) $-\infty < x < \infty$

61. Function $f(x) = \frac{\lambda\sin x + 6\cos x}{2\sin x + 3\cos x}$ is monotonic increasing, if

(a) $\lambda > 1$ (b) $\lambda < 1$
(c) $\lambda < 4$ (d) $\lambda > 4$

62. The minimum value of $f(a) = (2a^2 - 3) + 3(3 - a) + 4$ is

(a) $\frac{15}{2}$ (b) $\frac{11}{2}$
(c) $\frac{-13}{2}$ (d) $\frac{71}{8}$

63. The minimum value of $4e^{2x} + 9e^{-2x}$ is

(a) 11 (b) 12
(c) 10 (d) 14

64. The order of the differential equation $y\left(\frac{dy}{dx}\right) = x/\frac{dy}{dx} + \left(\frac{dy}{dx}\right)^3$ is

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

65. The differential equation of the family of curves $y = a\cos(x + b)$ is

(a) $\frac{d^2y}{dx^2} - y = 0$ (b) $\frac{d^2y}{dx^2} + y = 0$
(c) $\frac{d^2y}{dx^2} + 2y = 0$ (d) None of these

66. The differential equation of the family of curves represented by the equation $x^2y = a$, is

(a) $\frac{dy}{dx} + \frac{2y}{x} = 0$ (b) $\frac{dy}{dx} + \frac{2x}{y} = 0$
(c) $\frac{dy}{dx} - \frac{2y}{x} = 0$ (d) $\frac{dy}{dx} - \frac{2y}{y} = 0$

67. The solution of the equation $\sin^{-1}\left(\frac{dy}{dx}\right) = x + y$ is

(a) $\tan(x + y) + \sec(x + y) = x + c$
(b) $\tan(x + y) - \sec(x + y) = x + c$
(c) $\tan(x + y) + \sec(x + y) + x + c = 0$
(d) None of these

68. $\int_{-\pi}^{\pi} \frac{\sin^4 x}{\sin^4 x + \cos^4 x}dx =$

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

69. The area between the curve $y = \sin^2 x$, x-axis and the ordinates $x = 0$ and $x = \frac{\pi}{2}$ is

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

70. The area of smaller part between the circle $x^2 + y^2 = 4$ and the line $x = 1$ is

(a) $\frac{4\pi}{3} - \sqrt{3}$ (b) $\frac{8\pi}{3} - \sqrt{3}$
(c) $\frac{4\pi}{3} + \sqrt{3}$ (d) $\frac{5\pi}{3} + \sqrt{3}$

71. A line passes through (2, 2) and is perpendicular to the line 3x + y = 3. Its y-intercept is

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

72. A line AB makes zero intercepts on x-axis and y-axis and it is perpendicular to another line CD, $3x + 4y + 6 = 0$. The equation of line AB is

(a) y = 4 (b) $4x - 3y + 8 = 0$
(c) $4x - 3y = 0$ (d) $4x - 3y + 6 = 0$

73. The equation of straight line passing through point of intersection of the straight lines $3x - y + 2 = 0$ and $5x - 2y + 7 = 0$ and having infinite slope is

(a) $x = 2$ (b) $x + y = 3$
(c) $x = 3$ (d) $x = 4$

74. Orthorcentre of triangle with vertices (0, 0), (3, 4) and (4, 0) is

(a) $\left(3, \frac{5}{4}\right)$ (b) (3, 12)
(c) $\left(3, \frac{3}{4}\right)$ (d) (3, 9)

75. The equation of the locus of all points equidistant from the point (4, 2) and the x-axis, is
(a) $x^2 + 8x + 4y - 20 = 0$ (b) $x^2 - 8x - 4y + 20 = 0$
(c) $y^2 - 4y - 8x + 20 = 0$ (d) None of these

76. The number of circle having radius 5 and passing through the points (– 2, 0) and (4, 0) is
(a) One (b) Two
(c) Four (d) Infinite

77. The equation of the circle which touches x-axis and whose centre is (1, 2) is
(a) $x^2 + y^2 - 2x + 4y + 1 = 0$
(b) $x^2 + y^2 - 2x - 4y + 1 = 0$
(c) $x^2 + y^2 + 2x + 4y + 1 = 0$
(d) $x^2 + y^2 + 4x + 2y + 4 = 0$

78. Equation of diagonals of square formed by lines $x = 0$, $y = 0$, $x = 1$ and $y = 1$ are
(a) $y = x, y + x = 1$ (b) $y = x, x + y = 2$
(c) $2y = x, y + x = \frac{1}{3}$ (d) $y = 2x, y + 2x = 1$

79. The equation of the line perpendicular to line $ax + by + c = 0$ and passing through (a, b) is equal to
(a) $bx - ay = 0$ (b) $bx + ay - 2ab = 0$
(c) $bx + ay = 0$ (d) None of these

80. The line which is parallel to x-axis and crosses the curve $y = \sqrt{x}$ at an angle of 45° is equal to [Pb.
(a) $x = \frac{1}{4}$ (b) $y = \frac{1}{4}$
(c) $y = \frac{1}{2}$ (d) $y = 1$

81. The co-ordinates of a point which is equidistant from the points (0, 0, 0), (a, 0, 0), (0, b, 0) and (0, 0, c) are given by
(a) $\left(\frac{a}{2}, \frac{b}{2}, \frac{c}{2}\right)$ (b) $\left(-\frac{a}{2}, -\frac{b}{2}, \frac{c}{2}\right)$
(c) $\left(\frac{a}{2}, -\frac{b}{2}, -\frac{c}{2}\right)$ (d) $\left(-\frac{a}{2}, \frac{b}{2}, -\frac{c}{2}\right)$

82. A line makes angle α, β, γ with the co-ordinate axes. If $\alpha + \beta = 90°$, then $\gamma =$
(a) 0 (b) 90°
(c) 180° (d) None of these

83. The co-ordinates of the point in which the line joining the points (3, 5, –7) and (– 2, 1, 8) is intersected by the plane yz are given by
(a) $\left(0, \frac{13}{5}, 2\right)$ (b) $\left(0, -\frac{13}{5}, -2\right)$
(c) $\left(0, -\frac{13}{5}, \frac{2}{5}\right)$ (d) $\left(0, \frac{13}{5}, \frac{2}{5}\right)$

84. The direction ratios of the line joining the points (4, 3, – 5) and (– 2, 1, – 8) are
(a) $\frac{6}{7}, \frac{2}{7}, \frac{3}{7}$ (b) 6, 2, 3
(c) 2, 4, – 13 (d) None of these

85. The line joining the points (– 2, 1, –8) and (a, b, c) is parallel to the line whose direction ratios are 6,2, 3. The values of a, b, c are
(a) 4, 3, –5 (b) 1, 2, – 13/2
(c) 10, 5, – 2 (d) None of these

86. The points with position vectors $60\hat{\imath} + 3\hat{\jmath}$, $40\hat{\imath} - 8\hat{\jmath}$ and $a\hat{\imath} - 57\hat{\jmath}$ are collinear if
(a) $a = -40$ (b) $a = 40$
(c) $a = 20$ (d) None of these

87. Let $\hat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $\vec{c} = \hat{a} + 2\hat{b}$ and $\vec{d} = 5\hat{a} - 4\hat{b}$ are perpendicular to each other, then the angle between $\hat{a}$ and $\hat{b}$ is
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{2}$
(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

88. If $[\vec{a} \times \vec{b}\vec{b} \times \vec{c}\vec{c} \times \vec{a}] = \lambda[\vec{a}\vec{b}\vec{c}]^2$, then λ is equal to
(a) 0 (b) 1
(c) 2 (d) 3

89. If $|\vec{a}| = 2|\vec{b}| = 3$ and $|2\vec{a} - \vec{b}| = 5$, then $|2\vec{a} + \vec{b}|$ equals
(a) 17 (b) 7
(c) 5 (d) 1

90. If $\vec{x} = 3\hat{\imath} - 6\hat{\jmath} - \hat{k}$, $\vec{y} = \hat{\imath} + 4\hat{\jmath} - 3\hat{k}$ and $\vec{z} = 3\hat{\imath} - 4\hat{\jmath} - 12\hat{k}$, then the magnitude of the projection of $\vec{x} \times \vec{y}$ on $\vec{z}$ is
(a) 12 (b) 15
(c) 14 (d) 13

91. If angle θ be divided into two parts such that the tangent of one part is k times the tangent of the other and ϕ is their difference, then $\sin\theta =$
(a) $\frac{k+1}{k-1}\sin\phi$ (b) $\frac{k-1}{k+1}\sin\phi$
(c) $\frac{2k-1}{2k+1}\sin\phi$ (d) None of these

92. If $x = y\cos\frac{2\pi}{3} = z\cos\frac{4\pi}{3}$, then $xy + yz + zx =$
(a) – 1 (b) 0
(c) 1 (d) 2

93. If $\sin A = \frac{1}{\sqrt{10}}$ and $\sin B = \frac{1}{\sqrt{5}}$, where A and B are positive acute angles, then $A + B =$
(a) π (b) $\pi/2$
(c) $\pi/3$ (d) $\pi/4$

94. If $y = (1 + \tan A)(1 - \tan B)$ where $A - B = \frac{\pi}{4}$, then $(y+1)^{y+1}$ is equal to
(a) 9 (b) 4
(c) 27 (d) 81

95. $\cos^2 48^o - \sin^2 12^o =$
(a) $\frac{\sqrt{5}-1}{4}$ (b) $\frac{\sqrt{5}+1}{8}$
(c) $\frac{\sqrt{3}-1}{4}$ (d) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

96. If $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$, $-\pi < \alpha, \beta < \pi$, then total number of ordered pair of (α, β) is
(a) 0 (b) 1
(c) 2 (d) 4

97. If $\tan\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2m+1}$, then $\alpha + \beta =$
(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$
(c) $\frac{\pi}{6}$ (d) None of these

98. If $\tan\alpha$, $\tan\beta$ are the roots of the equation $x^2 + px + q = 0$ $(p \neq 0)$, then
(a) $\sin^2(\alpha+\beta) + p\sin(\alpha+\beta)\cos(\alpha+\beta) + q\cos^2(\alpha+\beta) = -q$
(b) $\tan(\alpha+\beta) = \frac{p}{q-1}$
(c) $\cos(\alpha+\beta) = 1 - q$
(d) $\sin(\alpha+\beta) = -p$

99. The value of $\cos 12^o + \cos 84^o + \cos 156^o + \cos 132^o$ is
(a) $\frac{1}{2}$ (b) 1
(c) $-\frac{1}{2}$ (d) $\frac{1}{8}$

100. $\sec 50^o + \tan 50^o$ is equal to
(a) $\tan 20^o + \tan 50^o$ (b) $2\tan 20^o + \tan 50^o$
(c) $\tan 20^o + 2\tan 50^o$ (d) $2\tan 20^o + 2\tan 50^o$

101. From a group of 5 boys and 3 girls, three persons are chosen at random. The probability that there are more gils than boys is-
(a) 4/7 (b) 3/8

(c) 2/7 (d) 5/8

102. Three dice are thrown simultaneously. What is the probability of obtaining a total of 17 or 18 -
(a) 1/9 (b) 1/72
(c) 1/54 (d) None of these

103. If an integer is chosen at random from first 100 positive integers, then the probability that the chosen number is a multiple of 4 or 6, is-
(a) 41/100 (b) 33/100
(c) 1/10 (d) None of these

104. A pack of cards contains only 3 aces, 4 kings, 4 queens and 4 jacks. Two cards are drawn at random. The probability that at least one of them is an ace is-
(a) 1/5 (b) 3/16
(c) 9/20 (d) 1/9

105. A fair coin is tossed a fixed number of times. If the probability of getting 7 heads is equal to that of getting 9 heads, then the probability of getting 3 heads is-
(a) $\frac{35}{2^{12}}$ (b) $\frac{35}{2^{14}}$
(c) $\frac{7}{2^{12}}$ (d) None of these

106. There are 6 positive and 8 negative numbers. Four numbers are chosen at random and multiplied. The probability that a product is a positive number is-
(a) 505/1001 (b) 420/1001
(c) 15/1001 (d) 70/1001

107. Three athlete A, B and C participate in a race competition. The probability of winning A and winning of B is twice of winning C. Then the probability that the race win by A or B, is-
(a) 2/3 (b) 1/2
(c) 4/5 (d) 1/3

108. A man alternately tosses a coin and throws a dice beginning with the coin. The probability that he gets a head in the coin before he gets a 5 or 6 in the dice is-
(a) 3/4 (b) 1/2
(c) 1/3 (d) None of these

109. A bag contains 3 while and 3 black balls. Balls are drawn one by one with out replacing them in the bag. The probability that drawing ball will be in alternate colours is-
(a) 1/10 (b) 5/21
(c) 1/2 (d) None of these

110. A box contains 2 black, 4 white and 3 red balls. One ball is drawn at random from the box and kept aside. From the remaining balls in the box, another balls is drawn at random and kept aside the first. This process is repeated till all the balls are drawn from the box. The probability that the balls drawn are in the sequence of 2 black, 4 white and 3 red is-
(a) 1/1260 (b) 1/7560
(c) 1/126 (d) None of these

111. The AM of the series 1,2,4,8,16, ……,2^n is-
(a) $\frac{2^n-1}{n}$ (b) $\frac{2^{n+1}-1}{n+1}$
(c) $\frac{2^n+1}{n}$ (d) $\frac{2^n-1}{n+1}$

112. If the mean of the set of numbers $x_1, x_2, x_3,…., x_n$ is $\vec{x}$, then the mean of the numbers $x_i + 2i, 1 \le i \le n$, is-
(a) $\vec{x}$ + 2n (b) $\vec{x}$ + n + 1
(c) $\vec{x}$ + 2 (d) $\vec{x}$ + n

113. If the mean of n observations $1^2, 2^2, 3^2,…., n^2$ is $\frac{46n}{11}$, then n is equal to
(a) 11 (b) 12
(c) 23 (d) 22

114. The mean of 50 observations is 36. If two observations 30 and 42 are deleted, then the mean of the remaining observations is-
(a) 48 (b) 36
(c) 38 (d) None of these

115. The weighted mean of first n natural numbers, whose weights are equal to the squares of corresponding numbers, is
(a) $\frac{n+1}{2}$ (b) $\frac{3n(n+1)}{2(2n+1)}$
(c) $\frac{(n+1)(2n+1)}{6}$ (d) $\frac{n(n+1)}{2}$

116. The mean of a set of observations is $\overline{x}$. If each observation is divided by $\alpha, \alpha \neq 0$, and then is increased by 10 then the mean of the new set is-
(a) $\frac{\overline{x}}{\alpha}$ (b) $\frac{\overline{x}+10}{\alpha}$
(c) $\frac{\overline{x}+10\alpha}{\alpha}$ (d) $\alpha\overline{x} + 10$

117. The geometric mean of the observations 2, 4, 8, 16, 32, 64 is-
(a) $2^{5/2}$ (b) $2^{7/2}$
(c) 33 (d) None of these

118. A boy goes to school from his home at a speed of x km/hr. and comes back at a speed of ykm / hr. then the average speed of the boy is given by-
(a) $\frac{x+y}{2}$ km/hr. (b) $\sqrt{xy}$km/hr
(c) $\frac{2xy}{x+y}$ km/hr (d) Any of these

119. If a, b, c are any three positive numbers, then the least value of $(a+b+c)\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ is-
(a) 3 (b) 6
(c) 9 (d) None of these

120. Product of n positive numbers is unity. The sum of these numbers can not be less than-
(a) 1 (b) n
(c) n^2 (d) None of these