ONE MARK SPECIAL TEST -
NAGAPATTINAM DISTRICT EDUCATION DEPARTMENT

Standard X   Reg.No. ☐☐☐☐☐☐☐

Time : 3.00 hrs

MATHEMATICS

Marks : 100

I. **Choose the correct answer:**

1. If $f : A \to B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
   - a) 7
   - b) 47
   - c) 1
   - d) 14

2. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is
   - a) linear
   - b) cubic
   - c) reciprocal
   - d) quadratic

3. If the ordered pairs $(a+2, 4)$ and $(5, 2a+b)$ are equal, then (a, b) is
   - a) $(3, -2)$
   - b) $(2, 3)$
   - c) $(5, 1)$
   - d) $(2, -2)$

4. If $f : A \to B$ is a constant function, then the number of elements in the range of f is
   - a) 2
   - b) 0
   - c) 1
   - d) not defined

5. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B, then the number of elements in B is
   - a) 3
   - b) 2
   - c) 4
   - d) 8

6. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
   - a) 8
   - b) 20
   - e) 12
   - d) 16

7. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then fog is
   - a) $\frac{3}{2x^2}$
   - b) $\frac{2}{3x^2}$
   - c) $\frac{2}{9x^2}$
   - d) $\frac{1}{6x^2}$

8. For any two finite sets A and B given $n(A) = x$ and $n(B) = y$, the number of functions A to B is
   - a) y^x
   - b) x^y
   - c) xy
   - d) x + y

9. Let $f(x) = \sqrt{1 + x^2}$ then
   - a) $f(x-y) = f(x) \cdot f(y)$
   - b) $f(x-y) \leq f(x) \cdot f(y)$
   - c) $f(x-y) \geq f(x) \cdot f(y)$
   - d) none of these

10. If $g = \{(1,1), (2,3), (3,5), (4,7)\}$ a function given by $g(x) = \alpha x + \beta$, then the values of α and β are
    - a) $(-1, 2)$
    - b) $(2, -1)$
    - c) $(-1, -2)$
    - d) $(1, 2)$

11. If $\{(a,8), (6,b)\}$ represents an identify function, then the value of a and b are respectively
    - a) $(8, 6)$
    - b) $(8, 8)$
    - c) $(6, 8)$
    - d) $(6, 6)$

12. If $n(A \times B) = 6$ and $A = \{1, 3\}$, then find $n(B)$
    - a) 3
    - b) 6
    - c) 1
    - d) 2

13. $7^{4K} \equiv \underline{\hspace{1cm}} \bmod (100)$
    - a) 1
    - b) 2
    - c) 3
    - d) 4

14. An A.P consists of 31 terms. If its 16th term is m, then the sum of all the terms of this A.P is
    - a) 16 m
    - b) 62 m
    - c) 31 m
    - d) $\frac{31}{2}$ m

15. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
    - a) 14520
    - b) 14280
    - c) 14200
    - d) 14400

16. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18} \dots$ is
    - a) $\frac{1}{24}$
    - b) $\frac{1}{27}$
    - c) $\frac{2}{3}$
    - d) $\frac{1}{81}$

17. If a, b, c are in A.P, then $\frac{a-b}{b-c}$
    - a) $\frac{a}{b}$
    - b) $\frac{b}{c}$
    - c) 1
    - d) 0

18. The sum of the exponents of the prime factors in the prime factorization of 1729 is
    - a) 4
    - b) 3
    - c) 2
    - d) 1

19. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P
    - a) 4551
    - b) 8097
    - c) 7881
    - d) 12848

20. If 6 times of 6th term of an A.P is equal to 7 times the 7th term, then the 13th term of the A.P is
    - a) 0
    - b) 6
    - c) 7
    - d) 13

21. Using Euclid's division lemma, if the cube of any positive integer is divided by 9, then the possible remainders are
    - a) 0, 1, 8
    - b) 1, 4, 8
    - c) 0, 1, 3
    - d) 1, 3, 5

22. The least number that is divisible by all the numbers from 1 to 10 (both inclusive is)
    - a) 2025
    - b) 5220
    - c) 5025
    - d) 2520

23. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \dots + 2^0$, which of the following is true?
    - a) B is 2^{64} more than A
    - b) A and B are equal
    - c) B is larger than A by 1
    - d) A is larger than B by 1

24. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$, then F_5 is
    - a) 3
    - b) 5
    - c) 8
    - d) 11

25. Graph of a quadratic polynomial is a
    - a) Straight line
    - b) Parabula
    - c) Hyperbola
    - d) Circle

26. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$, then the value of k is
    - a) 3
    - b) 5
    - c) 6
    - d) 8

27. Which of the following should be added to make $x^4 + 64$ a perfect square?
    - a) $-8x^2$
    - b) $8x^2$
   - c) $16x^2$
    - d) $4x^2$

28. The number of excluded values of polynomial $\frac{x^3 + x^2 - 10x + 8}{x^4 + 8x^2 - 9}$ is
   a) 4   b) 3   c) 1   d) 2

29. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
   a) 100, 120   b) 10, 12   c) –120, 100   d) 12, 10

30. If number of column and rows are not equal in the matrix, then it is said to be a
   a) Diagonal matrix   b) Rectangular matrix
   c) Square matrix   d) Identity matrix

31. The LCM of $6x^2y$, $9x^2yz$, $12y^2z$ is
   a) $36xy^2z^2$ b) $36x^2y^2z^2$ c) $36x^2y^2z$ d) $3x^2y$

32. The solution of the system $x + y - 3x = -6$, $-7y + 7z = 7$, $3z = 9$ is
   a) x = 1, y = 2, z = 3   b) x = –1, y = 2, z = 3
   c) x = –1, y = –2, z = 3   d) x = 1, y = –2, z = 3

33. Find the matrix X if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$

   a) $\begin{bmatrix} -2 & -2 \\ 2 & -1 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$

34. A square matrix $A = [a_{ij}]_{n \times n}$ where $i > j$ and $a_{ij} = 0$, then the matrix is
   a) Diagonal matrix   b) Square matrix   c) Rectangle metric   d) Unit matrix

35. Which of the following can be calculated from the given matrices $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$

   $B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ i) A^2 ii) B^2 iii) AB   iv) BA

   a) (i) and (ii) only   b) (ii) and (iii) only   c) (ii) and (iv) only   d) all of these

36. Transports of row matrix is
   a) Unit matrix   b) Diagonal matrix   c) Column matrix   d) Row matrix

37. The values of Discriminant is
   a) $b - 4ac$ b) $b + 4ac$ c) $b^2 - 4ac$ d) $b^2 + 4ac$

38. If A is a 2 x 3 matrix and B is a 3 x 4 matrix, how many columns does AB have
   a) 3   b) 4   c) 2   d) 5

39. For the given matrix $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$ the order of the matrix A^T is

   a) 2 x 3   b) 3 x 2   c) 3 x 4   d) 4 x 3

40. A tangent is perpendicular to the radius at the
   a) centre   b) point of contact   c) infinity   d) chord

41. Two poles of height 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?
   a) 13 m   b) 14 m   c) 15 m   d) 12.8 m

42. How many tangents can be drawn at any point on a circle
   a) 2   b) 0   c) 1   d) Infinite

43. In ΔLMN, ∠L = 60º, ∠M = 50º. If ΔLMN ~ ΔPQR, then the value of ∠R is
   a) 110º   b) 30º   c) 70º   d) 40º

44. In the given figure, PR = 26 cm, QR = 24 cm, ∠PAQ = 90º, PA = 6 cm and QA = 8 cm. Find ∠PQR

   a) 80º   b) 85º   c) 75º   d) 90º
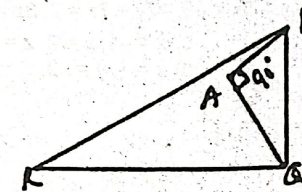
45. In a ΔABC, AD is the bisector of ∠BAC. If AB = 8 cm, BD = 6 cm and DC = 3 cm. The length of the side AC is
   a) 6 cm   b) 4 cm   c) 3 cm   d) 8 cm

46. The two tangents from an external point P to a circle with centre O are PA and PB. If ∠APB = 70º, then the value of ∠AOB is
   a) 110º   b) 130º   c) 100º   d) 120º

47. Which of the following is not a Cevian?
   a) Median   b) Perpendicular bisector
   c) Altitude   d) Angle bisector

48. If ΔABC is an isosceles triangle with ∠C = 90º and AC = 5 cm, then AB is
   a) 2.5 cm   b) 5 cm   c) 10 cm   d) $5\sqrt{2}$ cm

49. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10 cm, then the length of AB is
   a) $6\frac{2}{3}$ cm   b) $\frac{10\sqrt{6}}{3}$ cm   c) $66\frac{2}{3}$ cm   d) 15 cm

50. If in ΔABC and ΔEDF $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar when
   a) ∠B = ∠E   b) ∠A = ∠D   c) ∠B = ∠D   d) ∠A = ∠F

51. The point of intersection of $3x - y = 4$ and $x + y = 8$ is
   a) (5,3)　　b) (2,4)　　c) (3,5)　　d) (4,4)

52. The straight line given by the equation $x = 11$ is
   a) Parallel to x axis　　b) Parallel to y axis
   c) Passing through the origin　　d) Passing through the point (0,11)

53. When proving that a quadrilateral is a trapezium, it is necessary to show
   a) Two sides are parallel,　　b) Two parallel and two non parallel sides
   c) Opposite sides are parallel　　d) All sides are of equal length

54. When will the shape of a straight line be negative?
   a) $\theta = 0°$　　b) $0 < \theta < 90°$　　c) $90° < \theta < 180°$　　d) $\theta = 90°$

55. The equation of a line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$
   a) $7x - 3y + 4 = 0$　　b) $3x - 7y + 4 = 0$　　c) $3x + 7y = 0$　　d) $7x - 3y = 0$

56. The area of triangle formed by the point $(-5,0)$, $(0,-5)$ and $(5,0)$ is
   a) 0 sq.units　　b) 25 sq.units　　c) 5 sq.units　　d) None of these

57. The equation of a line passing through the point $(3,-4)$ and having slope $-\frac{5}{7}$ is
   a) $5x + 7y + 13 = 0$　　b) $7x + 5y + 13 = 0$　　c) $5x - 7y + 13 = 0$　　d) $7x - 5y + 13 = 0$

58. Intercept form of a straight line is
   a) $\frac{x}{a} + \frac{y}{b} = 1$　　b) $\frac{x}{a} + \frac{y}{b} = 0$　　c) $\frac{x^2}{a} + \frac{y^2}{b} = 1$　　d) $\frac{x^2}{a} + \frac{y^2}{b} = 0$

59. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector of PQ is
   a) $\sqrt{3}$　　b) $-\sqrt{3}$　　c) $\frac{1}{\sqrt{3}}$　　d) 0

60. If $(5,7)$, $(3, p)$ and $(6,6)$ are collinear, then the value of p is
   a) 3　　b) 6　　c) 9　　d) 12

61. $(2,1)$ is the point of intersection of two lines
   a) $x - y - 3 = 0$, $3x - y - 7 = 0$　　b) $x + y = 3$, $3x + y = 7$
   c) $3x + y = 3$, $x + y = 7$　　d) $x + 3y - 3 = 0$, $x - y - 7 = 0$

62. A straight line has equation $8y = 4x + 21$. Which of the following is true?
   a) The slope is 0.5 and the y intercept is 2.6
   b) The slope is 5 and the y intercept is 1.6
   c) The slope is 0.5 and the y intercept is 1.6
   d) The slope is 5 and the y intercept is 2.6

63. $a\cot\theta + b\csc\theta = p$ and $b\cot\theta + a\csc\theta = q$ then $p^2 - q^2$ is equal to
   a) $a^2 - b^2$　　b) $b^2 - a^2$　　c) $a^2 + b^2$　　d) $b - a$

64. The angle of depression of the top and the bottom of 20 m tall building from the top of a multistoried building are 30° and 60° respectively. The height of the multistoried building and the distance between two buildings (in metres) is
   a) $20, 10\sqrt{3}$　　b) $30, 5\sqrt{3}$　　c) 20, 10　　d) $30, 10\sqrt{3}$

65. If $\sin\theta = \cos\theta$ then $\sec^2\theta + \csc^2\theta$ is equal to
   a) $2\sqrt{2}$　　b) 1　　c) 0　　d) 4

66. The value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$ is equal to
   a) $\tan^2\theta$　　b) 1　　c) $\cot^2\theta$　　d) 0

67. If $\sin\theta + \cos\theta = a$ and $\sec\theta + \csc\theta = b$, then the value of $b(a^2 - 1)$ is equal to
   a) 2a　　b) 3a　　c) 0　　d) 2ab

68. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \csc\theta)$ is equal to
   a) 0　　b) 1　　c) 2　　d) −1

69. If $5x = \sec\theta$ and $\frac{5}{y} = \tan\theta$, then $x^2 - \frac{1}{y^2}$ is equal to
   a) 25　　b) $\frac{1}{25}$　　c) 5　　d) 1

70. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure
   a) 45°　　b) 30°　　c) 90°　　d) 60°

71. Who is the father of Trigonometry?
   a) Euclid　　b) Pythagoras　　c) Thales　　d) Hipparchus

72. $\tan\theta \csc^2\theta - \tan\theta$ is equal to
   a) $\sec\theta$　　b) $\cot^2\theta$　　c) $\sin\theta$　　d) $\cot\theta$

73. A tower is 60 m height. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30°, then x is equal to
   a) 41.92 m　　b) 43.92 m　　c) 43 m　　d) 45.6 m

74. An instrument used to find angle of depressions and angle of elevation
   a) Clinometer　　b) Ammeter　　c) Lactometer　　d) Voltmeter

75. The volume (in cm³) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is
   a) $\frac{4}{3}\pi$　　b) $\frac{10}{3}\pi$　　c) 5π　　d) $\frac{20}{3}\pi$

76. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
   a) 12 cm　　b) 10 cm　　c) 13 cm　　d) 5 cm

77. The slant height of a frustum with top and the bottom radius R and r respectively is

a) $\sqrt{r^2 + h^2}$ b) $\sqrt{R^2 + r^2 - h^2}$ c) $\sqrt{h^2 + (R - r)^2}$ d) $\pi(R + r)h$

78. The total surface area of a hemi-sphere is how much times the square of its radius?

a) π b) 4π c) 3π d) 2π

79. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of the radius r_2 units. Then $r_1 : r_2$ is

a) 2 : 1   b) 1 : 2   c) 4 : 1   d) 1 : 4

80. The curved surface area of a right circular cone of height 15 cm and base diameter 16 m is

a) 60π cm^2 b) 68π cm^2 c) 120π cm^2 d) 136π cm^2

81. The total surface area of a cylinder whose radius is one third of its height is

a) $\frac{9\pi h^2}{8}$ sq.units   b) $24\pi h^2$ sq.units   c) $\frac{8\pi h^2}{9}$ sq.units   d) $\frac{56\pi h^2}{9}$ sq.units

82. If the volume and curved surface area of a sphere are equal, then the radius is

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

83. If the radius of the base of a cone is tripled and the height is doubled then the volume is

a) made 6 times   b) made 18 times   c) made 12 times   d) unchanged

84. A shuttle cock used for playing badminton has the shape of the combination of

a) a cylinder and a sphere   b) a hemisphere and a cone
c) a sphere and cone   d) frustum of a cone and hemisphere

85. If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is

a) $4\pi r^2$ sq.units   b) $6\pi r^2$ sq.units   c) $3\pi r^2$ sq.units   d) $8\pi r^2$ sq.units

86. The curved surface area of a hemisphere is _____ times its total surface area.

a) 3   b) $\frac{2}{3}$ c) $\frac{3}{2}$ d) $3\pi r^2$

87. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is

a) 5600π cm^3 b) 1120π cm^3 c) 56π cm^3 d) 3600π cm^3

88. Which of the following is incorrect?

a) $P(A) > 1$ b) $0 \le P(A) \le 1$ c) $P(\phi) = 0$ d) $P(A) + P(\overline{A}) = 1$

89. If the standard deviation of x, y, z is p, than the standard deviation of 3x + 5, 3y + 5, 3z + 5 is

a) 3p + 5   b) 3p   c) p + 5   d) 9p + 15

90. Which of the following is not a measure of dispersion?

a) Range   b) Standard deviation
c) Arithmetic mean   d) Variance

91. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$, then the value of x is

a) 2   b) 1   c) 3   d) 1.5

92. Probability of impossible event is

a) 1   b) 0.5   c) 0   d) 100

93. If a letter is chosen at random from the English alphabets {a,b,......z} then the probability that the letter chosen preceds x

a) $\frac{12}{13}$ b) $\frac{1}{13}$ c) $\frac{23}{26}$ d) $\frac{3}{26}$

94. If the variance is 0.01 then the value of standard deviation is _____.

a) 0.01   b) 0.1   c) 0.0001   d) 1

95. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all observation is

a) 40000   b) 160900   c) 160000   d) 30000

96. The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is

a) $\frac{p}{p+q+r}$ b) $\frac{q}{p+q+r}$ c) $\frac{p+q}{p+q+r}$ d) $\frac{p+r}{p+q+r}$

97. The range of the data 8,8,8,8,8,.........8 is

a) 0   b) 1   c) 8   d) 3

98. Variance of first 20 natural numbers is

a) 32.25   b) 44.25   c) 33.25   d) 30

99. Which of the following values can be a probability of an event?

a) $\frac{7}{4}$ b) 0   c) –1   d) 2.23

100. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is $\frac{1}{9}$, then the number of tickets bought by Kamalam is

a) 5   b) 10   c) 15   d) 20

****