DECEMBER 2023

MATHS QUESTION PAPER

1. How much amount is required to be invested every year so as to accumulate ₹30,000 at the end of 10 years if the interest compounded annually at 10%. Given A (10, 01) = 15.9374

(a) ₹1882.36

(b) ₹1828.30

(c) ₹1832.65

(d) ₹1853.65

2. Suppose Mr. X invested ₹5,000 every year starting from today in mutual fund for next 10 years. Assuming that average return compounded annually is at 18% per annum. What is future value?

(a) ₹1,83,677.68

(b) ₹1,38,678.85

(c) ₹1,83,776.53

(d) ₹1,38,774.55

3. A Person wants to open a shop have two options to acquire a commercial space either by leasing for 10 years at annual rent of ₹2,00,000 or by purchasing the space for ₹12,00,000. If person can borrow money at 14% compounded per annum. Which alternate is most suitable? Given P(10, 0.14) = 5.21611

(a) Leasing

(b) Purchase

(c) Can't say

(d) data insufficient

4. Find the 17^{th} term of an AP series if 15^{th} and 21^{st} terms are 30.5 and 39.5 respectively.

(a) 33.5

(b) 35.5

(c) 36.0

(d) 38.0

5. In a survey of 100 boys it was found that 50 used white shirts, 40 red shirts and 30 blue shirts. 20 were habituated in using both white and red shirts. 15 were using both red and blue shirts and 10 were using blue and white shirts. Find the number of boys who are suing all colours.

(a) 20

(b) 25

(c) 30

(d) 35

6. In how many different ways can the letters of the word ‘CORPORATION’ be arranged so that the vowels always come together?

(a) 810

(b) 1440

(c) 25200

(d) 50400

7. If n^{th} term of an AP series is 7n – 2, then sum of ‘n’ terms is:

(a) $0.5(7n^2 + 2n)$

(b) $0.5(7n^3 – 3n)$

(c) $0.5(7n^2 + 3n)$

(d) $0.5(7n^2 – 2n)$

8. In a certain language SIKKIM is written as THLJJL, then how is TRAINING written is that code?

(a) SQBHOHOH

(b) UQBHOHOF

(c) UQBJOHOH

(d) UQBJOHOM

9. Seven friends O. P, Q, R, S, T and U are watching movie sitting in a row. S is sitting at one extreme end. Q is sitting second to the right of S. P is sitting between O and Q. Both U and O are not sitting at extreme end. R is sitting immediate left of T, who is sitting in the middle?

(a) O

(b) P

(c) Q

(d) U

10. In certain language, PEAR is coded as 7519, and TOIL is coded as 2693, then how DOCTOR be written in that code?

(a) 463293

(b) 463239

(c) 463269

(d) 463296

11. Kamal walks 10 km north from there he walks 6 Km towards south. Then he walks 3 Km towards east. How far and in which direction is he with reference to starting point?

(a) 5 Km south - east

(b) 7 Km north - east

(c) 5Km north - east

(d) 7km south – west

12. There are six persons A, B, C, D E and F in a family. B is the son of C but C is not the mother of B. A and C are a married couple. E is the brother of C. D is the daughter of A. F is the brother B. Who is the mother B?

(a) A

(b) E

(c) D

(d) F

13. When Mr. P saw Mr. Q, he recalled, "He is the son of the father of my daughter's mother." Who is Mr. Q to Mr. P?

(a) Brother

(b) Cousin

(c)Nephew

(d) Brother-in-law

14. Introducing a boy, Akshat said, "His mother is the only daughter of my mother-in-law." How is Akshat related to the boy?

(a) Uncle

(b) Father

(c) Brother

(d) Husband

15. Showing the man playing the cricket, Ms. P said, " He is the brother of my uncle's daughter". Who is the man to Ms. P?

(a) Son

(b) Cousin

(c) Uncle

(d) Brother-in-law

16. By plotting cumulative frequency against the respective class boundary, we get

(a) Frequency curve

(b) Ogives

(c) Frequency polygon

(d) Histogram

17. The frequency of visitor in an office is given below:

Time	9 AM – 11AM	11AM – 1PM	1PM – 3PM	3PM – 5PM
Frequency	5	18	7	12

Find the cumulative frequency of visitors for the time 11 AM – 1 PM?

(a) 5

(b) 23

(c) 18

(d) 30

18. The AM and HM of two numbers are 5 and 3.2 respectively, then GM will be:

(a) 4.4

(b) 4.2

(c) 4.0

(d) 3.8

19. If the quartile deviation is 12 and the first quartile is 25, then the value of the third quartile is:

(a) 37

(b) 49

(c) 61

(d) 60

20. If mode of a grouped data is 10 and median is 6, then what is the value of mean?

(a) 2

(b) 4

(c) 6

(d) 8

21. In a Standard Normal distribution, then the value of the man (μ) and standard deviation (σ) is:

(a) $\mu = 0$ and $\sigma = 0$

(b) $\mu = 0$ and $\sigma = 1$

(c) $\mu = 1$ and $\sigma = 0$

(d) $\mu = 1$ and $\sigma = 1$

22. If the regression line of y on x and of x on y are given by $10x - 290 = -20y$ and $7y - 104 = -4x$. Then the arithmetic means of x and y are given by

(a) 5, 12

(b) 7, 12

(c) 12, 5

(d) 5, 7

23. If mean and variance of a random variable which follows the Binomial Distribution are 7 and 6 respectively, then the probability of success is:

(a) $\frac{6}{7}$

(b) $\frac{36}{49}$

(c) $\frac{1}{7}$

(d) $\frac{1}{49}$

24. _____ may be defined as the ratio of covariance between the two variables to the product of the standard deviations of the two variables.

(a) Scatter diagram

(b) Karl Pearson's Correlation Coefficient

(c) Spearman's correction coefficient

(d) Coefficient of concurrent deviations

25. The solution of cubic equation $x^3 - 23x^2 + 142x - 120 = 0$ is given by the triplet:

(a) (1, 10, 12)

(b) (1, - 10, 12)

(c) (-1, -10, -12)

(d) (1, 10, -12)

26. If $2^x = 4^y = 8^z$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{6z} = \frac{24}{7}$, then the value of z is:

(a) $\frac{7}{16}$

(b) $\frac{7}{32}$

(c) $\frac{7}{48}$

(d) $\frac{7}{64}$

27. The solution of the inequality $\frac{5-2x}{3} \leq \frac{x}{6} - 5$ is:

(a) $x \geq 8$

(b) $x \geq 7$

(c) $x \leq 80/3$

(d) $x \geq 40/3$

28. What is the effective rate of interest when principal amount of ₹50,000 deposited in a nationalized bank for one year, corresponding to a nominal rate interest 8% per annum compounded quarterly, given $(1.02)^4 = 1.0824$

(a) 10.38%

(b) 8.08%

(c) 8.16%

(d) 8.24%

29. Manoj invest ₹12,000 at 6% per annum simple interest to obtain a total amount of ₹14,880. What is the time for which the amount was invested?

(a) 3 years

(b) 4 years

(c) 2 years

(d) 5 years

30. Mr. X makes a deposit of ₹50,000 in the bank for a period of $2\frac{1}{2}$ years. If the rate of interest is 12% per annum, compounded half yearly, then the maturity value of the money deposited by Mr. X is:

[Where $(1.06)^5 = 1.3382$]

(a) ₹66,910

(b) ₹66,123

(c) ₹67,925

(d) ₹65,550

31. A, B, C, D, E, F, G, H are sitting in a circle facing the centre. D sits 3rd to left of A. E sits to the immediate right of A. b is third to left of D. G is second to right of B. C is neighbourer of B. C is 3rd to left of H. Who is sitting exactly in between F and E.

(a) C

(b) E

(c) H

(d) A

32. Given an infinite geometric series with first term 'a' and common ratio 'r'. if its sum is 4 and the second term is $\frac{3}{4}$, then one of correct option is

(a) a = 1 and r = $\frac{1}{4}$

(b) a = 3 and r = $\frac{3}{4}$

(c) a = 3 and r = $\frac{1}{4}$

(d) a = 1 and r = $\frac{1}{2}$

33. Find the value of integral $\int_0^1 x\sqrt{x^2+4}dx$

(a) $\frac{1}{3}[5\sqrt{5}-8]$

(b) $\frac{1}{3}[5\sqrt{5}+8]$

(c) $\frac{1}{3}[5\sqrt{5}-4]$

(d) $\frac{1}{3}[5\sqrt{5}+4]$

34. If ${}^{15}C_{3r} = {}^{15}C_{r+3}$ then r is equal to:

(a) 5

(b) 4

(c) 3

(d) 2

35. Find odd one out of the series: 16, 25, 36, 72, 144, 196 and 225

(a) 36

(b) 72

(c) 196

(d) 225

36. In a certain system of coding the word "STATEMENT" is written as "TNEMETATS". In the same system of coding the word "POLITICAL" written as:

(a) LACITILOP

(b) LACTILIOP

(c) OPILITACL

(d) LACATILOP

37. Five persons are living in a five story building. Mr. Mahesh lives in flat above Mr. Ashok. Mr. Lokesh lives in a flat below Mr. Gaurav and Mr. Rakesh lives in a flat below Mr. Lokesh. Who possibly lives in the ground floor?

(a) Mr. Rakesh

(b) Mr. Lokesh

(c) Mr. Mahesh

(d) Mr. Gaurav

38. Sunita walked 30 meters towards the East, took a right turn and walked 40 meters. Then she took a left turn and walked 30 meters. In which direction is she now from the starting point?

(a) North-East

(b) East

(c) South-East

(d) South

39. If mean of 5 observation x +1, x +3, x + 5, x +7 and x +9 is given 15, then the value of x will be:

(a) 10

(b) 12

(c) 8

(d) 11

40. Consider the following data where class length is given as 5. Calculate the number of class intervals.

59, 68, 78, 57, 44, 73, 40, 60, 70, 47

(a) 5

(b) 6

(c) 7

(d) 8

41. The mean of the first three terms is 17 and mean of next four terms is 21. Calculate the mean of seven terms.

(a) 18.28

(b) 19.78

(c) 19.58

(d) 19.28

42. The mean of a set of 20 observations in 18.3. The mean is reduced by 0.6 when a new observation is added to the set. The new observation is:

(a) 17.6

(b) 18.9

(c) 5.7

(d) 24.6

43. IF P(A) = ½ and P(B) = 1/3 and P(A ∪ B) = 2/3 then find P(A∩ B)

(a) ¼

(b) 2/3

(c) 1/6

(d) ½

44. If six coins are tossed simultaneously. The probability of obtaining exactly two heads are.

(a) 0.2343

(b) 0.9841

(c) 0.1268

(d) 0.0156

45. If ‘x’ and ‘y’ are related as 3x – 4y = 30 and the quartile deviation of ‘x’ is 12, then the quartile deviation of ‘y’ is:

(a) 9

(b) 8

(c) 7

(d) 6

46. A box contain 20 electrical bulbs out of which 4 are defective. Two bulbs are chosen at random from this box. The probability that at least one of them is defective.

(a) $\frac{7}{19}$

(b) $\frac{4}{19}$

(c) $\frac{12}{19}$

(d) $\frac{15}{19}$

47. If the coefficient of correlation is 0.8 and regression coefficient b_{xy} = 0.32 then what is the value of regression coefficient b_{xy}?

(a) 2

(b) 1

(c) 0.52

(d) 0.48

48. The gross monthly pay of an employee was ₹15,000 in a year 2020. The consumer price index number in 2023 is 155 with 2020 as base year. If employee is to rightly compensate what dearness allowance is required to be paid?

(a) ₹8,000

(b) ₹8,250

(c) ₹8,500

(d) ₹8,750

49. If the Regression coefficient (r_{yx}) of y on x is greater than unity, then other Regression coefficient (r_{xy}) of x on y is:

(a) Less than one

(b) Greater than one

(c) Equal to one

(d) Equal to zero

50. If 4y – 6x = 18 is regression line of y on x and coefficient of correlation between x and y is 0.8. What is the value of regression coefficient of x on y?

(a) 0.2448

(b) 0.4267

(c) 0.5733

(d) 0.7441

51. Divide 27 into two parts, so that 5 times the first and 11 times the second together equal to 195, then the ratio of first and second part is:

(a) 17 : 10

(b) 15 : 12

(c) 14 : 13

(d) 16 : 11

52. The solution of the linear simultaneous equation $2x - y = 4$ and $3x + 4y = 17$ is

(a) x = 3; y =2

(b) x = 2; y = 3

(c) x = -3; y = - 2

(d) x = - 0; y = -3

53. If $\frac{9^n \times 3^5 \times (27)^5}{3 \times (81)^4} = 27$, then the value of n is

(a) 2

(b) 0

(c) 3

(d) 4

54. The roots of the equation $x^3 + x^2 - x - 1 = 0$ are

(a) x = 1, x = -1, x = -1

(b) x = 1, x = 1, x = -1

(c) x = -1, x = -1, x = -1

(d) x = 1, x = 1 x = 1

55. What will be the future value of an annuity of ₹2,500 made annually for 12 years at interest rate of 5% compounded annually if $(1.05)^{12} = 1.7958$

(a) ₹37,588.58

(b) ₹39,790.00

(c) ₹40,873.13

(d) ₹42,603.68

56. If the initial investment of ₹4,00,000 becomes ₹6,00,000 in 24 months, then the Compound Annual Growth Rate (CAGR) is:

(a) 30.33%

(b) 22.4%

(c) 19.46%

(d) 14.475

57. Mrs. X invests in an annuity immediately that promises annual payments of ₹50,000 for the next 16 years. If the interest rate is 6% compounded annually then the approximate present value of this annuity is _____, where $(1.06)^{15} = 2.3965$

(a) ₹5,51,217.75

(b) ₹5,75,900.00

(c) ₹5,05,288.08

(d) ₹5,35,612.45

58. If A = {2,4} and B = {1, 2, 3} then $(A \cup B) \times (A \cap B)$ is equal to:

(a) {(1,2), (2, 2) (3, 2)}

(b) {(1,2), (2,2), (2,3), (2,4)}

(c) {(2,1), (2,2), (2,4)}

(d){(1,2), (2,2), (3,2), (4,2)}

59. Find the value of 'x' for the following data.

1 + 7 + 13 + 19…….. + x = 225

(a) 56

(b) 63

(c) 49

(d) 42

60. If $x^3 + y^3 - 3axy = 0$, then $\frac{dy}{dx}$ is equal to:

(a) $\frac{ay-x^2}{y^2-ax}$

(b) $\frac{x^2-ay}{y^2-ax}$

(c) $\frac{ay-x^2}{ax-y^2}$

(d) $\frac{x^2-ay}{ax-y^2}$

61. Find 'n' if ${}^nP_2 = 72$

(a) 12

(b) 36

(c) 24

(d) 9

Nine friends J, K, L, M, N, O, P, Q and R are setting in a row. L is to the right of M and is the third place to the right of N, K is at one end of the row. Q is seated adjacent to botth O and P. O is at th third place to the left of K. J is right next to L and the left of O.

62. Who is immediate left to M?

(a) N

(b) R

(c) L

(d) J

63. Who is sitting at the center of the row?

(a) I

(b) J

(c) O

(d) Q

64. Mr. X walks 14 kilometers towards north. From there, he walks 8 kilometers towards south. Then he walks 8 kilometers towards the west. How far and in which direction is he with reference to his starting point?

(a) 10 Kilometeres North West

(b) 10 Kilometeres West

(c) 7 Kilometers East

(d) 7 Kilometers West

65. Find the missing number

2, 3, 8, ?, 3968

(a) 65

(b) 63

(c) 70

(d) 80

66. If A.M. and G.M. of two positive numbers a and b are 12 and 12, respectively, find the numbers.

(a) 18 and 6

(b) 15 and 9

(c) 16 and 8

(d) 12 and 12

67. In a cumulative frequency curve what is represented on the Y-axis?

(a) Class interval

(b) Cumulative frequency

(c) Frequency density

(d) Relative frequency

68. If the range of a data is 20 and its smallest value is 5, then what is the largest value of data is?

(a) 20

(b) 25

(c) 5

(d) 30

69. In a frequency distribution, the relative frequency of the class is:

(a) The ratio of the class frequency to the total number of classes

(b) The ratio of the class frequency to the total frequency

(c) The ratio of the class frequency to the total number of data points.

(d) The ratio of the class mid point to the class frequency

70. If a card is drawn at random from a pack of 52 cards, what is the chance of getting a Club or a King?

(a) $\frac{13}{52}$

(b) $\frac{4}{52}$

(c) $\frac{17}{52}$

(d) $\frac{16}{52}$

71. If 'x' and 'y' are independent normal variate with mean and Standard deviation μ_1, μ_2 and σ_1, σ_2 respectively, then for z = x + y which also follows normal distribution mean and SD are:

(a) Mean = $\mu_1 + \mu_2, SD = \sqrt{\sigma_1^2 + \sigma_2^2}$

(b) Mean = $(\mu_1 + \mu_2)/2, SD = \sqrt{(\sigma_1^2 + \sigma_2^2)/2}$

(c) Mean = $\mu_1 - \mu_2, SD = \sqrt{\sigma_1^2 - \sigma_2^2}$

(d) Mean = $(\mu_1 + \mu_{2)/2}, SD = \sqrt{(\sigma_1^2 - \sigma_2^2)/2}$

72. For a binomial distribution the mean and standard deviation are 10 and 3 respectively. Find the value of n.

(a) 30

(b) 9

(c) 90

(d) 100

73. An index number constructed to measure the relative change in the price of an item or a group of item is called:

(a) Quantity index number

(b) Price index number

(c) Volume index number

(d) Composite index number

74. Fisher's index does not satisfy following test.

(a) Unit test

(b) Time reversal Test

(c) Circular test

(d) Factor Reversal Test

75. If the Laspeyre's index is 110 and Passche's index is 108, then what is the value of Fisher's index?

(a) 106.50

(b) 107.60

(c) 108.99

(d) 109.88

76. From the year 2013 to 2023, Consumer price index number is increased from 135 to 180. During this period, salary of the employees as per pay commission recommendations was revised from ₹23,000 to ₹29,500. In real terms, an employee should get following additional amount (upto nearest whole number) to maintain his previous standard of living.

(a) ₹1,168

(b) ₹666

(c) ₹909

(d) ₹6,500

77. Given x = $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ $and\ y = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ Then find the value of $\frac{1}{x^2} + \frac{1}{y^2}$

(a) 63

(b) 61

(c) 62

(d) 60

78. If α and β are the roots of the equation $x^2 - 4x + 1 = 0$, then value of $\alpha^3 + \beta^3$ will be

(a) - 76

(b) 76

(c) - 52

(d) 52

79. A software company should recruit more than or equal to 10 employees at a time in their recruitment drive. Under these conditions, company recruits experiences (x) and freshers (y) employees. The values of x and y can be related by the following inequality.

(a) $x + y \leq 10$ $x \geq 0, y \geq 0$

(b) $x + y \geq 10$ $x \geq 0, y \geq 0$

(c) $x + y \neq 10$ $x \geq 0, y \geq 0$

(d) $x + y \geq 10$ $x \leq 0, y \leq 0$

80. A machine costing ₹1,00,000 has useful life of 10 years. If the rate of depreciation is 12%, what is the scrap value of the machine at the end of life? Given $(0.88)^{10} = 0.27850$

(a) ₹25,850

(b) ₹26,850

(c) ₹27,850

(d) ₹28,850

81. Compute the compound interest on ₹6,000 for $1\frac{1}{4}$ years at 8% per annu,. Interest will be compounded quarterly

(a) 642

(b) 630.78

(c) 634.68

(d) 624.48

82. The population of a city increases at the rate of 5% every year. What will be the population of the city in the year 2023, if its population in 2021 was 1,00,000?

(a) 1,05,500

(b) 1,10,250

(c) 1,15,240

(d) 1,20,550

83. Mr. XYZ invested ₹60,000 in a nationalized bank in the form of fixed deposit at the rate of 7.5% per annum simple interest rate. He received ₹73,500 after the end of the term of fixed deposit. Calculate the period for which ₹60,000 was invested in fixed deposit.

(a) 3 years

(b) 3.5 years

(c) 4 years

(d) 4.5 years

84. Calculate the present value of ₹2,000 to be required after 10 years Compounded annually at 5% per annum given $(1.05)^{10} = 1.62889$

(a) 1,227.82

(b) 1,282.48

(c) 1,328.35

(d) 1,822.65

85. If $x = 5t^2 + 3$ and $y = 2t^2 + 1$, then $\frac{dy}{dx}$ can be calculated as

(a) 2

(b) 1

(c) 2t

(d) 2/5

86. If B = {1, 2, 3, 4, 5}, then the number of proper subsets of B is

(a) 120

(b) 30

(c) 31

(d) 32

87. If A = {1,2}, B = {3,4}, C ={5,6} then the value of $A \times (B \cup C)$

(a) {(1,2), (3,4), (5,6)}

(b) {(1,3), (2,3), (1,4), (2,4), (2,5), (1,5), (1,6), (2,6)}

(c) {(1,3),(2,3),(1,4),(2,4),(2,5),(1,5)}

(d) {(3,1),(2,3),(4,1),(2,4),(2,5),(1,5),(1,6),(2,6)}

88. Calculate $\int_1^3 \left(e^x - \frac{1}{x^2}\right) dx$

(a) $e^3 - e - \frac{2}{3}$

(b) $e^2 - e - \frac{1}{3}$

(c) $e^3 + e + \frac{2}{3}$

(d) $e^3 - e + \frac{2}{3}$

89. In a family, there are six members A, B, C, D, E and F. A & B are married couple. A being the male member. D is only son C and is brother of A. E is sister of D. B is daughter-in-law of F, whose husabdn is died. How C is related to B?

(a) Brother

(b) Nephew

(c) Brother-in-law

(d) Sister-in-law

90. Pointing to a lady, Suresh said “She is the mother of my son’s wife’s daughter”. How is Suresh related to lady?

(a) Uncle

(b) Cousin

(c) Daughter-in-law

(d) Father-in-law

91. Mr. X walks northwards. After a while, he turns to his right and a little further to his left. Finally, after walking 200 Meter, he turns to his left again. In which direction is he moving now

(a) North

(b) South

(c) East

(d) West

92. Pointing to lady, a man said “The son of her only brother is brother of my wife”. How is the lady related to man

(a) Mother-in-law

(b) Sister of father-in-law

(c) Mother of Father-in-law

(d) Cousin

93. The Median of the following frequency distribution is

x	0-10	10-20	20-30	30-40	40-50
f(x)	3	5	20	12	7

(a) 27.75

(b) 9.35

(c) 8.25

(d) 10.01

94. Frequency density corresponding to a class interval is ratio of:

(a) Class frequency to class length

(b) Class frequency to total frequency

(c) Class frequency to Cumulative frequency

(d) Class length to class frequency

95. If two variable ‘x’ and ‘y’ are related as $2x – y = 3$, if the median of ‘x’ is 10, what is median of ‘y’?

(a) 4

(b) 7

(c) 5

(d) 6

96. If the mean and median of a moderately asymmetrical series are 26.8 and 27.9 respectively, then the most probable mode is:

(a) 35.4

(b) 30.1

(c) 34.3

(d) 70.8

97. A perpendicular drawn from the point of intersection of two Ogive on the horizontal axis gives the value of

(a) 2nd Quartile

(b) 3rd Quartile

(c) Mode

(d) 1st Quartile

98. A number is selected from the first 30 natural numbers. What is the probability that it would be divisible by 3 or 8?

(a) 0.2

(b) 0.4

(c) 0.6

(d) 0.8

99. If P (A ∩ B) $= \frac{1}{3}, P(A \cup B) = \frac{5}{6}, P(\bar{B}) = \frac{1}{2}, then\ P(\bar{A}) is$:

(a) $\frac{2}{3}$

(b) $\frac{1}{3}$

(c) $\frac{1}{4}$

(d) $\frac{3}{4}$

100. A number is selected at random from the first 100 natural numbers. What is the probability that it would be a multiple of 3 or 7?

(a) $\frac{33}{100}$

(b) $\frac{4}{100}$

(c) $\frac{21}{100}$

(d) $\frac{43}{100}$