(ALL CA FOUNDATION BATCHES)

DATE: 15.01.2021 **MAXIMUM MARKS: 100** **TIMING: 3 Hours**

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. $\log\left(a+\sqrt{a^2+1}\right)+\log\left(\frac{1}{a+\sqrt{a^2+1}}\right)$ is equal to
   (a) 1
   (b) 0
   (c) 2
   (d) $\frac{1}{2}$

2. If $a=1+\frac{1}{2}+\frac{1}{2^2}+\frac{1}{2^3}+------\infty$

   $b=1+\frac{1}{6}+\frac{1}{6^2}+\frac{1}{6^3}+------\infty$

   Then the value of ab is:-
   (a) $\frac{5}{12}$
   (b) $\frac{5}{6}$
   (c) $\frac{12}{5}$
   (d) 2

3. In following data-

	Male	Female
Observations	2	2
GM	4	25

   then find combined geometric mean-
   (a) 9
   (b) 6.11
   (c) 10
   (d) None of these

4. If $x=\log t$ and $y=\frac{1}{t}$, then $\frac{d^2y}{dx^2}+\frac{dy}{dx}$ is equal to :
   (a) 0
   (b) 1
   (c) - 1
   (d) None of these

5. What is the number of ways of arranging the letters of the word "BANANA" so that no two N's appear together?
   (a) 40
   (b) 60
   (c) 80
   (d) 100

6. Coefficient of Variation if Median = 23, Mode = 29 and Variance = 100 is
   (a) 10%
   (b) 50%
   (c) 20%
   (d) None of these

7. If the standard deviation of 0, 1, 2, 3... 9 is k, than standard deviation of 10, 11, 12, 13,.... 19 is
   (a) 10k
   (b) k+10
   (c) k
   (d) $k + \sqrt{10}$

8. Solve $x^3 - 7x + 6 = 0$
   (a) x = –4, –2, –3
   (b) x = 1, 2, –3
   (c) x = 5, 6, –1
   (d) x = 7, 2, –5

9. For the data given calculate Fisher's index
   ΣP_1Q_0 = 3365, ΣP_0Q_0 = 3530,
   ΣP_1Q_1 = 3400, ΣP_0Q_1 = 3600
   (a) 99
   (b) 90
   (c) 90.25
   (d) 94.88

10. Average of first three observation is 14 and average of next two observation is 18 find average of are five observations.
   (a) 14.5
   (b) 15
   (c) 14
   (d) 15.6

11. Six, children A, B, C, D, E and F are standing in a row. B is between F and D. E is between A and C. A does not stand next to F or D. C does not stand next to D. F is between which of the following pairs of children?
   (a) B and E
   (b) B and C
   (c) B and D
   (d) B and A

12. Six members of a family namely A, B, C, D, E and F are travelling together. 'B' is the son of C but C is not the mother of B. A and C are married couple. E is the brother of C, D is the daughter of A. F is the brother of B. How many male members are there in the family?
   (a) 3
   (b) 2
   (c) 4
   (d) 1

13. R and S are brothers. X is the sister of Y and X is mother of R. What is Y to S?
(a) Uncle
(b) Brother
(c) Father
(d) Mother

14. Which of the following is odd one :-
835, 734, 642, 751, 853, 981, 532
(a) 751
(b) 853
(c) 981
(d) 532

15. A man starts form a point, walks 4 miles North, turns to his right and walks 2 miles, again turns to his right and walks 2 miles, again turns to his right and walks 2 miles. In which direction would he be now from his starting point?
(a) North
(b) South
(c) East
(d) West

16. A, B, C, X, Y, Z are seated in a straight line facing North. C is third to the right of Z and B sits second to the right of C. X sits to the immediate right of A. How many persons are seated between A and C ?
(a) One
(b) Two
(c) Three
(d) Four

(Directions Q 17 to 20) Two or Three statements are followed by two conclusions I and II, you have to take the two given statements to be true, disregarding the commonly known facts and then decide which of the given conclusions logically follows from the two given statements?

17. **Statement:** Some Chairs are glasses.
All tree are Chairs
Conclusions: I. Some trees are glasses.
II. Some glasses are trees.
(a) Only I follows
(b) Only II follows
(c) Both I and II follows
(d) Neither I nor II follows

18. **Statement:** All papers are pens.
All pens are erasers.
Conclusions: I. Some erases are papers.
II. Some pens are no papers.
(a) Only I follows
(b) Only II follows
(c) Either I or II follows
(d) Neither I nor II follows

19. **Statement:** Only dogs are animals.
No historian is an animal.
Conclusions: I. Some dogs are not historians.
II. Some historians are not dogs.
(a) Only conclusion I follows.
(b) Only conclusion II follows.
(c) Neither I nor II follows.
(d) Both conclusion I and II follows.

20. **Statement:** All roads are poles
No poles are Bungalows.
Conclusions: I. Some roads are Bungalows.
II. Some Bungalows are poles.
(a) Only conclusion I follows.
(b) Only conclusion II follows.
(c) Both conclusions are correct.
(d) Neither I nor II follows.

21. Raman starts walking in the morning facing the Sun. After sometime, he turned to the left later again he turned to his left. At what direction is Raman moving now ?
(a) East
(b) West
(c) South
(d) North

22. Suresh introduces a man as "He is the son of the woman who is the mother of the husband of my mother". How is Suresh related to the man?
(a) Uncle
(b) Son
(c) Cousin
(d) Grandson

23. If 3^x = 2, 5^y =3 and 2^z =5, find the value of multiply of x.y.z
(a) 0
(b) 1
(c) 2
(d) None of these

24. Using matrix Cramers method
Δ x=6, Δy=12, Δz=18, Δ=3, Find x, y and z values
(a) $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}$
(b) $-1/2,\ -1/4,\ -1/6,$
(c) 2, 4, 6
(d) None

25. if A = $\begin{bmatrix} 4 & 6 \\ 2 & 3 \end{bmatrix}$
    (a) is a singular matrix
    (b) Non-singular matrix
    (c) Identity matrix
    (d) Symmetric matrix

26. If the regression line of y on x is given by Y = x + 2 and Karlpearson's coefficient of correlation is 0.5 then $\frac{\sigma y^2}{\sigma x^2} =$ _____
    (a) 3
    (b) 2
    (c) 4
    (d) None

27. A certain sum of money amounts to Rs. 6,300 in two years and Rs. 7,875 in three years nine months at simple interest find the rate of interest per annum :
    (a) 20%
    (b) 18%
    (c) 15%
    (d) 10%

28. A company establishes a sinking fund to provide for the payment of Rs. 2,00,000 debt maturing in 20 years. Contributions to the hind are to be made at the end of every year. Find the amount of each annual deposit if interest is 5% per annum :
    (a) Rs. 6,142
    (b) Rs. 6,049
    (c) Rs. 6,052
    (d) Rs. 6,159

29. If $(\sqrt{3}+2)$ is a root of a quadratic equation $x^2 + px + q = 0$ then the value of p and q.
    (a) (4,-1)
    (b) (4,1)
    (c) (- 4,1)
    (d) (2,3)

30. In how many ways 5 gents and 5 ladies sit at a round table; if no two ladies are to sit together.
    (a) 720
    (b) 120
    (c) 2,880
    (d) 34,600

31. Two equal sums of money were lent at simple interest at 11 p.a. for $3\frac{1}{2}$ years and $4\frac{1}{2}$ years respectively. If the difference in interests for two periods was Rs. 825 then each sum is :

(a) Rs. 8,250
(b) Rs. 8,500
(c) Rs. 7,500
(d) Rs. 9,250

32. The first, second and third month salaries of a person are in the ratio 2:4:5. The difference between the product of the salaries of first 2 months & last 2 months in 4,80,00,000. Find the salary of the first month.
(a) Rs. 4,000
(b) Rs. 6,000
(c) Rs. 12,000
(d) Rs. 8,000

33. On what sum will the compound interest at 5% per annum for two years compounded annually be Rs. 1640?
(a) Rs. 18,000
(b) Rs. 20,000
(c) Rs. 16,000
(d) None

34. The missing number in the series : 104, 109, 99, 114, 94, ?
(a) 69
(b) 78
(c) 120
(d) None of these

35. $\int (\log x)^2 \, dx$
(a) $x (\log x)^2 - 2 x \log x + 2x + k$
(b) $x (\log x)^2 - 2x + k$
(c) $2x \log x - 2x + k$
(d) None of these

36. Given A = {2, 3}, B = {4, 5}, C = {5, 6} then A × (B∩C) is :
(a) {(2, 5), (3, 5)}
(b) {(5, 2), (5, 3)}
(c) {(2, 3), (5, 5)}
(d) None of these

37. If the sum of n terms is $2n^2+5n$ then its nth term is
(a) 4n – 3
(b) 3n – 4
(c) 4n + 3
(d) 3n + 4

38. The solution of the inequality $8x+6<12x+14$ is
(a) (-2,2)
(b) (0, -2)
(c) $(2,\infty)$
(d) $(-2,\infty)$

39. The AM of 15 observations is 9 and the AM of first 9 observations is 11 and then AM of remaining observations is
(a) 11
(b) 6
(c) 5
(d) 9

40. If log_2 x + log_8 x + log_{32} x = $\frac{23}{15}$ then the value of x is
(a) 8
(b) 5
(c) 2
(d) None of these

41. A sum of money invested of compound interest doubles itself in four years. It becomes 32 times of itself at the same rate of compound interest in
(a) 12 years
(b) 16 years
(c) 20 years
(d) 24 years

42. $\alpha\beta$ are the roots of the $2x^2+3x+7=0$. Then the value of $\alpha\beta^{-1}+\alpha^{-1}\beta$ is
(a) 2
(b) 3/7
(c) 7/2
(d) -19/14

43. A person deposited Rs. 5,000 in a bank. The deposit was left to accumulate at 6% compounded quarterly for the first five years and at 8% compounded semi-annually for the next eight years. The compound interest amount at the end of 13 years is :
(a) Rs. 12,621.50
(b) Rs. 7,613
(c) Rs. 12,613.10
(d) Rs. 7,316

44. If F : R $\rightarrow$ R, f(x) = x+1,
G : R $\rightarrow$ R g(x) = x^2+1
then fog(-2) equals to
(a) 6
(b) 5
(c) -2
(d) None

45. The binomial distribution with mean 3 and variance 2 is.
(a) $\left(\frac{2}{3}+\frac{1}{3}\right)^9$
(b) $\left(\frac{2}{6}+\frac{1}{6}\right)^9$

(c) $\left(\frac{2}{3}+\frac{1}{3}\right)^6$

(d) $\left(\frac{2}{5}+\frac{1}{5}\right)^9$

46. The future value of an annuity of Rs. 1,000 made annually for 5 years at the interest of 14% compounded annually is: [Given that $(1.14)^5=1.92541$]
(a) Rs. 5,610
(b) Rs. 6,610
(c) Rs. 6,160
(d) Rs. 5,160

47. An examination paper with 10 question consist of 6 questions in mathematics and 4 questions in statistic part. At least one question from each part is to be attempted in how many ways can this be done?
(a) 1024
(b) 945
(c) 1005
(d) 1022

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

(a) $\frac{q}{p}$

(b) $\frac{x}{y}$

(c) $\frac{y}{x}$

(d) $\frac{p}{q}$

49. If the inflexion points of a Normal Distribution are 6 and 14. Find its standard Deviation?
(a) 4
(b) 6
(c) 10
(d) 12

50. What is the number of ways that 4 boys and 3 girls can be seated so that boys and girls alternate?
(a) 12
(b) 72
(c) 120
(d) 144

51. If two variables are uncorrelated, their regression lines are:
(a) Parallel
(b) Perpendicular
(c) (a) and (b) both
(d) Inclined at 45 degrees

52. The coefficient of correlation between two variables x and y is 0.28. Their covariance is 7.6. If the variance of x is 9, then the standard deviation of y is:
(a) 8.048
(b) 9.048
(c) 10.048
(d) 11.048

53. The two lines of regression are x+2y–15 = 0 and 2x+3y–18 = 0. The regression equation of Y on X is :
(a) x+2y–15=0
(b) 2x+3y–18 = 0
(c) Both (a) and (b)
(d) None

54. Consider the following data:

Year :	2000	2001	2002	2003	2004
Price :	15	44	36	60	70

The index number for 2003 based on 2000 is:
(a) 300
(b) 250
(c) 400
(d) None of these

55. When the product of price index and the quantity index is equal to the corresponding value index then it is known as :
(a) Unit test
(b) Time reversal test
(c) Factor reversal test
(d) None

56. From the following data

Year	1992	1993	1994	1995	1996
Link Index	100	103	105	112	108

(Base 1992 = 100) for the year 1993-1996. The construction of chain index is:
(a) 103, 100.94, 107, 118.72
(b) 103, 108.15, 121.13, 130.82
(c) 107, 100.25, 104, 118.72
(d) None of these

57. If two regression lines are 3x+4y–18=0 and 5x+2y=10. Then $\sigma_x : \sigma_y$= ?
(a) 0.53
(b) 0.73
(c) 0.60
(d) None

58. If the correlation coefficient $r = \pm 1$ for the random variables X and Y, then the lines of regressions of Y on X and Y on Y
    (a) are perpendicular to each other
    (b) coincide
    (c) intersect with acute angle $\pi/4$
    (d) are parallel to each other

60. The difference between compound interest and simple interest on a sum for 2 years at 8 per cent is Rs. 768. The sum is
    (a) Rs. 1,00,000
    (b) Rs. 1,10,000
    (c) Rs. 1,20,000
    (d) Rs. 1,70,000

61. The effective annual rate of interest corresponding to a nominal rate of 6% per annum payable half – yearly is
    (a) 6.06%
    (b) 6.07%
    (c) 6.08%
    (d) 6.09%

62. What is the difference between the compound interests on Rs. 5,000 for 1 year at 4% per annum compounded yearly and half yearly?
    (a) 2
    (b) 3
    (c) 4
    (d) None of these

63. Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for the next three year, and at the rate of 14% p.a. for the period beyond five years. If he pays a total interest of Rs. 11,440 at the end of the nine years, how much money did he borrow?
    (a) Rs. 11,500
    (b) Rs. 12,000
    (c) Rs. 12,500
    (d) Rs. 15,500

64. Multiple axis line chart is applied for
    (a) Showing multiple charts
    (b) Two or more related time series when the variable are expressed in the same unit
    (c) Two or more related time series when the variables are expressed in different unit
    (d) Multiple variable in the time series

65. The no. of observations falling within a class is called
    (a) density
    (b) frequency
    (c) both
    (d) none

66. G.M. of a set of n observations is the root of their product.
(a) nth
(b) (n+1)th
(c) n^2th
(d) (n-1)th

67. The probability that a number selected from [1,2,3,4,……., 100] is a perfect cube is
(a) $\frac{1}{10}$
(b) $\frac{1}{25}$
(c) $\frac{1}{20}$
(d) $\frac{3}{100}$

68. If ${}^{n+2}C_r = {}^{n+2}C_{10-r}$ then ${}^{n}C_6$ equals to
(a) 8
(b) 28
(c) 56
(d) None of these

69. If it is known that the probability of a missile hitting a target is 1/8, what is the probability that out of 10 missiles fired, at least 2 will hit the target?
(a) 0.4258
(b) 0.3968
(c) 0.5238
(d) 0.3611

70. If four unbiased coins are tossed together, then the probability of getting at least two heads is
(a) 11/16
(b) 13/16
(c) 9/16
(d) 15/16

71. Mohit picked up a prime number from the set of first 20 natural numbers. What is the probability that it is 7?
(a) 1/19
(b) 1/20
(c) 2/7
(d) 1/8

72. The measure of central tendency which is most affected by extreme observations is -
(a) Mean
(b) Median
(c) Geometric mean
(d) Mode

73. How many words, with or without meaning can be formed by using all the letters of the word "MACHINE", so that the vowels occurs only the odd positions ?
(a) 1440
(b) 720
(c) 576
(d) 640

74. The mean salary paid per week to 1,000 employees of an establishment was found to be Rs. 900. Later on, it was discovered that the salaries of two employees were wrongly recorded as Rs. 750 and Rs. 365 instead of Rs. 570 and Rs. 635. Find the corrected mean salary.
(a) 280
(b) 1000
(c) 900.09
(d) 800.09

75. A helicopter flies around a square field, the sides of which measure 100 kms. each. The helicopter covers at a speed of 100 kms. per hour the first side, at 200 kms. per hour the second side, at 300 kms. per hour the third side and 400 kms. per hour the fourth side. Find out the average speed round the square.
(a) 180 km/hr
(b) 192 km/hr
(c) 210 km/hr
(d) 140 km/hr

76. The mean and standard deviation of 10 observations are 35 and 2 respectively. Find out the changed mean and standard deviation if each observation is increased by 5.
(a) 40 , 2
(b) 35 , 7
(c) 40 , 7
(d) None

77. Which of the following elements should come in a place '?' ?
IR10 KP12 MN14 OL16 ?
(a) RS19
(b) RI19
(c) QR19
(d) QJ18

78. If 'HONEY' is coded as JQPGA.
Which word is code as VCTIGVU?
(a) CARPETS
(b) TRAPETS
(c) TARGETS
(d) UMBRELU

79. Identify the single letter, which when removed from the following words form new words.
MINK, WARM, LAMP, TEAM
(a) A
(b) R
(c) M
(d) L

80. A question and two statements numbered I and II are given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.
How many sons does X have?
Statements:-
I. E and W are only two brothers of P.
II. P is the only daughter of Q and X.

(a) Only statement I is sufficient
(b) Only statement II is sufficient
(c) Both statement I and II are sufficient
(d) Both statement I and II are not sufficient

81. Find the odd one out.
(a) C72X
(b) E110V
(c) G140T
(d) J180P

82. The mean of poison distribution is 3.20 find the probability of getting variable X of non zero values - $e^{-3.20} = 0.1108$
(a) 0.1108
(b) 0.8892
(c) 0.3264
(d) 0.12

83. The variance of random variable x is-
(a) $E(x-\mu)^2$
(b) $E[x-E(x)]^2$
(c) $E(x^2-\mu)$
(d) (a) or (b)

84. If $P(\bar{A}\cup\bar{B})=5/6, P(A)=1/2$ *and* $P(\bar{B})=2/3,$ *what is* $P(A\cup B)$?
(a) 1/3
(b) 5/6
(c) 2/3
(d) 4/9

85. On what sum will the compound interest at 5% per annum for 2 years compounded annually be Rs. 3,280?
(a) Rs. 32,000
(b) Rs. 16,000
(c) Rs. 48,000
(d) Rs. 64,000

86. A car that costs Rs. 6,00,000 is bought by paying Rs. 1,00,000 as down-payment and equal annual payments for three-years. What is the annual installment if the interest is paid at 8% on the remaining amount compounded annually?
(a) Rs. 1,94,016.75
(b) Rs. 2,94,016.75
(c) Rs. 1,61,013.75
(d) Rs. 1,74,016.75

87. A sum compounded annually become $\frac{25}{16}$ times of itself in 2 years, the rate of interest per annum is-
(a) 5%
(b) 12.5%
(c) 25%
(d) 50%

88. A person deposited a sum of Rs. 10,000 in a bank. After 2 years, he withdrew Rs. 4,000 and at the end of 5 years, he received an amount of Rs. 7,900; then the rate of simple interest is:
(a) 6%
(b) 5%
(c) 10%
(d) None of these

89. Ravi's father has a son Rohit who has an aunt Laxmi who has a husband Rao whose father-in-law is Mohan. What is the relation of Mohan to Ravi ?
(a) Nephew
(b) Grandfather
(c) Son
(d) Uncle

90. If PLAY is coded as 8123 and RHYME is coded as 49367. What will be code of MALE ?
(a) 6217
(b) 6198
(c) 6395
(d) 6285

91. An area diagram is
(a) Histogram
(b) Frequency Polygon
(c) Ogive
(d) None

92. For a standard normal distribution, the points of inflexion are given by
(a) μ-σ and μ+σ
(b) -σ and σ
(c) -1 and 1
(d) 0 and 1

93. Which one of the following cannot be determined by graphic method-
(a) Mean
(b) Median
(c) Quartiles
(d) Mode

94. Consecutive rectangles in a Histogram have no space in between
(a) true
(b) false
(c) both
(d) none

95. Mean of binomial distribution = 3 and variance = 4 find the value of n-
(a) 8
(b) 9
(c) $\frac{4}{3}$
(d) Not valid

96. If the maximum and minimum values of 10 observations are 40 and 10 then coefficient of range is
(a) $\frac{5}{3}$
(b) $\frac{3}{5}$
(c) 30
(d) None of these

97. What is the G.M. for the numbers 2,4,8,16,32,64?
(a) $2^{5/2}$
(b) $2^{7/2}$
(c) 33
(d) None

98. The area of a normal Curve is
(a) 90%
(b) 95%
(c) Unity
(d) Infinity

99. When the two curves of ogive intersect, the point of intersection provides:
(a) First Quartile
(b) Second Quartile
(c) Third Quartile
(d) Mode

100. Standard Deviation is independent of change of _____ .
(a) Origin
(b) Scale
(c) Both
(d) None of these