(ALL CA FOUNDATION BATCHES)

DATE: 02.01.2021 **MAXIMUM MARKS: 100** **TIMING: 3 Hours**

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. If the compound interest on a certain sum at $16\frac{2}{3}\%$ for 3 years is Rs. 1,270, find the simple interest on the same sum at the same rate and for the same period.
   (a) 1,050
   (b) 1,020
   (c) 1,080
   (d) None of these

2. The number of straight lines can be formed out of 10 point of which 7 are collinear
   (a) 24
   (b) 21
   (c) 25
   (d) 26

3. If $F:R\to R$ is a bijection function given by $f(x)=(x-1)^3+2$ then $f^{-1}(x)$ is
   (a) $(x-2)^{1/3}+1$
   (b) $(x-2)^{-1/3}+1$
   (c) $(x+2)^{1/3}-1$
   (d) None of these

4. If $2x^2 + 5xy + 3y^2 = 1$ then $\frac{dy}{dx}$ is
   (a) $\frac{-4x-5y}{5x+6y}$
   (b) $\frac{4x+5y}{5x-6y}$
   (c) $\frac{4x-5y}{5x+6y}$
   (d) None

5. 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

6. 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

7. If the rate of interests are 6%, 8% and 10% yearly for first, second and third year respectively, then the compound interest for 3 years on the amount Rs. 60,000 will be:-
   (a) Rs. 19,446
   (b) Rs. 15,556.80
   (c) Rs. 16,602
   (d) Rs. 75,556.80

8. For Finding correlation between two attributes, we consider
   (a) Pearson's correlation coefficient
   (b) Scatter diagram
   (c) Spearman's rank correlation coefficient
   (d) Coefficient of document deviations

9. A man invested $\frac{1}{3}$ of his capital at 7% , $\frac{1}{4}$ at 8% and the remainder at 10% Simple interest. If his annual income is Rs. 561, the capital is:
   (a) Rs. 5400
   (b) Rs. 6000
   (c) Rs. 6600
   (d) Rs. 7200

10. The sides of a triangle are in the ratio $\frac{1}{2}:\frac{1}{3}:\frac{1}{4}$. If the perimeter of the triangle is 52 cm, the length of the smallest side is :-
   (a) 9 cm
   (b) 18 cm
   (c) 24 cm
   (d) 12 cm

11. The odds are 9:5 against a person who is 50 years living till he is 70 and 8:6 against a person who is 60 living till he is 80. Find the probability that at least one of them will be alive after 20 years:
   (a) $\frac{11}{14}$
   (b) $\frac{22}{49}$
   (c) $\frac{31}{49}$
   (d) $\frac{35}{49}$

12. log $(1^3+2^3+3^3+---+n^3)$ is equal to :-
    (a) 2 log n + 2 log (n+1) - 2 log 2
    (b) log n + 2 log (n+1) - 2 log 2
    (c) 2 log n + log (n+1) - 2 log 2
    (d) None

13. Five Friends P, Q, R, S and T are sitting in a row facing North. Here S is between T and Q and Q is to the immediate left of R. P is to the immediate left of T. Who is in the middle?
    (a) S
    (b) T
    (c) Q
    (d) R

Directions (Q. 14-15): Following questions are based on the information provided below:
(i) 'P x Q' means 'P is brother of Q.'
(ii) 'P ÷ Q' means 'P is sister of Q.'
(iii) 'P + Q' means 'P is mother of Q.'
(iv) 'P – Q' means 'P is father of Q.'

14. Which of the following means 'M is nephew of R' ?
    (a) M x T + J ÷ R
    (b) R x K – M x T
    (c) R x K - M
    (d) R – K ÷ M

15. Which of the following means 'D is maternal uncle of T' ?
    (a) D x J + T
    (b) D x J - T
    (c) D ÷ J + T
    (d) D ÷ J – T

16. Next term of the series :
    7, 11, 13, 17, 19, 23, 25, 29, ?
    (a) 30
    (b) 31
    (c) 32
    (d) 33

17. Find the next term of the series BKS, DJT, FIU, HHV, ?
    (a) GWJ
    (b) JGW
    (c) GJW
    (d) None

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

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

20. A sum of Rs. 7930 is divided into 3 parts and given on loan at 5% simple interest to A, B and C for 2,3 and 4 years respectively. If the amounts of all three are equal after their respective periods of loan, then the A received a loan of :-
    (a) Rs. 2800
    (b) Rs. 3050
    (c) Rs. 2760
    (d) Rs. 2750

21. Two regression lines always intersect at the means.
    (a) true
    (b) false
    (c) both
    (d) none

22. Link relative index number is expressed for period n is
    (a) $\frac{P_n}{P_{n+1}}$
    (b) $\frac{P_0}{P_{n-1}}$
    (c) $\frac{P_n}{P_{n-1}} \times 100$
    (d) None of these

23. Marshall Edge worth Index formula after interchange of p and q is impressed in terms of:
    (a) $\frac{\Sigma q_n(P_0 + q_n)}{\Sigma q_0(P_0 + q_n)}$
    (b) $\frac{\Sigma P_n(q_0 + q_n)}{\Sigma P_0(q_0 + q_n)}$
    (c) $\frac{\Sigma q_0(q_0 + q_n)}{\Sigma P_n(P_0 + P_n)}$
    (d) None of these

24. Given the following data:

Variable	:	X	Y
Mean	:	80	98
Variance	:	4	9

Coefficient of correlation = 0.6
What is the most likely value of y when x = 90?

(a) 90
(b) 103
(c) 104
(d) 107

25. There are 7 Men and 3 Ladies. Find the number of ways in which a committee of 6 can be formed of them if the committee is to include at least two ladies ?
(a) 160
(b) 180
(c) 150
(d) None

26. The mean proportion between $\frac{a-b}{a+b}$ and $\frac{a^2b^2}{a^2-b^2}$ is:-

(a) $\frac{ab}{a-b}$

(b) $\frac{ab}{a+b}$

(c) $\frac{a-b}{ab}$

(d) $\frac{a+b}{ab}$

27. A distribution in which the values of mean, mode and median coincide is known as -
(a) Asymmetrical distribution
(b) Skewed distribution
(c) Symmetrical distribution
(d) Non-normal distribution

28. If 5^{th} and 12^{th} terms of an AP are 14 and 35 respectively, find the first term of AP.
(a) 4
(b) 2
(c) 1
(d) 3

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

30. Find odd man out of the following series:-
7, 9, 13, 17, 19
(a) 7
(b) 9
(c) 19
(d) 13

31. Covariance = 60
Variance of x = 100 then
(a) Variance of Y should less than 25
(b) Variance of Y should more than 36
(c) Standard deviation of Y should less than 10
(d) None of these

32. Fisher Index = 149.94
Dorbish Index is 150
then find Paache Index
(a) 120
(b) 154
(c) 170
(d) 200

33. 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

34. Two lines of regression are given by 5x+7y-22=0 and 6x+2y-22=0. If the variance of y is 15 find the standard deviation of x.
(a) 2.646
(b) 6.246
(c) 7.612
(d) 3.646

35. The multiplicative time series model is:
(a) Y = T + S + C + I
(b) Y = TSCI
(c) Y= a + bx
(d) $y = a + bx + CX^2$

36. Find A^{-1} for $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

(a) $\begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$

(b) $\begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$

(c) $\begin{bmatrix} 3 & 0 \\ 2 & 5 \end{bmatrix}$

(d) $\begin{bmatrix} -3 & -5 \\ -1 & -1 \end{bmatrix}$

37. 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%

38. The simple interest on a certain sum of money for $2\frac{1}{2}$ year at 12% per annum is Rs. 40 less than the simple interest on the same sum for $3\frac{1}{2}$ years at 10% per annum. Find the sum.
(a) 1,000
(b) 800
(c) 900
(d) None of these

39. Find the missing value in 3/8, 8/19, 18/41, ?, 78/173
(a) 37/84
(b) 40/87
(c) 39/86
(d) 38/85

40. What is the present value of Rs. 1 to be received after two years compounded annually at 10% interest rate ?
(a) 0.73
(b) 0.60
(c) 0.90
(d) 0.83

41. Insurance company is trying to sell you an investment policy that will pay you Rs. 30,000 per year forever. If the required return on this investment is 5.8% p.a. How much will you pay for this policy?
(a) 5,32,241.48
(b) 5,17,241.38
(c) 4,82,348.38
(d) 6,48,441.37

42. In a G.P. If the fourth term is '3' then the product of first seven terms is
(a) 3^5
(b) 3^7
(c) 3^6
(d) 3^8

43. $\alpha\beta$ 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

44. Pointing to an old man, vijay said,"His son is my son's uncle". How is old man related to Vijay?
(a) Brother
(b) Uncle
(c) Father
(d) Grand father

45. If P+Q means P is the mother of Q, P÷Q Means P is the father of Q, P-Q means P is the sister of Q. Then which of the following relationship show that M is the daughter of R?
(a) R÷M+N
(b) R+N÷M
(c) R-M÷N
(d) None

46. A man goes 3 km east from point A and then takes a right turn from point B to move 4 km to point C. What is the minimum distance between point A and point C ?
(a) $2\sqrt{2}km$
(b) $5km$
(c) $7km$
(d) $6km$

(Directions Q 47 to 50) 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?

47. **Statements :**
(i) All pen are rubber.
(ii) All scale is box.
(iii) Some rubber are box.
Conclusions :
(I) Some scale are pen.
(II) No scale are pen.
(a) Only Conclusion I follows
(b) Only Conclusion II follows
(c) Both Conclusion I and II follows
(d) Either Conclusion I or II follows

48. **Statements :**
(i) All A are C.
(ii) All D are C.
Conclusions :
(I) Some D are C.
(II) Some D are not A.
(a) Only conclusion I follows.
(b) Only conclusion II follows.
(c) Either I or II follows.
(d) Both conclusion I and II follows.

49. **Statements :**
(i) Some cups are belt.
(ii) No Belt is black.
Conclusions :
(I) Some belt are cups.
(II) Some cups are not black.
(a) Only conclusion I follows.
(b) Only conclusion II follows.
(c) Either I or II follows.
(d) Both conclusion I and II follows.

50. **Statements :**
(i) All ships are aeroplanes.
(ii) All trucks are ships.
(iii) All cars are trucks.
Conclusions :
(I) Some ships are not cars.
(II) All cars are aeroplanes.
(a) Only conclusion I follows.
(b) Only conclusion II follows.
(c) Either I or II follows.
(d) Neither I nor II follows.

51. K is a place which is located 2 km away in the north-west direction from the capital P. R is another place that is located 2 km away in the south-west direction from K. M is another place and that is located 2 km away in the North-west direction from R. T is yet another place that is located 2 km away in the south-west direction from M. In which direction is T located in relation to P ?
(a) South-West
(b) North-West
(c) West
(d) North

52. Out of the following which is a positional average -
(a) Arithmetic mean
(b) Geocentric mean
(c) Median
(d) Harmonic mean

53. 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

54. Sum of square deviation from mean for any set of observation is -
(a) Negative
(b) Minimum
(c) Zero
(d) None of these

55. _____ is the entire upper part of the table which includes columns and sub-column and unit of measurement.
(a) Stub
(b) Box-head
(c) Body
(d) Caption

56. Which is true from the following.
(a) Q.D<M.D.<S.D
(b) Q.D>M.D>S.D
(c) Q.D<S.D<M.D
(d) Q.D>S.D>M.D

57. If average of 50 person is 2850 Rs. but later on it was discovered one person salary is wrongly taken as 8000 instead of 7800 find correct mean.
(a) Rs. 5,854
(b) Rs. 5,846
(c) Rs. 5,650
(d) Rs. 2,846

58. To check the consistency of two data which measure of dispersion will be used-
(a) QD
(b) SD
(c) CV
(d) None of these

59. In normal distribution QD=6 find SD
(a) 4
(b) 9
(c) 7
(d) 6

60. Skewness of normal distribution is
(a) Positive
(b) Negative
(c) Zero
(d) None of these

61. 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16 find coefficient of variation :
(a) 54.23
(b) 4.69
(c) 8.5
(d) None of these

62. The Q.D. of 6 numbers 15, 8, 36, 40, 38, 41 is equal to
(a) 12.5
(b) 25
(c) 13.5
(d) 37

63. SD of first five consecutive natural numbers is
(a) $\sqrt{10}$
(b) $\sqrt{8}$
(c) $\sqrt{3}$
(d) $\sqrt{2}$

64. The 20th term of arithmetic progression whose 6th term is 38 and 10th term is 66 is_____
(a) 118
(b) 136
(c) 178
(d) 210

65. Find the probable error if r = $\frac{2}{\sqrt{10}}$ and n = 36.
(a) 0.6745
(b) 0.06745
(c) 0.5287
(d) None

66. A.M. of regression coefficients is
(a) Equal to r
(b) Greater then or equal to r
(c) Half of r
(d) None of these

67. If a coin is Tossed 5 times then the probability of getting Tail and Head occurs alternatively is
(a) $\frac{1}{8}$
(b) $\frac{1}{16}$
(c) $\frac{1}{32}$
(d) $\frac{1}{64}$

68. If mean and variance are 5 and 3 respectively then relation between p & q is
(a) p > q
(b) p < q
(c) p = q
(d) p is symmetric

69. The sum of all natural numbers between 100 and 1000 which are multiple of 5 is:
(a) 98450
(b) 96450
(c) 97450
(d) 95450

70. In how many ways the word "arrange" be arranged such that the 2 'r' do not come together?
(a) 1000
(b) 900
(c) 800
(d) None

71. If the difference of S.I and C.I is Rs. 72 at 12 % for 2 years. Calculate the amount.
(a) 8,000
(b) 6,000
(c) 5,000
(d) 7,750

72. If ${}^{13}c_6+2{}^{13}c_5+{}^{13}c_4 = {}^{15}c_x$, then x = _____
(a) 6
(b) 7
(c) 8
(d) 9

73. If a random variable x assumes the values 0, 1 and 2 with probabilities 0.30, 0.50 and 0.20, then its expected value is
(a) 1.50
(b) 3
(c) 0.90
(d) 1

74. The maximum value of the variance of a binomial distribution with parameters n and p is
(a) n/2
(b) n/4
(c) np (1 — p)
(d) 2n

75. An experiment succeeds twice as often as it fails. What is the probability that in next five trials there will be three success.
(a) 192/243
(b) 19/243
(c) 80/243
(d) 50/243

76. If 1.5 per cent of items produced by a manufacturing units are known to be defective, what is the probability that a sample of 200 items would contain no defective item?
(a) 0.05
(b) 0.15
(c) 0.20
(d) 0.22

77. The standard deviation of a Poisson variety is 1.732. What is the probability that the variety lies between -2.3 to 3.68?
(a) 0.65
(b) 0.11
(c) 0.35
(d) None of the

78. S borrows Rs. 5,00,000 to buy a house. If he pays equal instalments for 20 years and 10% interest on outstanding balance what will be the equal annual instalment?
(a) Rs. 48792.72
(b) Rs. 58729.84
(c) Rs. 57829.61
(d) None of these

79. Ramesh wants to retire and receive Rs. 4,000 a month. He wants to pass this monthly payment to future generations after his death. He can earn an interest of 8% compounded annually. How much will he need to set aside to achieve his perpetuity goal?
(a) Rs. 6,00,000
(b) Rs. 6,50,000
(c) Rs. 6,25,000
(d) Rs. 6,80,000

80. If a, b, c are in A.P. and x, y, z are in G.P. then the value of $x^{(b-c)} .y^{(c-a)}. z^{(a-b)}$ is:
(a) 1
(b) 0
(c) b(c - a)
(d) None

81. After qualifying out of 400 professionals, 112 joined service, 120 strarted practice and 160 joined assistantship. There were 32, who were in both practice and service, 40 in both practice and assistantship and 20 in both service and assistantship. There were 12 who did all the three. Find how many could not get any of these.
(a) 88
(b) 244
(c) 122
(d) None

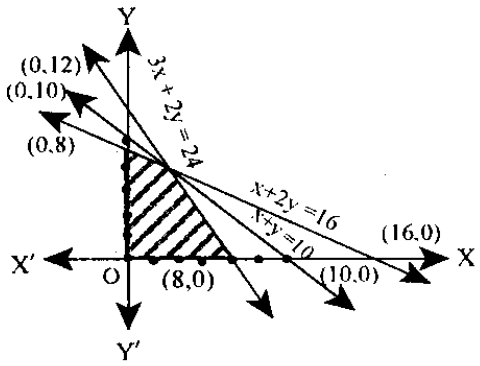
82. If a relation R = {(1,1), (2,2), (1,2), (2,1)} is symmetric on A = {1,2,3} then R is
(a) Reflexive but not Transitive
(b) Transitive but not Reflexive
(c) Reflexive and Transitive
(d) Neither Reflexive nor Transitive

83. If ROSE is written as TQUG, how BISCUIT can be written in that code?
(a) DKUEWKV
(b) CJTDVJU
(c) DKVEWKV
(d) DKUEWKY

84. If MEKLF is coded as 91782 and LLLJK as 88867, how can IHJED is coded as ?
(a) 97854
(b) 64512
(c) 54610
(d) 75632

85. Out of Rs. 20,000 Narendra gives some amount on loan at simple interest rate 8% per annum and rest amount at simple interest rate $\frac{4}{3}$ % per annum. At the end of year he earns Rs. 800. The amount given at 8% rate will be:-
(a) Rs. 8,000
(b) Rs. 6,000
(c) Rs. 10,000
(d) Rs. 12,000

86. The shaded region represents:



(a) $3x+2y \le 24, x+2y \ge 16, x+y \le 10x, x \ge 0, y \ge 0,$
(b) $3x+2y \le 24, x+2y \le 16, x+y \ge 10, x \ge 0, y \ge 0$
(c) $3x+2y \le 24, x+2y \le 16, x+y \le 10, x \ge 0, y \ge 0$
(d) None

87. $A = \begin{bmatrix} 1 & -2 \\ 3 & 2 \end{bmatrix}$

A^{-1} is equal to:-

(a) $\begin{bmatrix} 2/8 & 2/8 \\ -3 & 1/8 \end{bmatrix}$

(b) $\begin{bmatrix} 2/8 & 2 \\ -3/8 & 1/8 \end{bmatrix}$

(c) $\begin{bmatrix} 1/4 & 1/4 \\ -3/8 & 1/8 \end{bmatrix}$

(d) None

88. A sum of money doubles itself in 5 years at compound interest it will be eight times:-
(a) 10 years
(b) 12 years
(c) 15 years
(d) 20 years

89. If you want to accumulate Rs. 50,000 by making equal payments at the end of each quarter for the next five years, what will be the size of these investments, if money is worth 6% per annum converted quarterly?
(a) 3024.13
(b) 2103.13
(c) 2190.02
(d) 2162.29

90. A fertilizer company produces two types of fertilizers called grade I and grade II. Each of these types is processed through two critical chemical plant units. Plant A has maximum of 120 hours available in a week and plant B has maximum of 180 hours available in a week. Manufacturing one bag of grade I fertilizer requires 6 hours in plant A and 4 hours in plant B. Manufacturing one bag of grade II fertilizer requires 3 hours in plant A and 10 hours in plant B Express this using linear inequalities.
(a) $6x + 10y \leq 120$, $3x + 4y \leq 180$, $x, y \geq 0$
(b) $6x + 10y \geq 120$, $3x + 4y \geq 180$, $x, y \geq 0$
(c) $6x + 3y \leq 120$, $4x + 10y \leq 180$, $x, y \geq 0$
(d) $6x + 3y \geq 120$, $4x + 10y \geq 180$, $x, y \geq 0$

91. If α, β are roots of $x^2 + x + 2 = 0$, then the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
(a) $\frac{-2}{3}$
(b) $\frac{-3}{4}$
(c) $\frac{-3}{2}$
(d) None of these

92. Find the effective rate of interest of 9.9% p.a. calculated monthly:-
(a) 9.9%
(b) 11.36%
(c) 9.36%
(d) 10.36%

93. If $2^a = 3^b = 12^c$
then ab is equal to :-
(a) a+b+c
(b) c (a+2b)
(c) c (2a+b)
(d) None

94. Seven person X, Y, Z, P, Q, R and S are sitting around a circular table facing the centre but not necessarily in the same order Q is fourth to the left of Y. P is third to the right of X, Y is to the immediate right of X, Z is fourth to the right of R, R is not an immediate neighbour of P. who is second to the left of S
(a) Q
(b) R
(c) X
(d) Y

95. The number of types of cumulative frequency is –
(a) 1
(b) 2
(c) 3
(d) 4

96. In tabulation 'Caption' is
(a) the upper part of the table
(b) the lower part of the table
(c) the main part of the table
(d) the upper part of the table that describes the column and sub-column

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. A card is drawn at random from a pack. If it is known that the card drawn is red, what is the probability that it is a diamond?
(a) 0.2
(b) 0.3
(c) 0.4
(d) 0.5

99. The interval $(\mu-3\sigma, \mu+3\sigma)$ covers_____area of a normal distribution.
(a) 90%
(b) 95%
(c) 99%
(d) 99.73%

100. If a variable takes the discrete values $\boldsymbol{a}+4, \boldsymbol{a}-\frac{7}{2}, \boldsymbol{a}-\frac{5}{2}, \boldsymbol{a}-3, \boldsymbol{a}-2, \boldsymbol{a}+\frac{1}{2}, \boldsymbol{a}-\frac{1}{2}, \boldsymbol{a}+5\ (\boldsymbol{a}>0)$, then the median is:

(a) $\boldsymbol{a}-\frac{5}{4}$

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

(c) $\boldsymbol{a}-2$

(d) $\boldsymbol{a}+\frac{5}{4}$

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