

(GCF-2, GCF-3, VCF-1, VDCF-1, SCF-1)

DATE: 05.09.2021

MAXIMUM MARKS: 100

TIMING: 3 Hours

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. If $f(x) = {}^x c_2$, then $f^{-1}(3)$ is equal to:-
 - (a) $-\frac{5}{2}$
 - (b) $-\frac{2}{5}$
 - (c) $\frac{5}{2}$
 - (d) $\frac{2}{5}$

2. The cost function for the production of x units of a commodity is given by $c(x) = 2x^3 - 15x^2 + 36x + 15$
 The Cost will be minimum, when x is equal to:-
 - (a) 3
 - (b) 2
 - (c) 1
 - (d) 4

3. If $f(x) = \frac{x-1}{x}$ and $g(x) = \frac{1}{1-x}$ then fog (x) is equal to:-
 - (a) x-1
 - (b) x
 - (c) 1-x
 - (d) -x

4. If a Relation $R = \{(1, 1), (2, 2), (1, 2), (2, 1)\}$ on $A = \{1, 2, 3\}$, then R is:
 - (a) Reflexive, Symmetric and Transitive
 - (b) Reflexive and Symmetric
 - (c) Reflexive and Transitive
 - (d) Symmetric and Transitive

5. The difference between the roots of the equation $x^2 - 7x - 9 = 0$ is:
 - (a) 7
 - (b) $\sqrt{85}$
 - (c) 9
 - (d) $2\sqrt{85}$

6. Let E_1 and E_2 one two linear equations in two variables x and y. (0,1) is a solution of both equations E_1 and E_2 . (2,-1) is a solution of equation E_1 only and (-2,-1) is solution of E_2 only then E_1 and E_2 are:-
 - (a) $x=0, y=1$
 - (b) $2x-y=-1, 4x+y=1$
 - (c) $x+y=1, x-y=-1$
 - (d) $x+2y=2, x+y=1$

7. If one root of the equation is $2 - \sqrt{3}$, form the equation.
- $x^2 - 2x + 2 = 0$
 - $x^2 - 3x + 1 = 0$
 - $x^2 - 5x + 5 = 0$
 - $x^2 - 4x + 1 = 0$
8. Solve $x^3 - 7x + 6 = 0$
- $x = -4, -2, -3$
 - $x = 1, 2, -3$
 - $x = 5, 6, -1$
 - $x = 7, 2, -5$
9. Two machines (I and II) produce two grades of plywood, Grade A and Grade B. In one hour of operation, machine I produces 2 units of Grade A and one unit of Grade B, while machine II, in one hour of operation produces 3 units of grade A and four units of grade B. The machines are required to meet a production schedule of atleast 14 units of grade A and 12 units of grade B. Express this using linear inequalities.
- $2x + 3y \geq 14, x + 4y \geq 12, x \geq 0, y \geq 0$
 - $2x + 3y \leq 14, x + 4y \geq 12, x \geq 0, y > 0$
 - $2x + 3y \leq 14, x + 4y \leq 12, x \geq 0, y \geq 0$
 - $2x + 3y \geq 14, x + 4y \leq 12, x \geq 0, y \geq 0$
10. The numbers a, X, c are in A.P. if $X = 25$ and a, Y, c are in G.P. if $Y = 7$, then the value of (a, c) are:
- 1, 16
 - 1, 25
 - 1, 36
 - 1, 49
11. A person received the salary for the 1st Year is Rs. 5,00,000 per year and he received an increment of Rs. 15,000 per year then the sum of the salary he taken in 10 years.
- Rs. 56,75,000
 - Rs. 72,75,000
 - Rs. 63,75,000
 - None
12. The value of $A^{\frac{1}{2}} \times A^{\frac{1}{4}} \times A^{\frac{1}{8}} \dots \infty$
- zero
 - Infinity
 - $\frac{1}{2}$
 - A

13. In the following rectangle there are numbers and alphabets, what will come in place of question mark?

| | | | |
|---|---|---|---|
| 2 | 4 | 6 | 8 |
| C | F | I | ? |
| D | H | L | P |

- (a) K
(b) N
(c) L
(d) M
14. In a certain code 256 means 'Red Colour Chalk', 589 means 'Green Colour Flower' and 245 means 'White Colour Chalk'. What digit in the code means 'White'?
- (a) 2
(b) 4
(c) 5
(d) None of these
15. If water is called food, food is called tree, tree is called sky, sky is called wall, on which of the following grows a fruit?
- (a) Sky
(b) Tree
(c) Food
(d) Wall
16. Arun started from point A and walked 10 km East to point B, then turned to North and walked 3 km to point C and then turned West and walked 12 kms to point D, then again turned South and walked 3 kms to point E. In which direction is he from his straight point ?
- (a) East
(b) South
(c) West
(d) North
17. How many capital letters of English alphabets have same mirror image?
- (a) 9
(b) 10
(c) 11
(d) 12
18. If + Means X, - Means + and X Means \div , then the value of $5+4-18X3$ is :-
- (a) -45
(b) $12\frac{2}{3}$
(c) 26
(d) 15
19. 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

20. A certain sum of money triples itself in 8 years with simple rate of annual interest. In how many years it will be five times of itself?
- 16 years
 - 18 years
 - 20 years
 - None of these
21. A bag contains coins of Rs. 1, 50 paise and 25 paise in the ratio 4:5:6. If the total amount in the bag is Rs. 120, then the number of coins of 25 paise, is :-
- 60
 - 75
 - 90
 - 96
22. A, B, C, D are four quantities of the same kind such that A:B=4:5, B:C=7:8, C:D=12:13, then A:B:C is :-
- 4:35:104
 - 4:35:84
 - 28:35:40
 - 30:40:45
23. If set $A = \{1, 2, 3\}$, then what is the power set of A ?
- $\{\{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$
 - $\{\phi, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}\}$
 - $\{\phi, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$
 - None
24. The value of $\frac{1}{1+a^{x-y}} + \frac{1}{1+a^{y-x}}$ is equal to :
- 1
 - 0
 - 2
 - a^{x+y+z}
25. Find the present value of Rs. 2000 to be received after 4 years if the interest rate is 8% per annum compounded annually ?
- Rs. 1170.06
 - Rs. 1470.06
 - Rs. 1570.06
 - Rs. 1180.06
26. 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?
- Rs. 1,94,016.75
 - Rs. 2,94,016.75
 - Rs. 1,61,013.75
 - Rs. 1,74,016.75

27. The sum of digit in unit place of all the numbers, formed with the help of 3, 4, 5, 6 taken all a time is :-
(a) 432
(b) 564
(c) 108
(d) 36
28. There are 15 points in a plane, out of there 6 are collinear. The number of straight lines formed by joining these points is:-
(a) 90
(b) 91
(c) 45
(d) 51
29. The number of arrangements of the letters of the word "SALOON" if the two O's do not come together is :-
(a) 360
(b) 720
(c) 240
(d) 120
30. In how many ways a committee of 5 members can be selected from 6 men and 5 women, consisting of 3 men and 2 women?
(a) 108
(b) 300
(c) 140
(d) 200
31. How many different words can be formed with the letters of the word 'MISSISSIPPI'?
(a) 36450
(b) 35460
(c) 34560
(d) 34650
32. If ${}^nP_5 = 20 {}^nP_3$ then n is equal to :-
(a) 7
(b) 6
(c) 8
(d) 5
33. Which is the first positive term of the sequence-
-111, -107, -103, -99.....
(a) 20
(b) 29
(c) 30
(d) 35
34. Insert 4 GM's between 9 and 288 :-
(a) 27, 54, 108, 144
(b) 18, 36, 72, 144
(c) 36, 72, 144, 208
(d) 18, 27, 54, 108

35. If $\log_{10} 2 = x$ and $\log_{10} 4 = y$, then $\log_{10} 80$ is equal to:

- (a) $x - y + 1$
- (b) $x + y + 1$
- (c) $x - y - 1$
- (d) $2x - y + 1$

36. If $\log_3 [\log_2 (\log_3 x)] = 1$ then x is equal to:-

- (a) 8
- (b) 18
- (c) 81
- (d) 6561

37. $\frac{2^{n+3} - 10 \times 2^{n+1}}{2^{n+1} \times 6}$ is equal to:-

- (a) -1
- (b) 1
- (c) 0
- (d) 2

38. Suppose the revenues of a company for five years:-

| Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------|------|------|------|------|------|
| Revenues | 100 | 120 | 160 | 210 | 260 |

Calculate compound annual growth rate.

- (a) 26.98%
- (b) 27.74%
- (c) 25.96%
- (d) 29.01%

39. In a class of 120 students, 35% students can play only cricket, 45% students can play only table tennis and the remaining students can play both the games. In all how many students can play cricket?

- (a) 55
- (b) 66
- (c) 60
- (d) 70

40. If $f: A \rightarrow R$ is a real valued function defined by $f(x) = \frac{1}{x-1}$, then A is:-

- (a) R
- (b) $R - \{1\}$
- (c) $R - \{0\}$
- (d) $R - \{0, 1\}$

41. $\int \frac{dx}{x + \sqrt{x^2 - 1}}$
- (a) $\frac{x^2}{2} - \frac{x}{2} \sqrt{x^2 + 1} + \frac{1}{2} \log (x + \sqrt{x^2 - 1}) + C$
- (b) $x - \frac{x}{2} \sqrt{x^2 - 1} - \frac{1}{2} \log (x + \sqrt{x^2 - 1}) + C$
- (c) $\frac{x^2}{2} + \frac{x}{2} \sqrt{x^2 - 1} + \frac{1}{2} \log (x + \sqrt{x^2 - 1}) + C$
- (d) $\frac{x^2}{2} - \frac{x}{2} \sqrt{x^2 - 1} + \frac{1}{2} \log (x + \sqrt{x^2 - 1}) + C$
42. $\int_1^2 (x^2 - 5x + 2) dx$
- (a) $-\frac{6}{19}$
- (b) $\frac{19}{6}$
- (c) $-\frac{19}{6}$
- (d) 19
43. The derivative of $x^2 \log x$ is : –
- (a) $1 + 2 \log x$
- (b) $2 \log x$
- (c) $x(1 + 2 \log x)$
- (d) None
44. Correlation coefficient is _____ of the units of measurement:
- (a) Dependent
- (b) Independent
- (c) Both
- (d) None
45. The correlation between sale of cold drinks and day temperature is _____.
- (a) Zero
- (b) Positive
- (c) Negative
- (d) None of these
46. If $y = a + bx$, then what is the coefficient of correlation between x and y ?
- (a) 1
- (b) -1
- (c) 1 or -1 according as $b > 0$ or $b < 0$
- (d) None of these

47. If the plotted points in a scatter diagram lie from upper left to lower right, then correlation is:
 - (a) Positive
 - (b) Zero
 - (c) Negative
 - (d) None of these
48. Co-variance may be positive, negative or zero:
 - (a) True
 - (b) False
 - (c) Both
 - (d) None
49. The difference between the observed value and the estimated value in regression analysis is known as:
 - (a) Error
 - (b) Residue
 - (c) Deviation
 - (d) (a) or (b)
50. The two lines of regression meet at:
 - (a) (\bar{x}, \bar{y})
 - (b) (σ_x, σ_y)
 - (c) (σ_x^2, σ_y^2)
 - (d) (x, y)
51. 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
52. If the relationship between two variables x and u is $u + 3x=10$ and between two other variables y and v is $2y+5v=25$, and the regression coefficient of y on x is known as 0.80, then what would be the regression coefficient of v on u?
 - (a) 0.32
 - (b) 0.1066
 - (c) 0.2548
 - (d) 0.1586
53. If the regression coefficient of y on x, the coefficient of correlation between x and y and variance of y are $-3/4$, $-\sqrt{3}/2$ and 4 respectively, what is the variance of x?
 - (a) $2/\sqrt{3}/2$
 - (b) $16/3$
 - (c) $4/3$
 - (d) 4

54. Given below the information about the capital employed and profit earned by a company over the last twenty five years:

| Particulars | Mean | SD |
|----------------------------|------|----|
| Capital employed (000 Rs.) | 62 | 5 |
| Profit earned (000 Rs.) | 25 | 6 |

Correlation coefficient between capital and profit = 0.92. The sum of the Regression coefficients for the above data would be:

- (a) 1.871
 (b) 2.358
 (c) 1.968
 (d) 2.346
55. Find the coefficient of correlation when its probable error is 0.2 and the number of pairs of item is 9:
 (a) 0.505
 (b) 0.332
 (c) 0.414
 (d) 0.316
56. If $P(\overline{A} \cup \overline{B}) = 5/6$, $P(A) = 1/2$ and $P(B) = 2/3$, what is $P(A \cup B)$?
 (a) $1/3$
 (b) $5/6$
 (c) $2/3$
 (d) $4/9$
57. Two dice with face marked 1, 2, 3, 4, 5, 6 are thrown simultaneously and the points on the dice are multiplied together. The probability that product is 12 is:
 (a) $4/36$
 (b) $5/36$
 (c) $12/36$
 (d) None
58. A box contains 5 white and 7 black balls. Two successive draws of 3 balls are made (i) with replacement (ii) without replacement. The probability that the first draw would produce white balls and the second draw would produce black balls are respectively:
 (a) $6/321$ and $3/926$
 (b) $1/20$ and $1/30$
 (c) $35/144$ and $35/108$
 (d) $7/968$ and $5/264$
59. Standard normal distribution have inflexion points:
 (a) μ & σ
 (b) $\mu - \sigma$ & $\mu + \sigma$
 (c) -1 & $+1$
 (d) None of these
60. The probability that A speaks truth is $4/5$, while the probability for B is $3/4$. The probability that they contradict each other when asked to speak on a fact is:
 (a) $3/20$
 (b) $1/5$
 (c) $7/20$
 (d) $4/5$

61. What is the probability that a leap year selected at random would contain 53 Saturdays?
 (a) $\frac{1}{7}$
 (b) $\frac{2}{7}$
 (c) $\frac{1}{12}$
 (d) $\frac{1}{4}$
62. Variance of a random variable x is given by:
 (a) $E(x - \mu)^2$
 (b) $E[x - E(x)]^2$
 (c) $E(x^2 - \mu)$
 (d) (a) or (b)
63. A Binomial distribution is _____. The parameter(s) are:
 (a) Biparametric, n and q
 (b) Biparametric, n and p
 (c) Uniparametric, p
 (d) Uniparametric, q
64. What is the no. of trials of a binomial distribution having mean and SD as 3 and 1.5 respectively?
 (a) 2
 (b) 4
 (c) 8
 (d) 12
65. In Binomial Distribution, $\mu = 4$, $\sigma^2 = 3$, then mode =
 (a) 4
 (b) 4.25
 (c) 4.5
 (d) 4.1
66. A man tosses a fair coin 10 times, the probability that he has heads on the five tosses is:
 (a) ${}^{10}C_5 \left(\frac{1}{2}\right)^{10}$
 (b) $\left(\frac{1}{2}\right)^{10}$
 (c) ${}^5C_1 \left(\frac{1}{2}\right)^{10}$
 (d) $\left(\frac{1}{2}\right)^5$

67. 6 coins are tossed 512 times. Also, compute the mean and SD of the number of heads:
- 2 and 1.33
 - 3 and 1.22
 - 4 and 1.55
 - 2 and 1.11
68. X is a binomial variable such that $2 P(X=2) = P(X=3)$ and mean of X is known to be $10/3$. What would be the probability that X assumes at most the value 2?
- $16/81$
 - $17/81$
 - $47/2473$
 - $46/243$

Directions (Q.69-71) : Read the following information carefully and answer the questions, given below :-

- 'P ÷ Q' means P, is Son of Q
 - 'P x Q' means P, is Sister of Q
 - 'P + Q' means P, is Brother of Q
 - 'P - Q' means P, is Mother of Q
69. How is T related to S in the expression?
'T x R + V ÷ S' ?
- Sister
 - Mother
 - Aunt
 - Daughter
70. How is T related to S in the expression?
'T x R ÷ V - S' ?
- Father
 - Sister
 - Daughter
 - Aunt
71. How is V related to T in the expression?
'T ÷ R + V x S' ?
- Aunt
 - Nephew
 - Niece
 - Uncle

Directions (Q.72 – Q.76) : Study the following information carefully and answer the questions given below:-

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.

72. Which of the following represents the pairs of persons sitting exactly in the middle of the line?
- XB
 - ZB
 - BX
 - XC

73. What is X's position with respect to Z?
(a) Immediate right of Z
(b) Second to the left
(c) Third to the right
(d) Second to the right
74. Three of the following four are alike in a certain way based on their seating positions in the above arrangement and so form a group, which is the one that does not belong to the group?
(a) ZA
(b) XC
(c) XA
(d) CY
75. How many persons are seated between A and C ?
(a) One
(b) Two
(c) Three
(d) Four
76. If A : X and Z : A, then Y :
(a) Y
(b) B
(c) A
(d) X
77. One evening, Raja started to walk toward the Sun. After walking a while, he turned to his right and again to his right. After walking a while, he again turned right. In which direction is he facing ?
(a) South
(b) East
(c) West
(d) North
78. Choose the missing term out of the given alternatives:-
B, S, F, Q, J, O, N, M, ____, ____
(a) R, I
(b) P, K
(c) P, I
(d) R, K
79. "The less than Ogive" is a:
(a) U-shaped curve
(b) J-shaped curve
(c) S-shaped curve
(d) Bell-shaped curve
80. Most of the commonly used frequency curves are:
(a) Mixed
(b) Inverted J-shaped
(c) U-shaped
(d) Bell-shaped

81. A Pie Diagram used to represent the following data:

| Source | Customers | Excise | Income Tax | Wealth Tax |
|---------------------|-----------|--------|------------|------------|
| Revenue in millions | 120 | 180 | 240 | 180 |

The Central Angles corresponding to Income Tax and Wealth Tax-

- (a) $(130^{\circ}, 90^{\circ})$
 - (b) $120^{\circ}, 90^{\circ}$
 - (c) $60^{\circ}, 120^{\circ}$
 - (d) $90^{\circ}, 60^{\circ}$
82. The most appropriate diagram to represent 5 year plan outlay of India in different economic sectors is:
- (a) Pie diagram
 - (b) Histogram
 - (c) Line diagram
 - (d) Frequency polygon
83. The most stable measure of central tendency is:
- (a) Mode
 - (b) Median
 - (c) Mean
 - (d) G.M.
84. The sum of the squares of the deviations of the variable is _____ when taken about AM
- (a) Maximum
 - (b) Zero
 - (c) Minimum
 - (d) None
85. If an observation in the data set is negative, while the others are positive, then its geometric mean is:
- (a) Positive
 - (b) Negative
 - (c) Zero
 - (d) Indeterminant
86. Compute AM, GM and HM FOR 6, 8, 12, 36
- (a) 15.50, 12, 9.93
 - (b) 9.93, 15, 8.65
 - (c) 9.52, 14.35, 8.65
 - (d) 18.25, 19, 7.54
87. If the relationship between x and y is given by $4x-6y=13$ and if the median of x is 16. Find median of y:
- (a) 7.50
 - (b) 8.00
 - (c) 8.50
 - (d) None of these
88. Following are the wages of the labourers: Rs. 82, Rs. 56, Rs. 90, Rs. 50, Rs. 120, Rs. 75, Rs. 75, Rs. 80, Rs. 130, and Rs. 65. Find Q_1 , D_6 , P_{82} .
- (a) Rs. 62.75, Rs. 81.20, Rs. 120.20
 - (b) Rs. 45.35, Rs. 92.50, Rs. 135.20
 - (c) Rs. 56.25, Rs. 110.63, Rs. 85.30
 - (d) Rs. 78.50, Rs. 81.20, Rs. 150.75

89. For a moderately skewed distribution of marks in statistics for a group of 100 students, the mean mark and median mark were found to be 50 and 40. What is the modal mark?
- 15
 - 20
 - 25
 - 30
90. The A.M of square of first '2n' natural numbers is
- $\frac{1}{6}(2n+1)(4n-1)$
 - $\frac{1}{6}(2n-1)(4n-1)$
 - $\frac{1}{6}(2n-1)(4n+1)$
 - $\frac{1}{6}(2n+1)(4n+1)$
91. If the standard deviation of x is 3, what is the variance of (5-2x)?
- 36
 - 6
 - 1
 - 9
92. The sum of the squares of deviations for 10 items from the mean is 250, mean is 50. The coefficient of variation is:
- 25
 - 50
 - 10
 - 100
93. If the values of y are not affected by changes in the values of x, the variables are said to be:
- Correlated
 - Uncorrelated
 - Both
 - Zero
94. Examine the nature of the roots of $3x^2 - 8x + 4 = 0$
- Roots are real and unequal
 - Roots are imaginary and unequal
 - Roots are real, rational and unequal
 - Roots are real, irrational and unequal
95. Which number should be subtracted from 23, 30, 57 and 78 so that remaining numbers are in proportion?
- 4
 - 5
 - 6
 - 7

96. If an examination a candidate was to pass in each of the 4 papers. In how many different ways can be failed?
(a) 14
(b) 16
(c) 17
(d) 15
97. A man walks 5 km toward south and then turns to the north. After walking 3km he turns to the left and walks 5 km. Now his direction from starting point is?
(a) West
(b) North
(c) North – East
(d) South – West
98. If a cartoon containing a dozen mirrors is dropped. Which of the following cannot be the ratio of broken mirrors to unbroken mirrors?
(a) 2:1
(b) 3:1
(c) 3:2
(d) 1:1

Directions (Q.N. 99-100) : Read the following instructions and answer the questions:-

- (i) Ram, Shyam, Harish, Mahesh and Rahim are five boys sitting along a circular table facing towards centre.
(ii) Harish is sitting immediately to the left of Rahim.
(iii) Ram is sitting between Mahesh and Rahim
99. Who is sitting to the immediate left side of Harish?
(a) Rahim
(b) Mahesh
(c) Ram
(d) Shyam
100. Who is sitting between Shyam and Ram ?
(a) Rahim
(b) Mahesh
(c) Harish
(d) Impossible to find

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