(GCF-1, 3, 4, 5, 6, 7+7A, 8+8A, 9, VCF-1,2, ACF-1,2, JCF-1)

DATE: 08.10.2023 **MAXIMUM MARKS: 100** **TIMING: 2 Hours**

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. 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

2. The present value of Rs. 10000 due in 2 years at 5% p.a. compound interest when the interest is paid on half-yearly basis is:
   (a) Rs. 9070.50
   (b) Rs. 9069.50
   (c) Rs. 9065.50
   (d) Rs. 9059.50

3. An annuity consisting of equal payments at the end of each month for 2 years is to be purchased for Rs. 2000. If the interest rate is 6% compounded monthly, how much is each payment?
   (a) 78.61
   (b) 76.80
   (c) 68.70
   (d) 68.50

4. The sum of all odd natural numbers between 36 and 120 is:
   (a) 2000
   (b) 2040
   (c) 3276
   (d) 3726

5. $X^y = e^{x+y}$ then $\frac{dy}{dx} =$
   (a) $\frac{2\log x}{(\log x - 1)^2}$
   (b) $\frac{-\log x - 2}{(\log x - 1)}$
   (c) $\frac{\log x}{(\log x - 1)}$
   (d) $\frac{\log x - 2}{(\log x - 1)^2}$

6. If Fisher's index = 150 and Paasche's index = 144, then Laspeyre's index is_____
   (a) 147
   (b) 156.25
   (c) 160.17
   (d) 138

7. I am three times as old as my son. Five years later, I shall be two and a half times as old as my son. How old am I?
   (a) 40 years
   (b) 45 years
   (c) 50 years
   (d) none of these

8. The future value of an annuity of Rs. 6000 is made annually for 8 years at interest rate of 9% compounded annually is :
   (a) Rs. 66170.84
   (b) Rs. 62195.93
   (c) Rs. 58125.24
   (d) None of these

9. If a sum triple itself in 6 years at C.I. In how many years it will be 27 times itself at the same rate?
   (a) 18
   (b) 54
   (c) 12
   (d) 27

10. If $f(x)=\sqrt{x+\sqrt{x+\sqrt{x+\ldots\infty}}}$, then what is f'(x) equal to ?
   (a) $\frac{1}{1-2f(x)}$
   (b) $\frac{1}{2f(x)-1}$
   (c) $\frac{1}{1+2f(x)}$
   (d) $\frac{1}{2+f(x)}$

11. The useful life of a machine is estimated to be 10 years and cost Rs. 10,000. Rate of depreciation is 10% p.a. The scrap value at the end of its life is
   (a) Rs. 3,486.78
   (b) Rs. 4,383
   (c) Rs. 3,400
   (d) None of these

12. The C.I on Rs. 16000 for $1\frac{1}{2}$ years at 10% p.a payable half -yearly is

(a) Rs. 2,222
(b) Rs. 2,522
(c) Rs. 2,500
(d) None of these

13. Six persons M, N, O, P, Q and R are sitting in two row with three persons in each row, Both the row are in front of each other. Q is not at the end of any row. P is second the left of R. O is the neigbbour of Q and diagonally opposite to P. N is the neigbour of R. Who is in front N ?

(a) R
(b) Q
(c) P
(d) M

Seven friends T, U, V, W, X, Y and Z are sitting in a straight line facing north. W sits fifth to the right of T. W does not sit at any of extreme ends. Two people sit between Z and X. Y sits third to the left of U. Y sits exactly in the middle. Z is not an immediate neighbour of Y.

14. What is Z's position with respect to W ?

(a) Second to the left
(b) Third to the right
(c) Fourth to the left
(d) Third to the left

15. If P is the husband of Q and R is the mother of S and Q. What is R to P ?

(a) Mother
(b) Sister
(c) Aunt
(d) Mother-in-law

16. X and Y are the children of A. A is the father of X but Y is not his son. How is Y related to A?

(a) Sister
(b) Brother
(c) Son
(d) Daughter

17. Given the prices of 2 commodities are increased by 10% and 20% respectively and the price of another commodity is decreased by 30%. The relative importance of 3 commodities are in the ratio 3:3:1. Find weighted price index number.

(a) 80
(b) 109
(c) 108.5
(d) 110

18. 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) $\frac{35}{49}$

19. Cost of paper for a week under the heads raw material, labour, direct production and others were Rs. 23, Rs. 18, Rs. 32, Rs. 17 respectively. What is the difference between the central angles for the largest and smallest components of cost of the paper?
    (a) 60
    (b) 68
    (c) 72
    (d) 56

20. Purchasing power of money is
    (a) Inversely proportional to price index number
    (b) Directly proportional to price index number
    (c) Both (a) and (b)
    (d) None of these

21. Age of applicants for life insurance and the premium of insurance-correlation are :
    (a) positive
    (b) negative
    (c) zero
    (d) None

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

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

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

25. Laspeyre's index is based on
    (a) Base Year Quantities
    (b) Current Year Quantities
    (c) Average of base and current year Quantity
    (d) None of these

26. _____ 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

27. 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

28. If two variable are uncorrelated then regression lines are.
    (a) Parareel
    (b) Perpendicular
    (c) Coincide
    (d) 45^0 Angled

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

30. 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%

31. 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

32. If $A = \{a, b, c\}$ and $R = \{(a, a), (a, b), (b, c), (b, b), (c, c), (c, a)\}$ is a relation on A, then which one of the following is correct?
    (a) R is reflexive, symmetric and transitive
    (b) R is reflexive and symmetric, but not transitive
    (c) R is reflexive and transitive, but not symmetric
    (d) R is reflexive, but neither symmetric nor transitive

33. 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) $\frac{a+b}{ab}$

34. 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

35. Which one of the following cannot be determined by graphic method-

(a) Mean
(b) Median
(c) Quartiles
(d) Mode

36. If $\propto, \beta$ are roots of $x^2 + x + 2 = 0$, then the value of $\frac{\propto}{\beta} + \frac{\beta}{\propto}$:

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

(b) $\frac{-3}{4}$

(c) $\frac{-3}{2}$

(d) None of these

37. 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

38. Which is always true for distinct observations-

(a) Standard Deviation = $\sqrt{\frac{\sum x^2}{n}}$

(b) Standard Deviation = $\sum x^2 + n^2$

(c) $\sum x^2 = n(\sigma^2 + \bar{x}^2)$

(d) $\bar{x}^2 = \sigma^2 + n^2$

39. Mean of binomial distribution = 3 and variance = 4 find the value of n-

(a) 8

(b) 9

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

(d) Not valid

40. (AUB')' is equal to:-

(a) A-B

(b) B-A

(c) A' U B'

(d) A' U B

41. 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

42. 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%

43. 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

44. If 5^{th} and 12^{th} terms of an AP are 14 and 35 respectively, find the first term of AP.

(a) 4

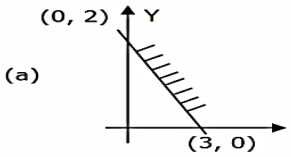
(b) 2

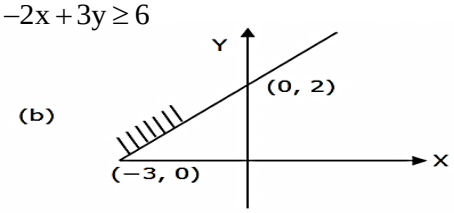
(c) 1

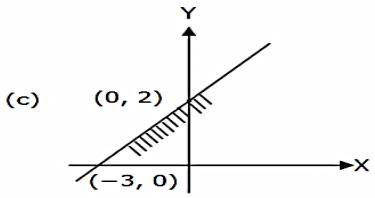
(d) 3

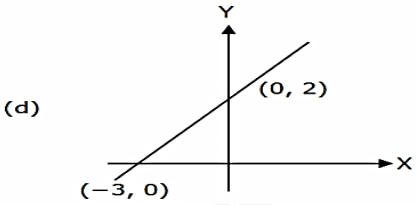
45. How many words, with or without meaning can be formed by using all the letters of the word "MACHINE", so that the vowels occurs only the odd positions ?
(a) 1440
(b) 720
(c) 576
(d) 640

46. Which option shows inequality $-2x + 3y \geq 6$

(a) 

(b) 

(c) 

(d) 

47. 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

48. A sum of money amounts to Rs. 5,200 in 5 years and to Rs. 5,680 in 7 years at simple interest. The rate of interest per annum is :-
(a) 3%
(b) 4%
(c) 5%
(d) 6%

49. The value of $\frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60}$ is :-
(a) 0
(b) 1
(c) 5
(d) 60

50. A bag contains coins of Rs. 1, 50 paisa and 25 paisa in the ratio 4:5:6. If the total amount in the bag is Rs. 120, then the number of coins of 25 paisa, is :-
(a) 60
(b) 75
(c) 90
(d) 96

51. How many different words can be formed with the letters of the word 'MISSISSIPPI'?
(a) 36450
(b) 35460
(c) 34560
(d) 34650

52. 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%

53. A bag contains 4 red, 3 black and 2 white balls, in how many ways 3 balls can be drawn from this bag so that they include at least one black ball?
(a) 64
(b) 46
(c) 85
(d) None of the above

54. If A = {1,2,3,4,5,6,7,8,9,}
B = {1,3,4,5,7,8};C = {2,6,8,} then find (A – B)$\cup$C=
(a) {2,6,}
(b) {2,6,8}
(c) {2,6,8,9}
(d) None of these

55. During a certain period the cost of living Index number goes up from 110 to 200 and the salary of the worker is also raised form Rs. 325 to Rs. 500. Does the worker :
(a) gain
(b) looses
(c) fully compensated
(d) gain lay 10%

56. 5 chairs and 3 tables cost of Rs. 350. and 3 Chairs and 5 tables cost Rs. 370. What is the cost of the one table and two chairs?
(a) Rs. 130
(b) Rs. 120
(c) Rs. 150
(d) Rs. 140

57. The number of diagonals in a polygon of 6 sides :
(a) 9
(b) 8
(c) 6
(d) 12

58. If A = {1, 2, 3, 4, 5} and B = {6, 7, 8}, then cardinal number of A x B is:
(a) 15
(b) 5
(c) 3
(d) 8

59. 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

60. 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

61. 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

62. During a certain period the cost of living Index number goes up from 110 to 200 and the salary of the worker is also raised form Rs. 325 to Rs. 500. Does the worker :
(a) gain
(b) looses
(c) fully compensated
(d) gain lay 10%

63. Regression coefficient are_____
(a) dependent of change of origin and of scale
(b) independent of both change of origin and of scale
(c) dependent of change of origin but not of scale
(d) independent of change of origin but not of scale

64. If 2 per cent of electric bulbs manufactured by a company are known to be defectives, what is the probability that a sample of 150 electric bulbs taken from the production process of the company would contain more than two defective bulbs?
(a) 0.46
(b) 0.43
(c) 0.77
(d) 0.58

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

66. 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

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

68. 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

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

70. A man starts from a point, walk 8 km towards North, turns right and walks 12 km, turns left and walks 7 km turns and walks 20 towards South, turns right and walks 12 km. In which direction is he from the starting point ?
(a) North
(b) South
(c) West
(d) East

Directions (Q. 71-72): 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.'

71. 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

72. 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

73. 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

74. What will be the next term of the following series?
1, 10, 37, 118, _____
(a) 354
(b) 361
(c) 363
(d) 586

75. If HEALTH is written as IFBMUI, then how will NORTH be written in that code ?
(a) OPSUI
(b) GSQNM
(c) FRPML
(d) IUSPO

76. If you are facing north – east and move 10 m forward, turn left and move 7.5 m. then you are
(a) North of your initial position
(b) South of your initial position
(c) East of you initial position
(d) None of the option

77. There are four towns P,Q,R and T. Q is to the south-west of P, R is to the east of Q and southeast of P, and T is to the north of R in line with QP. In which direction of P is T located?
(a) North
(b) North-East
(c) East
(d) South-East

78. Five friends A,B,C,D and E are staying in the same locality. B's house is to the east of A's house and to the north of C's house. C's house is to the west of D's house. D's house is in which direction with respect to A's house?
(a) North-East
(b) South-East
(c) North-West
(d) South-West

79. Pointing to a lady Ravi said, "She is the only daughter of the father of my sister's brother". How is she related to Ravi?
(a) Aunty
(b) Mother
(c) Sister
(d) None

Directions: Find odd One out of the following (80 - 81):

80. 4, 5, 7, 10, 14, 18, 25, 32
(a) 7
(b) 14
(c) 18
(d) 33

81. In a college party, 5 girls are sitting in a row. P is to the left of M and to the right of O. R is sitting to the right of N but to the left of O. Who is sitting in the middle?
(a) O
(b) R
(c) P
(d) M

82. 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

83. The Standard Deviation of first n natural numbers is 2 find the value of n.
(a) 12
(b) 7
(c) 9
(d) 5

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

85. If covariance between two variables is 25
Variance (x) = 36
Variance (y) = 25 Find r.
(a) 0.409
(b) 0.419
(c) 0.833
(d) 0.027

86. If mode is 18 and A.M is 24 find median
(a) 18
(b) 24
(c) 22
(d) 21

87. 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

88. Intersecting point of less than ogive and more than ogive curve -
(a) Mean
(b) Mode
(c) Median
(d) 10^{th} Percentile

89. Random Variable can be
(a) Positive
(b) Negative
(c) Zero
(d) All of these

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

91. f(x) = $\frac{1}{\sqrt{2\pi}} \times e^{\frac{-z^2}{2}} \quad -\infty < z < \infty$ Z refers to
(a) Poison Variate
(b) Normal Variate
(c) Standard Normal Variate
(d) Biometric Table

92. 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 :-
(a) 4:35:104
(b) 4:35:84
(c) 28:35:40
(d) 30:40:45

93. 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

94. 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

95. Chronological classification is :
(a) classification of units on the basis of time
(b) classification of units on the basis of geographical area
(c) classification of units according to the characteristic of attributes
(d) classification of units according to the characteristic of variables

96. The mean of set of observation is $\bar{x}$. If each observation is divided by α , $\alpha \neq 0$ and then is increased by 10, then the mean of the new set is

(a) $\bar{x} / \alpha$

(b) $(\bar{x}+10)/\alpha$

(c) $\frac{\bar{x}}{\alpha} + 10$

(d) $\alpha\bar{x} + 10$

97. For the data given calculate Fisher's index
$\Sigma P_1Q_0 = 3365$, $\Sigma P_0Q_0 = 3530$,
$\Sigma P_1Q_1 = 3400$, $\Sigma P_0Q_1 = 3600$
(a) 99
(b) 90
(c) 90.25
(d) 94.88

98. If $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}$ and $\frac{1}{x}$ are in proportion, then the value of 'x' will be:-
(a) $\frac{2}{15}$
(b) $\frac{15}{2}$
(c) $\frac{10}{3}$
(d) $\frac{5}{6}$

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

100. X is a random variable taking the values 5, 6 and 7 with probabilities 1/3, 1/4 and 5/12, then Find E(X).
    (a) 5.14
    (b) 6.08
    (c) 7.12
    (d) 3.29

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