BUSINESS MATHEMATICS AND LOGICAL REASONING & STATISTICS
(JULY 2021)

1) If $xy+yz+zx = -1$, then the value of $\left(\dfrac{x+y}{1+xy} + \dfrac{z+y}{1+zy} + \dfrac{x+z}{1+zx} \right)$ is

    a)   xyz

    b) $\dfrac{-1}{yz}$

    c) $\dfrac{1}{xyz}$

    d) $\dfrac{1}{x+y+z}$

2) If $\log_4 x + \log_{16} x + \log_{64} x + \log_{256} x = 25/6$ then the value of x is
    a)   64
    b)   4
    c)   16
    d)   2

3) Let U be the universal set, A and B are the subsets of U. If $n(U) = 650$, $n(A) = 310$, $n(A \cap B) = 95$ and $n(B) = 190$, then $n(\bar{A} \cap \bar{B})$ is equal to ($\bar{A}$ and $\bar{B}$ are the complement of A and B, respectively)
    a)   400
    b)   200
    c)   300
    d)   245

4) The range of the function f defined by $f(x) = \sqrt{16 - x^2}$ is
    a)   [-4, 0]
    b)   [-4, 4]
    c)   [0, 4]
    d)   (-4, 4)

5) Let $A = R - \{3\}$ and $B = R - \{1\}$. Let f A → B defined by $f(x) = \dfrac{x-2}{x-3}$. What is the value of $f^{-1}\left(\dfrac{1}{2}\right)$?

    a)   2/3
    b)   3/4
    c)   1
    d)   -1

6) If $f(x) = x^2 - 1$ and $g(x) = |2x + 3|$, then $f_o g(3) - g_o f(-3) =$
    a)   71
    b)   61
    c)   41
    d)   51

7) The number of terms of the series: $5 + 7 + 9 + \ldots$ must be taken so that the sum may be 480
    a)   20

b) 10
c) 15
d) 25

8) If the sum of 'n' terms of an AP (Arithmetic Progression) is $2n^2$, the fifth term is_____
   a) 20
   b) 50
   c) 18
   d) 25

9) The sum of three numbers in a geometric progression is 28. When 7,2 and 1 are subtracted from the first, second and the third numbers respectively, then the resulting numbers are in arithmetic progression. What is the sum of squares of the original three numbers?
   a) 510
   b) 456
   c) 400
   d) 336

10) If α and β are the roots of the equation $2x^2 + 5x + k = 0$, and $4(\alpha^2 + \beta^2 + \alpha\beta) = 23$, then which of the following is true?
   a) $k^2 + 3k - 2 = 0$
   b) $k^2 - 2k + 3 = 0$
   c) $k^2 - 2k - 3 = 0$
   d) $k^2 - 3k + 2 = 0$

11) The cost of 2 oranges and 3 apples is Rs. 28. If the cost of an apple is doubled then the cost of 3 oranges and 5 apples is Rs. 75. The original cost of 7 oranges and 4 apples (in Rs.) is
   a) 59
   b) 47
   c) 71
   d) 63

12) The value of `K' is_____, if 2 is a root of the following cubic equation: $x^3 - (k + 1) x + k = 0$
   a) 2
   b) 6
   c) 1
   d) 4

13) The sum of square of any real positive quantities and its reciprocal is never less than
   a) 1
   b) 2
   c) 3
   d) 4

14) If A = $\begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$ then the value of A^5 is

   a) $\begin{bmatrix} 1 & 0 \\ -1 & 5 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 \\ -5 & 1 \end{bmatrix}$

d) $\begin{bmatrix} 1 & -5 \\ 0 & 1 \end{bmatrix}$

15) If y = 4 + 9 sin 5x then which holds good?
a) $-5 \leq y \leq 13$
b) $-4 \leq y \leq 8$
c) $0 < y < 1$
d) $-5 < y < 5$

16) If $^np_6 = 20\ ^np_4$ then the value of n is given by
a)   n = 5
b)   n = 3
c)   n = 9
d)   n = 8

17) How many numbers of seven digit numbers which can be formed from the digits 3,4,5,6,7,8,9 no digits being repeated are not divisible by 5?
a)   4320
b)   4690
c)   3900
d)   3890

18) A person can go from place 'A' to 'B' by 11 different modes of transport but is allowed to return back to "A" by any mode other than the one earlier. The number of different ways, the entire journey can be complete is_____
a)   110
b) 10^{10}
c) 9^5
d) 10^9

19) The number of ways 5 boys and 5 girls can be seated at a round table, so no two boys are adjacent is
   a) 2550
   b) 2880
   c) 625
   d) 2476

20) A sum of 7500 amounts to Rs. 9075 at 10% p.a., interest being compounded yearly in a certain time. The simple interest (in Rs.) on the same sum for the same time and the same rate is
   a) 1000
   b) 1250
   c) 1800
   d) 1500

21) A loan of 1,02,000 is to be paid back in two equal annual instalments. If the rate of interest is 4% p.a., compounded annually, then the total interest charged (in Rs.) under this instalment plan is
   a) 6160
   b) 8120
   c) 5980
   d) 7560

22) If the desired future value after 5 years with 18% interest rate is Rs. 1,50,000, then the present value (in Rs.) is (Given that $(1.18)^5 = 2.2877$)
   a) 63,712
   b) 65,568
   c) 53,712
   d) 41,712

23) What is the compound interest (in Rs.) on a sum of 12,600 for $1^{1/2}$ years at 20% per annum if the interest is compounded half yearly? (Nearest to a Rupee)
   a) 4271
   b) 4171
   c) 4711
   d) 4117

24) A sum of x amounts to 27,900 in 3 years and to 41,850 in 6 years at a certain rate percent per annum, when the interest is compounded yearly. The valueof x is
   a) 16080
   b) 18600
   c) 18060
   d) 16800

25) If the nominal rate of growth is 17% and inflation is 9% for the five years. Let P be the Gross Domestic Product (GDP) amount at the present year then the projected real GDP after 6 years is
   a) 1.587 P
   b) 1.921 P
   c) 1.403 P
   d) 2.51 P

26) If a person bought a house by paying 45,00,000 down payment and Rs. 80,000 at the end of each year till the perpetuity, assuming the rate of interest as 16%, the present value of house (in Rs.) is given as
   a) 47,00,000

b) 45,00,000
c) 57,80,000
d) 50,00,000

27) Let the operating profit of a manufacturer for five years is given as:

Year	1	2	3	4	5	6
Operating profit (in Iakh Rs.)	90	100	106.4	107.14	120.24	157.35

Then the operating profit of Compound Annual Growth Rate (CAGR) for year 6 with respect to year 2 is given at
a) 9%
b) 12%
c) 11%
d) 13%

28) If discount rate is 14% per annum, then how much a company has to pay to receive 280 growing at 9% annually forever.
a) 5,600
b) 2,800
c) 1,400
d) 4,200

29) The effective rate of return for 24% per annum convertible monthly is given as
a) 24%
b) 26.82%
c) 18%
d) 24.24%

30) If the cost of capital be 12% per annum, then the net present value (in nearest Rs.) from the given cash flow is given as

Year	0	1	2	3
Operating profit (in thousands Rs.)	(100)	60	40	50

a) 31048
b) 34185
c) 51048
d) 24187
Note: Correct Ans is Rs. 21,048/- by taking the nearest value option D is preferable

31) A certain sum amounts to Rs. 15748 in 3 years at simple interest at r% p.a. The same sum amounts to Rs. 16,510 at (r+2)% p.a. simple interest in the same time What is the value of r?
a) 10%
b) 8%
c) 12%
d) 6%

32) What is the difference (in Rs.) between the simple interest and the compound interest on a sum of 8,000 for $2^{2/5}$ years at the rate of 10% p.a., when the interest is compounded yearly?
a) 135.75
b) 129.50
c) 151.75
d) 147.20

33) The future value of annuity of Rs. 2,000 for 5 years at 5% compounded annually is given (in nearest Rs.) as
a) 51051
b) 21021
c) 15624
d) 61254
NOTE: Correct Ans is Rs. 11,051/- by taking the nearest value option C is preferable

34) In a market there are 30 shops to allocate to people. If they allocate x shops then their monthly expenses, in rupees, is given by, $P(x) = -8x^2 + 400x - 1000$, then the number of shops should they allocate to minimize the expenses.
a) 0
b) 30
c) 25
d) 10

35) The cost function $C(x) = 125 + 500x - x^2 + x^3/3$, $0 \le x \le 100$ and the demand function for the items is given by, $p(x) = 1500 - x$, then the marginal profit when 18 items are sold is
a) 751
b) 571
c) 676
d) 875

36) If $f(x) = 3e^{x^4}$ then $f'(x) - 4x^3 f(x) + \left(\dfrac{1}{3}\right) f(0) - f'(0)$ is equal to

a) 0

b) e^{x^4}

c) 1
d) -1

37) The value of $\int_{-2}^{2} f(x)\, dx$, where $f(x) = 1+x$, $x \le 0$; $f(x) = 1-2x$, $x \ge 0$ is
a) 20
b) -2
c) -4
d) 0

38) The salaries of A,B and C are of ratio 2:3:5. If the increments of 15%, 10% and 20% are done to their respective salaries, then find the new ratio of the salaries.
a) 23:33:60
b) 33:23:60
c) 23:60:33
d) 33:60:23

39) A vessel contained a solution of acid and water in which water was 64%. Four litres of the solution were taken out of the vessel and the same quantity of water was added. If the resulting solution contains 30% acid, the quantity(in litres) of the solution, in the beginning in the vessel, was
a) 12
b) 36
c) 24
d) 27

40) If A : B = 5 : 3. B : C = 6 : 7 and C : D / 14 : 9, then the value of A:B:C:D

a) 20 : 14 : 12 : 9
b) 20 : 9 : 12 : 14
c) 20 : 9 : 14 : 12
d) 20 : 12 : 14 : 9

41) Choose the missing term in the series ......1,1,8,4.27,_____64,16
a) 27
b) 11
c) 9
d) 125

42) The wrong term in the series ...... 225,196,169,144,121,100,77,64, is_____
a) 121
b) 77
c) 100
d) 169

43) If DELHI is coded as EFMIJ then JAIPUR is coded as_____
a) JQVSBK
b) QVSKBJ
c) BJQVSK
d) KBJQVS

44) If FRAME is coded as 0618011305 then ARISE is coded as_____
a) 0118091905
b) 0119091805
c) 0118190905
d) 0118091805

45) If CLOCK is coded as 34235 and TIME as 8679, then MOTEL is coded as
a) 27894
b) 72964
c) 72894
d) 77684

46) A and B start moving towards each other from two places 200 m apart. After walking 60 m, B turns left and goes 20 m, then he turns right and goes 40 m. He then turns right again and comes back to the road on which he had started walking. If A and B walk with the same speed, what is the distance between them now?
a) 80 m
b) 70 m
c) 40 m
d) 60 m

47) 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

48) 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 0 is in which direction with respect to A's house?
a) North-East

b) South-East
c) North-West
d) South-West

49) One morning, after sunrise, Vikram and Shailesh were standing in a lawn with their backs towards each other. Vikram's shadow fell exactly towards left hand side. Which direction was Shailesh facing?
a) South-West
b) West
c) South
d) East-South

50) Pointing towards "A", "B", said : "Your mother is the younger sister of my mother". "A" is related to "B" as
a) Uncle
b) Cousin
c) Nephew
d) Father

51) Shyam's mother said to Shyam "my mother has a son whose son is Ram". Shyam is related to Ram as_____.
a) Uncle
b) Cousin
c) Nephew
d) Grandfather

52) Amit said "This girl is the wife of the grandson of my mother". How Amit related to the girl?
a) Father-in-law
b) Grandson
c) Father
d) Son

53) A is the son of C; C and Q are sisters; Z is the mother of Q and P is the son of Z. Which of the following statements is true?
a) A and P are cousins
b) C and P are sisters
c) P is the maternal uncle of A
d) A is the maternal uncle of P

54) A,B,C,D and E are sitting on a bench. A is sitting next to B. C is sitting next to D, D is not sitting with E who is on the left end of the bench. C is on the second position from the right. A is to the right of B and E. A and C are sitting together. In which position A is sitting between?
a) C and D
b) D and E
c) B and C
d) B and D

55) Five girls are sitting on a bench to be photographed. Seema is to the left of Rani and to the right of Bindu. Mary is to the right of Rani. Reeta is between Rani and Mary. Who is sitting immediate right to Reeta?
a) Seema
b) Rani
c) Bindu
d) Mary

56) Six friends P,Q,R,S,T and U are sitting around the hexagonal table each at one corner and are facing the centre of the hexagonal. P is second to the left of U. Q is neighbor of R and S. T is second to the left of S. Which one is sitting opposite to S?
a)   R
b)   P
c)   Q
d)   T

57) A,B,C,D,E,F and G are sitting in a row facing North:
1. F is to the immediate right of E.
2. E is 4th to the right of G.
3. C is the neighbor of B and D.
4. Person who is third to the left of D is at one of ends.
Who are to the right of D?
a)   E and F only
b)   G,B and C
c)   E,F and A
d)   G and B only

58) Statement: All fruits are lions. All lions are foxes. Some foxes are beggars.
Conclusion -
i. All fruits are foxes.
ii. Some fruits are beggars
a)   Only I follows
b)   Only II follows
c)   None follows
d)   Both I and II follows

59) Statement: All flowers are toys. Some toys are idiots. Some angles are idiots.
Conclusion -
i. Some angles are toys.
ii. Some idiots are flowers.
iii. Some flowers are angles
a)   Only I follows
b)   Only II follows
c)   Only III follows
d)   None follows

60) Statement: Some buttons are rivers. Some rivers are shirts. All shirts are people.
Conclusion -
i. Some people are rivers.
ii. Some people are buttons
iii. Some shirts are buttons.
a)   Only I follows
b)   Only II follows
c)   Only III follows
d)   Both II and III follows

61) Expenditures of a Company (in Million Rupees) per item in various Years

Year	Item of Expenditures				
	Salary	Fuel and Transport	Bonus Interest	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88

2002	420	142	3.96	49.4	98

What is the average amount of interest per year which the company had to pay during this period?
a)   33.66
b)   36.66
c)   31.66
d)   39.66

62)   There are n numbers. When 50 is subtracted from each of these number the sum of the numbers so obtained is -10. When 46 is subtracted from each of the original n numbers, then the sum of numbers, so obtained is 70. What is the mean of the original n numbers?
a)   56.8
b)   25.7
c)   49.5
d)   53.8

63)   The mean of 'n' observation is 'X'. If K is added to each observation, then the new mean is_____
a)   X
b)   XK
c)   X - K
d)   X + K

64)   If y = 3 + 1.9 x, and mode of x is 15, then the mode of y is
a)   15.9
b)   27.8
c)   35.7
d)   31.5

65)   The mean deviation of the numbers 3,10,6,11,14,17,9,8,12 about the mean is (correct to one decimal place)
a)   8.7
b)   4.2
c)   3.1
d)   9.8

66)   The standard deviation of 1 to 9 natural numbers is_____
a)   6.65
b)   2.58
c)   6.75
d)   5.62

67)   The probable value of mean deviation when Q3 = 40 and Q1 = 15 is_____
a)   15
b)   18.75
c)   17.50
d)   0

68)   If the numbers are 5,1,8,7,2, then the coefficient of variation is
a)   56.13%
b)   59.13%
c)   48.13%
d)   44.13%

69)   If every observation is increased by 7 then
a)   Standard Deviation increases by 7

b) Mean deviation increases by 7
c) Not affected at all
d) Quartile Deviation increases by 7

70) If a school has 14 teachers, their heights (in cm) are:
172,173,164,178,168,169,173,172,173,164,178,168,169,173, then average deviation of this data is
a) 2.43 approx.
b) 3.93 approx.
c) 3.43 approx.
d) 2.92 approx.

71) If the relationship between x and y is given by 2x + 3y = 10 and the range of y is 10, then what is the range of x?
a) 10
b) 18
c) 8
d) 15

72) If the sum of the product of the deviation and Y from their means is zero, the correlation coefficient between X
a) Zero
b) Positive
c) Negative
d) 10

73) If the slope of the regression line is calculated to be 5.5 and the intercept 15 then the value of Y when X is 6 is
a) 88
b) 48
c) 18
d) 78

74) If Y = 9X and X = 0.01Y, then r is equal to:
a) -0.1
b) 0.1
c) 0.3
d) -0.3

75) The straight - line graph of the linear equation Y = a + b X, slope is horizontal if:
a) b = 1
b) b ≠ 0
c) b = 0
d) a = b ≠ 0

76) If b_{yx} = -1.6 and b_{xy} = -0.4, then r_{xy} will be
a) 0.4
b) -0.8
c) 0.64
d) 0.8

77) The consumer price Index goes up from 120 to 180 when salary goes up from 240 to 540, what is the increase in real terms?
a) 80
b) 150
c) 120
d) 240

78) The weighted aggregative price index numbers for 2001 with 2000 as the base year using Paashe's Index Number is

Commodity	Price (in Rs.)		Quantities	
	2000	2001	2000	2001
A	10	12	20	22
B	8	8	16	18
C	5	6	10	11
D	4	4	7	8

a)   112.32
b)   112.38
c)   112.26
d)   112.20

79) The weighted aggregative price index numbers for 2001 with 2000 as the base year using Marshal - Edgeworth Index Number is

Commodity	Price (in Rs.)		Quantities	
	2000	2001	2000	2001
A	10	12	20	22
B	8	8	16	18
C	5	6	10	11
D	4	4	7	8

a)   112.26
b)   112.20
c)   112.32
d)   112.38

80) The weighted aggregative price index numbers for 2001 with 2000 as the base year using Fisher's Index Number is

Commodity	Price (in Rs.)		Quantities	
	2000	2001	2000	2001
A	10	12	20	22
B	8	8	16	18
C	5	6	10	11
D	4	4	7	8

a)   112.32
b)   112.20
c)   112.38
d)   112.26

81) If in an additive model 0 refers to original data as 875, T refers to trend 700, S refers to seasonal variations -200, C refers to cyclical variations 75 then the value of I which refers to irregular variations is
a)   -100
b)   -170
c)   -140
d)   -150

82) There were 200 employees in an office in which 150 were married. Total male employees were 160 out of which 120 were married. What was the number of female unmarried employees?
a)   30
b)   40
c)   50
d)   10

83) Data collected on religion from the census reports are
    a) Primary data
    b) Unclassified data
    c) Sample data
    d) Secondary data

84) Which of the following diagram is the most appropriate to represents various heads in total cost?
    a) Pie chart
    b) Bar graph
    c) Multiple line chart
    d) Scatter plot

85) In a graphical representation of data, the largest numerical value is 4 the smallest numerical value is 25. If classes desired are 4 then which class interval is
    a) 45
    b) 5
    c) 20
    d) 7.5

86) In graphical representation of data, ideographs are also called as
    a) Picto-graphs
    b) Asymmetry graphs
    c) Symmetry graphs
    d) Pictograms

87) _____means separating items according to similar characteristics grouping them into various classes.
    a) Classification
    b) Editing
    c) Separation
    d) Tabulation

88) Frequency density of a class interval is the ratio of_____
    a) Class frequency to the total frequency
    b) Class length to class frequency
    c) Class frequency to the cumulative frequency
    d) Frequency of that class interval to the corresponding class length

89) A graph that uses vertical bars to represent data is called a
    a) Line graph
    b) Scatter plot
    c) Vertical graphs
    d) Bar graph

90) A biased coin is such that the probability of getting a head is thrice the probability of getting a tail. If the coin is tossed 4 times, what is the probability of getting a head all the times?
    a) 2/5
    b) 81/128
    c) 81/256
    d) 81/64

91) If there are 16 phones, 10 of them are Android and 6 of them are of Apple, then the probability of 4 randomly selected phones to include 2 Android and 2 Apple phone is

a) 0.47
b) 0.51
c) 0.37
d) 0.27

91)

92) If there are 48 marbles marked with numbers 1 to 48, then the probability of selecting a marble having the number divisible by 4 is
a) 1/2
b) 2/3
c) 1/3
d) 1/4

93) If in a class, 60% of the student study Mathematics and Science and 90% of the student study Science, then the probability of a student studying Mathematics given that he / she is already studying Science is
a) 1/4
b) 2/3
c) 1
d) 1/2

94) A bag contains 7 Blue and 5 Green balls. One ball is drawn at random. The probability of getting a Blue ball is_____
a) 5/12
b) 12/35
c) 7/12
d) 0

95) The probability that a football team loosing a match at Kolkata is 3/5 and winning a match at Bengaluru is 6/7, the probability of the team winning at least one match is_____
a) 3/35
b) 18/35
c) 32/35
d) 17/35

96) The value of K for the probability density function of a variate X is equal to

X	0	1	2	3	4	5	6
P (X)	5K	3K	4K	6K	7K	9K	11K

a) 39
b) 1/40
c) 1/49
d) 1/45

97) In normal distribution, Mean, Median and Mode are
a) Zero
b) Not Equal
c) Equal
d) Null

98) It is a Poisson variate such that $P(x = 1) = 0.7$, $P(x = 2) = 0.3$, then $P(x = 0) =$
a) $e^{6/7}$
b) $e^{-6/7}$
c) $e^{-2/3}$
d) $e^{-1/3}$

99) If X is a binomial variate with p = 1/3, for the experiment of 90 trials, then the standard deviation is equal to
   a) $-\sqrt{5}$
   b) $\sqrt{5}$
   c) $2\sqrt{5}$
   d) $\sqrt{15}$

100) For a certain type of mobiles, the length of time between charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. A person owns one of these mobiles and wants to know the probability that the length of time will be between 50 and 70 hours is (Given ϕ)(1.33) = 0.9082, ϕ(0) = 0.5)
   a) -0.4082
   b) 0.5
   c) 0.4082
   d) -0.5

ANSWER KEY

1.	C	2.	C	3.	D	4.	C	5.	C	6.	D	7.	A
8.	C	9.	D	10.	D	11.	A	12.	B	13.	B	14.	C
15.	A	16.	C	17.	A	18.	A	19.	B	20.	D	21.	A
22.	B	23.	B	24.	B	25.	A	26.	D	27.	B	28.	A
29.	B	30.	21048	31.	B	32.	D	33.	11051.26	34.	C	35.	C
36.	C	37.	B	38.	A	39.	C	40.	D	41.	C	42.	B
43.	D	44.	A	45.	C	46.	C	47.	B	48.	B	49.	C
50.	B	51.	B	52.	A	53.	C	54.	C	55.	D	56.	B
57.	C	58.	A	59.	D	60.	A	61.	B	62.	49.37	63.	D
64.	D	65	C	66.	2.61	67.	A	68.	B	69.	C	70.	C
71.	D	72.	A	73.	B	74.	C	75.	C	76.	B	77.	125
78.	D	79.	A	80.	D	81.	A	82.	D	83.	D	84.	A
85.	B	86.	D	87.	A	88.	D	89.	D	90.	C	91.	0.37
92.	C	93.	B	94.	C	95.	C	96.	C	97.	C	98.	B
99.	C	100.	C										