

**Paper- 4: FUNDAMENTALS OF BUSINESS MATHEMATICS
AND STATISTICS**

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Full Marks: 100

Time Allowed: 3 Hours

Section – A

(Fundamentals of Business Mathematics)

PART – A

1. (a) Choose the correct answer from the given four alternatives: [9×2 = 18]

(i) 20 litres of a mixture contain milk and water in the ratio 5 : 3. If 4 litres of this mixture are replaced by 4 litres of milk, the ratio of milk to water in the new mixture will become:

- (a) 2 : 1
- (b) 6 : 3
- (c) 7 : 3
- (d) 8 : 3

(ii) $81^{(\log_5 3)^{-1}} + 27^{\log_9 36} \left[3^{(\log_9 9)^{-1}} \right]^4$ gives:

- (a) 216
- (b) 625
- (c) 890
- (d) 980

(iii) On the average experienced person does 5 units of work, while a fresh one 3 units of work daily but the employer has to maintain an output of at least 30 units of work per day. This situation can be expressed as

- (a) $5x + 3y \leq 30$
- (b) $5x + 3y \geq 30$
- (c) $5x + 3y > 30$
- (d) None of these

(iv) The difference between simple interest and compound interest on a sum of money for 2 years at 5% is ₹25. The sum is

- (a) ₹ 8,000
- (b) ₹ 9,000
- (c) ₹ 10,000
- (d) ₹ 15,000

- (v) In how many ways can 5 beads of different colours form a necklace
- (a) 24
 - (b) $\frac{4!}{2}$
 - (c) 56
 - (d) None of these
- (vi) Eight guests have to be seated, 4 on each side of a long rectangular table, 2 particular guests desire to sit on one side of the table and 3 others on the another side. The number of ways in which the selection can be made is
- (a) 4
 - (b) 3
 - (c) 5
 - (d) None of these
- (vii) If the arithmetic mean between two numbers x and y is thrice their geometric means, then the ratio $x : y$ could be -
- (a) $17 + 12\sqrt{2}$
 - (b) $17 - 12\sqrt{2}$
 - (c) $17 \pm 12\sqrt{2}$
 - (d) None of these.
- (viii) The ratio between the sum of n terms of two arithmetical progressions is $(7n + 1) : (4n + 27)$. The ratio of their 11th term is -
- (a) 124: 105
 - (b) 136 : 117
 - (c) 148: 111
 - (d) None of these.
- (ix) If $A \Delta B = (A - B) \cup (B - A)$ and $A = \{1, 2, 3, 4\}$, $B = \{3, 5, 7\}$ then $A \Delta B$ is
- (a) $\{1, 2, 4, 5, 7\}$
 - (b) $\{3\}$
 - (c) $\{1, 2, 3, 4, 5, 7\}$
 - (d) None of these

- (b) State whether the following statements are True (or) False. [6×1=6]
- (i) The ratio of two numbers is 12:5. If antecedent is 45 then the consequent is 108
 - (ii) The rate of S.I p.a a sum of money grows to one and a half times itself in 8 yrs is $6\frac{1}{2}\%$
 - (iii) The statements "Equivalent sets are always equal is True (or) False
 - (iv) There are 8 questions in an examination paper and each question has an alternative. The number of ways in which a student can give his answer is 6561.
 - (v) The value of $\left(\frac{243}{32}\right)^{-4/5}$ is $\frac{81}{16}$.
 - (vi) The C.I on a certain sum of money for 1 year at 8% p.a compounded quarterly is ₹ 824 then the sum is ₹ 10,000

PART - B

Answer any four questions out of six questions: [4×4=16]

2. A Dealer mixes Tea costing ₹ 6.92 per kg. with Tea costing ₹ 7.77 per kg. and sells the mixture at ₹ 8.80 per kg. and earns a profit of 17.5% on his Sale Price. In what proportion does he mix them? [4]
3. A sum of money invested at C.I. payable yearly amounts to ₹ 10,816 at the end of the second year and to ₹ 11,248.64 at the end of the third year. Find the rate of interest and the sum. [4]
4. How many terms of A.P. 24, 20, 16,... amount to 72. Explain the double answer. [4]
5. If $x = \log_{2a} a$, $y = \log_{3a} 2a$, $z = \log_{4a} 3a$, show that : $xyz+1 = 2yz$ [4]
6. If ${}^nC_r = 56$ and ${}^nP_r = 336$. Find r and n. [4]
7. Solve $\left(x - \frac{1}{x}\right)^2 + 2\left(x + \frac{1}{x}\right) = 7\frac{1}{4}$. [4]

Section – B

PART - A

8. Answer All objective questions.

(a) Answer Multiple Choice Question

[12×2= 24]

- (i) The sum of all the relative frequencies in a sample is equal to
- (a) the sample size
 - (b) zero
 - (c) one
 - (d) none of these
- (ii) The ordinal classification is
- (a) The classification of data on the basis of attributes
 - (b) The classification of data on the basis of numeric characteristics
 - (c) The classification of data on the basis of qualitative data
 - (d) both (a) and (c)
- (iii) If the mean of two values is 16 and their H.M is 9, then their G.M is
- (a) 10
 - (b) 12
 - (c) 14
 - (d) 16
- (iv) The 8th decile of the following observation is 29, 18, 15, 30, 42, 35, 34, 28, 45, 34
- (a) 44.6
 - (b) 40.6
 - (c) 34.15
 - (d) 38.15
- (v) The slope of regression line of x on y is
- (a) b_{yx}
 - (b) b_{xy}
 - (c) $1/b_{xy}$
 - (d) $1/b_{yx}$

- (vi) If the two regression lines in a bivariate distribution are $x + 9y = 7$ and $y + 4x = 16$, then $S_x : S_y$ is
- (a) 3 : 2
 - (b) 2 : 3
 - (c) 9 : 4
 - (d) 4 : 9
- (vii) If the rank correlation coefficient between two variables is 0.6 and the sum of squares of the differences in ranks is 66, then number of observations is
- (a) 10
 - (b) 9
 - (c) 8
 - (d) 11
- (viii) Co-efficient of correlation between two variables x and y is 0.8 and their covariance is 20. If the variance of X series is 16, the standard deviation of y series is
- (a) 32
 - (b) 12
 - (c) -6.25
 - (d) 6.25
- (ix) A card is drawn at random from a well-shuffled pack of 52 cards, what is the probability that it is a heart or a queen
- (a) $1/4$
 - (b) $1/13$
 - (c) $4/13$
 - (d) none of these
- (x) The letters of the word SUCCESS are to be arranged at random. What is the probability that the vowels occur at even places.
- (a) $2/5$
 - (b) $1/5$
 - (c) $1/7$
 - (d) $1/6$

- (xi) For a symmetric distribution
- (a) Mean < median < mode
 - (b) mean \neq median \neq mode
 - (c) mean > median > mode
 - (d) mean = median = mode
- (xii) When all the observations occur with equal frequency then which one of the following does not exist?
- (a) median
 - (b) mode
 - (c) mean
 - (d) none

(b) State whether the following statements are True (or) False. [12×1= 12]

- (i) Measures of central tendency are called averages of the 1st order
- (ii) The algebraic sum of deviations of a set of observations from their AM is Negative
- (iii) Quartile deviation for the data 1,3,4,5,6,6,10 is 1.5
- (iv) The most commonly used measure of dispersion is standard deviation
- (v) Coefficient of standard deviation is equal to AM/Standard deviation
- (vi) Spearman's method is devised by Prof. Charles Edward spearman
- (vii) If the plotted points in a scatter diagram lie from upper left to lower right, then the correlation is Zero.
- (viii) The line $X = a + by$ represents the regression equation of Y on X
- (ix) If $p : q$ are the odds in favour of an event, then the probability of that event is p/q
- (x) Mathematical Average is called Geometric means
- (xi) A distribution with two modes is called Bimodal
- (xii) If coefficient of skewness is negative then $Q_3 + Q_1 > 2Q_2$

PART – B

4 Questions to be answered out of 6 questions

[6×4=24]

9. Describe the Limitations of Statistics. [6]
10. Calculate the geometric mean of the following figures by direct and by Short-cut method. [6]

5, 10, 192, 14374, 20498, 120674, 15491

11. Weekly earnings of a random sample of 15 employees of a company are:
62, 42, 73, 80, 182, 78, 69, 103, 92, 84, 130, 58, 170, 71, 97 Find the lower quartile, upper quartile, interquartile range, range and the quartile deviation. [6]

12. Find the co-efficient of correlation from the following data: [6]

X:	3	5	7	8	9	15	16
Y:	15	18	22	24	19	25	31

13. From the data given below find (i) the two regression equations (ii) the coefficient of coordination between marks in Economics and Statistics, (iii) the most likely marks in statistics when the marks in Economics is 30 : [6]

Marks in Economics (x):	25	28	35	32	31	36	29	38
Marks in Statistics (y):	43	46	49	41	36	32	31	30

14. A can hit a target 3 times in 5 shots, B 2 times in 5 shots, C 3 times in 4 shots. They fire a volley. What is the probability that 2 shots hit ? [6]