Paper- 4: FUNDAMENTALS OF BUSINESS MATHEMATICS AND STATISTICS

Paper- 4: FUNDAMENTALS OF BUSINESS MATHEMATICS AND STATISTICS

Full Marks: 100 **Time Allowed: 3 Hours**

Section – A

(Fundamentals of Business Mathematics)

PART A

1. Answer All objective questions.

(a) Answer Multiple Choice Question **[9×2= 18]**

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

(a) 2 : 1

(b) 6 : 3

(c) 7: 3

(d) 8 : 3

ii. If $x = \log_{2a} a$, $y = \log_{3a} 2a$, $z = \log_{4a} 3a$, then xyz + 1 is equal to

(a) 2xy

(b) 2yz

(c) 2zx

(d) None of these.

iii. Find the present worth of an ordinary annuity of ₹1,200 p.a. for 10 years at 12% p.a. compounded annually.

[Use $(1.12)^{-10} = 0.3221$]

(a) ₹6,770

(b) ₹6,779

(c) ₹6,805

(d) None

iv. The sum of money that amounts to ₹1,110 in 10 years at the rate of 5% simple interest will be –

(a) ₹700

(b) ₹740

(c) ₹760

(d) ₹780

v. The number of ways in which 15 mangoes can be equally divided among 3 students is

(a) $\frac{15!}{(5!)^4}$

(b) $\frac{15!}{(5!)^3}$

(c) $\frac{15!}{(5!)^3}$

(d) None of these

vi. If p^{th} , q^{th} and r^{th} terms of a G. P. be a, b, c respectively, then $a^{(q-r)}\ b^{(r-p)}\ c^{(p-q)} = ?$

(a) 0
(b) 1
(c) -1
(d) None.

vii. Which term of the A.P. 5, 8, 11, 14, ….. is 320?

(a) 104^{th}
(b) 105^{th}
(c) 106^{th}
(d) 64^{th}

viii. $\log_3\left(\frac{1}{243}\right) = ?$

(a) -5
(b) -6
(c) -9
(d) None of these

ix. The number of subsets of a set containing n elements is
(a) 2^n
(b) 2^{-n}
(c) n
(d) None of these

(b) Answer the following Question True or False **[6×1=6]**

i. If A : B = B : C = C : D = 5: 6 then A: B: C: D = 125 : 150 : 180: 216

ii. The SA. I at x% for x years will be Rs. X on a sum of x

iii. If the set A has 4 elements, B has 3 elements then the number of elements in A × B is 12 elements

iv. If $x = 2 + \sqrt{5}$ then $x^3 + 3x^2 - 29x$ is 7

v. The logarithm of 324 to base $\frac{1}{3\sqrt{2}}$ is – 4

vi. $X^2 - 4x - 1 = 0$ is the quadratic equation whose roots are $2 + \sqrt{5}$ and $2 - \sqrt{5}$

PART B

4 questions to be answered out of 6 questions **[4×4=16]**

2. In 165 litres of a quantity of milk mixed up with water, the ratio of milk and water is 9: 2. How much water must be added to it so as to make the ratio of milk and water 5 : 3? **[4]**

3. The difference between the simple and compound interest on a certain sum for 3 years at 5% p. a. is Rs.228.75 P. Find the compound interest on the sum for 2 years at 5% p. **[4]**

4. Solve 1 + 6 + 11 + 16 + …… + x = 148 **[4]**

5. Prove that $\frac{\log\sqrt{27} + \log 8 + \log\sqrt{1000}}{\log 120} = \frac{3}{2}$. **[4]**

6. If $^{11}P_r = {}^{12}P_{r+1}$ find the value of r. **[4]**

7. If one root of $px^2 + qx + r = 0$ be square of the other, prove that.

$q3 + p^2r + pr^2 = 3pqr$. **[4]**

Section – B

PART A

8. Answer All objective questions.

(a) Answer Multiple Choice Question **[12×2= 24]**

(i) Frequency density corresponding to a class interval is the ratio of

(a) Class frequency to the total frequency

(b) Class frequency to the class length

(c) Class length to the class frequency

(d) Class frequency to the total frequency.

(ii) Mean deviation from the mean for the observations 0, -1, 4 is

(a) 2
(b) 2/5
(c) 3/5
(d) None of these

(iii) The quartile deviation of 7, 10, 12, 15, 17, 19, 25 is

(a) 4.2
(b) 4.3
(c) 4.5
(d) None of these

(iv) If probability that horse A wins the race is 1/5 and that horse B wins is ¼. What is the probability that at least one of them wins the race?

(a) $\frac{1}{9}$

(b) $\frac{9}{20}$

(c) $\frac{1}{20}$

(d) $\frac{2}{5}$

(v) The rank correlation coefficient for 10 pair of observations is 0.5. Later it was noticed that the ranks to x & y are given as 2 & 9 are wrongly given as 4 & 7. The correct value of correlation coefficient is

(a) 0.20

(b) 0.24

(c) 0.26

(d) 0.28

(vi) The two lines of regression become identical when

(a) r = 1
(b) r = -1
(c) r = 0
(d) Both (a) & (b)

(vii) Pie-diagram is used for

(a) Comparing different components and their relation to the total

(b) Representing qualitative data in a circle

(c) Representing quantitative data in circle

(d) (b) or (c) .

(viii) Which of the following statements is false?

(a) Statistics is derived from the Latin word 'Status'

(b) Statistics is derived from the Italian word 'Statist'

(c) Statistics is derived from the French word 'Statistik'

(d) None of these

(ix) The variance of first five even natural numbers is

(a) $2\sqrt{2}$
(b) 8
(c) $2\sqrt[3]{2}$
(d) $4\sqrt{2}$

(x) If covariance between two variables x and y is 50 and the variance of x is 25 then the variance of variable y must be

(a) Less than 100

(b) More than 100

(c) At least 10

(d) At most 10

(xi) Two unbiased dice are thrown together. The probability that the sum of the digits on the dice is more than 8 is

(a) $\frac{5}{18}$

(b) $\frac{5}{12}$

(c) $\frac{13}{18}$

(d) $\frac{7}{12}$

(xii) For a normal distribution with mean 150 and S. D. 45; find Q_1 and Q_3:

(a) 119.35 and 190.65 respectively

(b) 180.35 and 119.65 respectively

(c) 119.65 and 180.35 respectively

(d) 123.45 and 183.65 respectively

(b) Answer the following Question True or False [12×1=12]

(i) Statistics are affected by a small number of causes.

(ii) A frequency distribution is the arrangement of the given data in the form of a table showing frequency with which each variables occurs.

(iii) Good average should be unduly affected by the presence of extreme values.

(iv) The geometric mean is obtained by multiplying the value of the item together and then taking it to its root corresponding to the number of items.

(v) Mode is the value that has maximum frequency.

(vi) Dispersion is a measure of variation of the items.

(vii) Correlation is an analysis of the co-variation between two or more variables.

(viii) Graphic method is also known as simple graph method.

(ix) A set of all possible outcomes from an experiment is called a sample space.

(x) The word odd is frequently used in statistics.

(xi) Regression analysis is not used in prediction and forecasting problems.

(xii) If b_{xy} is positive, then b_{yx} will also be positive.

PART B

4 Questions to be answered out of 6 questions [6×4=24]

9. Explain the Essential parts of a Statistical table. **[6]**

10. Find the average marks of a student from the follows table **[6]**

Marks	No. of students
Below 10	25
Below 20	40
Below 30	60
Below 40	75
Below 50	95
Below 60	125
Below 70	190
Below 80	240

11. The following table gives the weights of one hundred persons. Compute the co-efficient of dispersion by the methods of Limits (i. e. range) **[6]**

Weight in lbs. Class interval	No. of persons
85-95	4
95-105	13
105-115	8
115-125	14
125-135	9
135-145	16
145-155	17
155-165	9
165-175	8

175-185	2
	100

12. Quotations of index number of equity shares price of a certain joint stock company and of prices of preference shares are given below:

Year	1991	1992	1993	1994	1995	1996	1997
Equity Shares	97.5	99.4	98.6	92.2	95.1	98.4	97.1
Preference Shares	75.1	75.9	77.1	78.2	79.0	74.8	76.2

Use the method of rank correlation to determine the relationship between Equity share and preference share prices. **[6]**

13. Find both the regression equations from the following: **[6]**

$\sum X = 60$ $\sum Y = 40$ $\sum XY = 1150$

$\sum X2 = 4160$ $\sum Y2 = 1720$ $N = 10$

14. An urn contains 3 white balls, 4 red balls and 5 black balls. Two balls are drawn. What is the probability that

(i) both are red?

(ii) both are white?

(iii) one red and one white? **[6]**