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) An alloy contains zinc and copper in the ratio 5 : 8 and another alloy contains zinc and copper in the ratio 5 : 3. If equal amounts of both the alloys are melted together, then the ratio of zinc and copPer in the resulting alloy is:

(a) 25 : 24

(b) 3 : 8

(c) 103 : 105

(d) 105: 103

(ii) Divide 581 among A, B, C so that 4A = 5B = 7C.

(a) ₹ 245, 196, 140

(b) ₹ 140, 160, 240

(c) 200, 250, 280

(d) None

(iii) If $\log_e 2 \log_n 625 = \log_{10} 6 \log_e 10$, then the value of n will be :

(a) 16

(b) 10

(c) 5

(d) 4

(iv) $3x^2 + 6x + 3 = 0$ then the roots of the equations are –

(a) (3,3)

(b) (–1, –1)

(c) (2,4)

(d) (4,1)

(v) The difference between compound interest and simple interest on a sum for 3 years at 5% per annun is ₹ 122. The sum is –

(a) ₹ 15,000

(b) ₹ 16,000

(c) ₹ 12,000

(d) ₹ 18,000

(vi) Out of 7 gents and 4 ladies a committee of 5 is to be formed. The number of committees such that each committee include at least one lady is

(a) 240

(b) 144

(c) 441

(d) None of these

(vii) In total number of ways in which six '+' and four '–' signs occur together is

(a) $\frac{7!}{3!}$

(b) 45

(c) 35

(d) None of these

(viii) 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

(ix) The set {0, 2, 4, 6, 8, 10} can be written as

(a) {2x/0 ≤ x ≤ 5}

(b) {x : 0 > x > 5}

(c) {2x : 0 < x < 5}

(d) None of these

(b) State whether the following statements are True (or) False. [6×1=6]

(i) If the ratio of two positive numbers is 4:5 and their L.C.M is 140 then the number are 35, 45

(ii) A sum of money amounts to ₹ 720 in 2 years and ₹ 783 in 3 years the rate of interest is 12%

(iii) The statement $(A \cap B)' = A'UB'$ is true (or) False

(iv) If $x = 5+2\sqrt{6}$ and xy = 1 then $\frac{1}{x^2}+\frac{1}{y^2}$ is 89

(v) The integral part of the value of logarithm of a number is called characteristic

(vi) The roots of the equation $(x-4)^2(x-2)(x+4)$ are 4,4,2,-2

PART - B

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

2. The ratio of the no. of boys to the no. of girls in a school of 720 students is 3:5. If 18 new girls are admitted in the school, find how many new boys may be admitted so that the ratio of the no. of boys to the no. of girls may change to 2:3. [4]

3. What is the present value of ₹ 1,000 due in 2 years at 5% compound interest, according as the interest is paid (a) yearly, (b) half-yearly? [4]

4. If a, b, c, d are in G.P., prove that, $(b - c)^2 + (c - a)^2 + (d - b)^2 = (a - d)^2$

5. In a class of 50 students appearing for an examination of ICWA, from a centre, 20 failed in Accounts, 21 failed in Mathematics and 27 failed in Costing, 10 failed both in Accounts and Costing, 13 failed both in Mathematics and Costing and 7 failed both in Accounts and Mathematics. If 4 failed in all the three, find the number of

(i) Failures in Accounts only.

(ii) Students who passed in all the three subjects. [4]

6. Number of permutations of *n* objects taken 4 at a time is twice the number of permutations of 5 objects taken 3 at a time. Find the value of *n*. [4]

7. $2^{x-2} + 2^{3-x} = 3$ [4]

Section – B

PART - A

8. Answer All objective questions.

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

(i) The Row heading is also known as

(a) Title

(b) Stub

(c) Caption

(d) Body of table

(ii) Horizontal bar diagrams is used for

(a) Qualitative data

(b) Data varying over time

(c) Data varying over space

(d) a or c

(iii) The third quartile of the following observations 10, 19, 22, 16, 15, 18, 20, 18, 14, 18, 23 is

(a) 17.55

(b) 18

(c) 15

(d) 20

(iv) For any two numbers SD is always

(a) Twice the range

(b) Half of the range

(c) Square of the range

(d) none of these

(v) If the coefficient of correlation between two variables is 0.7. Then the percentage of variation unaccounted for is

(a) 70%

(b) 30%

(c) 51%

(d) 49%

(vi) If r = 1, the angle between two regression equation is

(a) 0^0

(b) 90^0

(c) 60^0

(d) 45^0

(vii) If $y = ax^2 + bx + c$, where $c > 0$, $b > 0$ and $a \neq 0$, then Karl Pearson's correlation coefficient between x and y is

(a) +1

(b) – 1

(c) 0

(d) none of these

(viii) If letters of the word "PENCIL" are arranged in a random order, the probability that N is always next to E is

(a) 4/6

(b) 3/6

(c) 1/6

(d) none of these

(ix) 8 persons are to be arranged in a row. What is the probability that there are exactly 3 persons between two particular persons A and B.

(a) 1/7

(b) 1/6

(c) 1/5

(d) none of these

(x) A man and his wife appear for an interview for two posts. The probability of husband's selection is 1/7 and the wife's selection is 1/5. What is the probability that only one of them will be selected?

(a) 2/7

(b) 1/35

(c) 12/35

(d) None

(xi) The mean of first 10 even number is –

(a) 5.5

(b) 55

(c) 11

(d) None of these

(x) Mode depends on change of –

(a) Origin

(b) Scale only

(c) Both origin and scale

(d) Neither origin nor scale

(b) State whether the following statements are True (or) False. [12×2= 12]

(i) If each item reduced by 15, AM is increased by 15.

(ii) The greater of the two numbers where arithmetic mean is 34 and the geometric mean is 16 is 64.

(iii) If the first and third quartiles are 22.16 and 56.36, then the quartile deviation is 17.1.

(iv) "Root – mean square deviation from Mean's" is Quartile deviation and Standard deviation.

(v) In ogive, abscissa corresponding to ordinate KN/10 is K^{th} percentile.

(vi) Scatter diagram helps us to find the nature of correlation between two variables.

(vii) When one regression coefficient is positive, the other would be negative.

(viii) If P(A) = 1, then the event A is known as improbable event.

(ix) If events are mutually exclusive, then both events cannot occur at some time.

(x) As the sample increases, range tends to decrease.

(xi) The positive average is harmonic means.

(xii) Difference between the maximum and minimum value of a given data is range.

PART – B

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

9. Explain the Methods of collecting Primary Data. **[6]**

10. An incomplete frequency distribution is given as follows:

Variable	Frequency	Variable	Frequency
10-20	12	50-60	?
20-30	30	60-70	25
30-40	?	70-80	18
40-50	65	Total	229

Given that the median value is 46, determine the missing frequency using the median formula. **[6]**

11. From the following table giving height of students calculate the semi-interquartile Range and the co-efficient of Quartile Deviation.

Height in inches	No. of students
53	25
55	21
57	28
59	20
61	18
63	24
65	22
67	18
69	23

[6]

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

(i) $n = 50, \Sigma X = 75, \Sigma Y = 80, \Sigma X^2 = 130, \Sigma Y^2 = 140, \Sigma XY = 120$

(ii) $n = 10, \Sigma X = 140, \Sigma Y = 150, \Sigma (X - 10)^2 = 180.$

$\Sigma (Y - 15)^2 = 215, \Sigma (X - 10)(Y - 15) = 60.$

13. Fit a linear regression of marks in University examination to the same in College test.

Serial No.	1	2	3	4	5	6
Marks in College Test:	35	42	20	50	72	64
Marks in University examination:	40	48	24	60	84	68

Let X = marks in College test, Y = marks in University examination. Here we are to determine the equation of best fitted regression line of Y on X. **[6]**

14. A bag contains 5 red and 4 black balls, and the second one 3 red and 5 black balls. One of these is selected at random and a draw of two balls is made from it. What is the probability that one of them is red and other is black? [6]