Paper 4 - Fundamentals of Business Mathematics and Statistics

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

The figures in the margin on the right side indicate full marks.
This question paper has two sections.
Both the sections are to be answered subject to instructions given against each.

Section – A

I. (a) Choose the correct answer **(9 × 2 = 18)**

(1) If $x + y \propto x - y$, then which one is True?
(a) $x \propto -y$ (b) $y \propto -y$ (c) $x \propto y$ (d) $xy = 1$

(2) At what rate p.a. S.I. will a sum of money double itself in 25 years?
(a) 4% (b) 3% (c) 5% (d) 6%

(3) If A : B = 3 : 4 & B : C = 2 : 5, then A : B : C
(a) 3 : 4 : 5 (b) 3 : 4 : 10 (c) 4 : 3 : 10 (d) 3 : 4 : 8

(4) The value of 5! Is equal to
(a) 10 (b) 120 (c) 25 (d) 5

(5) If $^{r}c_{12} = {}^{r}c_{8}$ find $^{22}c_{r}$
(a) 213 (b) 321 (c) 231 (d) None of these

(6) The value of 0! is _____.
(a) 1 (b) 0 (c) 2 (d) 7

(7) Evaluate $\log_2 \log_2 (\log_2 4)$.
(a) 0 (b) 1 (c) 2 (d) 4

(8) Set of even positive integers less than equal to 6 by selector method.
(a) {x/x<6} (b) {x/x=6} (c) {x/x≤6} (d) None

(9) If one roots of the equation $x^2 - 3x + m = 0$ exceeds the other by 5 then the value of M is equal to _____
(a) -6 (b) -4 (c) 12 (d) 18

I. (b) State whether the following statements are true or false (6 × 1 = 6)

(1) If 30% of x = 40% of y then x : y = 4 : 3 ( )

(2) The value of $\log_{3\sqrt{3}} 729 = 4$. ( )

(3) The set A = { x : x + 5} is a null set. ( )

(4) The logarithm of one to any base is zero ( )

(5) ${}^{n}P_{n} = n!$. ( )

(6) The degree of the equation $3x^5 + xyz^2 + y^3$ is 3 ( )

II. Answer any four questions. Each question carries 4 marks (4 × 4 = 16)

(1) If $a^x = bc$, $b^y = ca$ and $c^z = ab$ then, show that $\frac{x}{x+1} = \frac{y}{y+1} + \frac{z}{z+1} = 0$.

(2) The marks obtained by four examinees are as follows :
A : B = 2 : 3, B : C = 4 : 5, C : D = 7 : 9, find the continued ratio.

(3) Insert 4 arithmetic means between 4 and 324.

(4) Evaluate $\log_2 \log_2 (\log_2 4)$.

(5) In how many ways can be letters of the word SUNDAY be arranged? How many of them do not begin with S? How many of them do not begin with S, but end with Y?

(6) The publisher of a book pays author a lump sum plus an amount for every copy sold. If 500 copies are sold, the author would receive ₹ 750 and for 1350 copies ₹ 1175. How much would the author receive if 10000 copies are sold?

Section - B

III. (a) Choose the correct answer (12 × 2 = 24)

(1) If the A. M. of first n natural numbers be 25, the value of n is
(a) 48 (b) 49 (c) 45 (d) 50

(2) Mode depends on change of
(a) Origin only (b) scale only (c) Both origin and scale (d) Neither origin

(3) If the co-efficient of correlation between x and y is 2/3 and the standard deviation of x is 3 and standard deviation of y is 4, the covariance between x and y will be _____
(a) 3 (b) 6 (c) 7 (d) 8

(4) If x = 5 + 2y be the relation between variables x and y and third quartile of y is 15, then third quartile of x is

(a) 35 (b) 30 (c) 15 (d) 60

(5) Class mark is

(a) A midpoint of class interval (b) Upper point of class interval

(c) Average rate of increase in net worth of a company (d) All the above 1 & 3

(6) Mean deviation about median of the numbers 31, 35, 29, 68, 60, 72, 37 is

(a) 12 (b) 15 (c) 12.5 (d) 14.5

(7) Two regression lines coincide when

(a) r = 0 (b) r = 2 (c) r = +1 or -1 (d) None

(8) For the regression equation of Y on X, 2x + 3y + 50 = 0. The value of b_{xy} is

(a) 2/3 (b) -2/3 (c) -3/2 (d) None

(9) If r be the coefficient of correlation between two variables x and y then

(a) $-1 \le r \le 1$ (b) $0 < r < 1$ (c) $-1 < r < 1$ (d) $0 \le r \le 1$

(10) If an unbiased coin is tossed twice, the probability of obtaining at least one tail is

(a) 0.25 (b) 0.50 (c) 0.75 (d) 1.00

(11) Two dice are thrown together. The probability that 'the event the difference of nos. shown is 2' is

(a) 2/9 (b) 5/9 (c) 4/9 (d) 7/9

(12) For a symmetric distribution

(a) Mean < median < mode (b) mean ≠ median ≠ mode

(c) mean > median > mode (d) mean = median = mode

III. (b) State whether the following statements are true or false (12 × 1 = 12)

(1) Geometric mean is based on few items in a series ( )

(2) Mode is a mathematical average ( )

(3) Co-efficient of variation = $\frac{\text{Co-efficient of variation}}{\text{Mean}} \times 100$ ( )

(4) Range is the value of difference between mode and median ( )

(5) If a coin is tossed, then probability of getting two heads is one ( )

(6) If an unbiased coin is tossed once, then the two events head and tail are mutually exclusive ( )

(7) 10^{th} Percentile is equal to 9^{th} Decile. ( )

(8) Mean deviation can never be negative ( )

(9) The value of correlation co-efficient lies between 0 & +1 ( )

(10) Bivariate data are the data collected for n variables ( )

(11) When all values are equal, then arithmetic mean would be zero ( )

(12) As the sample size increase, range tends to decrease ( )

IV. Answer any four questions. Each question carries 6 marks (4 × 6 = 24)

(1)

Class Boundaries:	0-10	10-20	20-30	30-40	40-50	Total
Frequency:	10	25	20	20	20	100

(2) Given the bivariate data

x:	2	3	4	5
y:	3	2	1	4

(3) The marks obtained by 6 students were 24, 12, 16, 11, 40, 42. Find the Range. If the highest mark is omitted, find the percentage change in the range.

(4) Find the standard deviation for the following distribution :

x	f
4.5	2
14.5	3
24.5	5
34.5	17
44.5	12
54.5	7
64.5	4

(5) Given:

Covariance between X and Y = 16

Variance of X = 25

Variance of Y = 16

(i) Calculate co-efficient of correlation between X and Y,

(ii) If arithmetic means of X and Y are 20 and 30 respectively, find regression equation of Y on X.

(iii) Estimate Y when X = 30.

(6) A bag contains 4 white, 3 black and 5 red balls. What is the probability of getting a white or a red ball at random in a single draw?