2022

(November)

BUSINESS ADMINISTRATION

(Honours)

(BBAC-102)

(Quantitative Analysis)

Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

PART—A

(*Marks* : 50)

UNIT—I

1. *(a)* Define statistics and discuss the uses of statistics in business and industrial activities. 3+5=8

(b) State the relationship between mean, median and mode. 2

OR

2. *(a)* The weekly expenditures of a few families are given below :

Expenditures (in ₹)	*No. of families*
110–120	6
120–130	15
130–140	38
140–150	62
150–160	106
160–170	50
170–180	18
180–190	12
190–200	3

Calculate the mean expenditure. 5

(b) The mean and standard deviation of the monthly wages of 50 male workers are ₹ 6,300 and ₹ 900 respectively. For a group of 40 female workers, these are ₹ 5,400 and ₹ 600 respectively. Find the combined standard deviation of monthly wages. 5

UNIT—II

3. *(a)* Discuss the different types of correlation. 4

(b) Prove that the coefficient of correlation (r) is independent of change of scale and change of origin. 6

OR

4. *(a)* Discuss the uses of index numbers in business. 3

(b) In a study of relationship between yield of wheat and rainfall, the following results were obtained :

	Yield (in kg)	*Rainfall* (in inches)
Mean	900	12
Standard deviation	80	2

Coefficient of correlation = 0·5

Calculate the likely yield when rainfall is 15 inches. 7

UNIT—III

5. *(a)* If $U = \{2, 4, 6, 8, 10, 12\}$, $A = \{2, 4, 6\}$ and $B = \{2, 6, 10\}$, then prove that—

(i) $(A \cup B)' = A' \cap B'$;

(ii) $(A \cap B)' = A' \cup B'$. 2+2=4

(b) How many different numbers of 4 digits can be formed out of the digits—1, 3, 5, 6, 7, 8, 9, each digit occuring only once in a number? 3

(c) If ${}^nP_4 : {}^nP_5 = 1:2$, then find the value of n. 3

OR

6. *(a)* In how many ways can 4 things be selected from 10 things when *(i)* one particular thing is always included and *(ii)* a particular thing is always excluded? 3+3=6

(b) State the addition theorem of probability. 2

(c) From a pack of cards, one card is drawn at random. Find the probability that the card drawn is either a King or a Spade. 2

UNIT—IV

7. (a) Find the value of

$$\begin{vmatrix} 2 & 3 & 0 \\ -2 & 1 & 2 \\ 6 & 5 & -1 \end{vmatrix}$$ 3

(b) Solve the following system of equations : 7

$$3x + y + 2z = 3$$
$$2x - 3y - z = -3$$
$$x + 2y + z = 4$$

OR

8. (a) What are diagonal matrix and identity matrix? 2+2=4

(b) If $A = \begin{bmatrix} 2 & 3 & -1 \\ -1 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 & 5 \\ -1 & 3 & 4 \\ 2 & 1 & 0 \end{bmatrix}$, then prove that $(AB)' = B'A'$. 6

UNIT—V

9. (a) Evaluate the following : 2×4=8

(i) $\lim_{x \to 0} \frac{\sqrt{1+2x} - \sqrt{1-x}}{x}$

(ii) $\lim_{x \to \infty} \left\{ \frac{3x^2 + 2x - 1}{4x^2 + x + 5} \right\}$

(iii) $\lim_{x \to 2} \frac{x^4 - 16}{x - 2}$

(iv) $\lim_{x \to 0} \frac{e^x - 1}{x}$

(b) Distinguish between $\lim_{x \to a} f(x)$ and $f(a)$. 2

OR

10. (a) Find $\frac{dy}{dx}$ of the following : 2×3=6

(i) $y = x^3\sqrt{1 - x^2}$

(ii) $y = (x^2 + 9x)(x^2 - 9x)$

(iii) $y = \left(x + \sqrt{x^2 + a^2}\right)^n$

(b) The total cost function is given by $C = 4q - q^2 + 2q^3$. Find at what level of output average cost will be minimum. 4

PART—B

(*Marks* : 25)

UNIT—I

11. State the properties of arithmetic mean. 5

OR

12. Given the following data :

x	2	4	6	8	10
f	1	4	6	4	1

Calculate the mean deviation. 5

UNIT—II

13. Briefly explain the four components of a time series. 5

OR

14. The two regression equations of X and Y series are

$$3y = 8x + 30$$

$$10x = 3y + 50$$

Find the coefficient of correlation between X and Y. 5

UNIT—III

15. Prove that ${}^{n-1}P_r + r \cdot {}^{n-1}P_{r-1} = {}^{n}P_r$. Is the relation between n and r always true? 5

OR

16. *(a)* Prove that ${}^{n}C_r = {}^{n}C_{n-r}$. 2

(b) Find the probability of drawing two diamonds from a pack of cards in two successive draws, the card drawn is not being replaced. 3

UNIT—IV

17. Find the inverse of

$$A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 5 & -2 & 6 \end{bmatrix}$$ 5

OR

18. What is a singular matrix? Is

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & 3 \\ 3 & 2 & -1 \end{bmatrix}$$

a singular matrix? Verify your answer. 2+3=5

UNIT—V

19. *(a)* What is a function? 2

(b) Find the points of discontinuity of a function $\frac{2x^2+x+1}{x^2-7x+12}$. 3

OR

20. Find $\frac{dy}{dx}$ of $2x^2-3xy+y^2=a^2$. 5

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