2025

BUSINESS MATHEMATICS AND STATISTICS — MDC

Paper : MDC-10

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Module - I

[Business Mathematics]

(Marks : 40)

Group - A

1. Answer ***any four*** questions : 5×4

(a) Find the value of x and y :

$$\begin{pmatrix} x & 2 \\ 4 & 3y \end{pmatrix} + \begin{pmatrix} 2y & -2 \\ 5 & 2x \end{pmatrix} = \begin{pmatrix} 5 & 0 \\ 9 & 7 \end{pmatrix}$$

(b) Evaluate : $\lim\limits_{x \to -1} \dfrac{2x^2 - x - 3}{x^2 - 2x - 3}$.

(c) What money will amount to ₹ 1,000 in 12 years at 4½ % p.a. compound interest?

(d) If $\begin{bmatrix} x+2 & x-2 \\ y-1 & y+1 \end{bmatrix} = \begin{bmatrix} 5 & 1 \\ 1 & 3 \end{bmatrix}$, then find the values of x and y.

(e) If $f(x + 3) = 3x^2 - 2x + 1$, find $f(x - 1)$.

(f) For what values of $f(5)$, $f(x) = \dfrac{x^2 - 25}{x - 5}$ will be continuous at $x = 5$?

Group - B

2. Answer ***any two*** questions :

(a) (i) If $A = \begin{pmatrix} 1 & 0 \\ -1 & 1 \end{pmatrix}$, find the value of $A^2 - 2A + I_2$.

(ii) Find the inverse of $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ -1 & 1 & 1 \end{bmatrix}$. 5+5

(b) (i) Find n, if ${}^{n}P_7 : {}^{n+1}P_6 = 5 : 2$.

(ii) How many words, each containing 2 vowels and 3 consonants can be formed with the letters of the word 'FACETIOUS'? 5+5

(c) (i) In what time will a sum of money double itself at 5 % p.a. compound interest?
[Given log 2 = 0.3010, log 105 = 2.0212]

(ii) A sum of money invested at compound interest 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 invested. 5+5

Module - II

[Business Statistics]

(Marks : 35)

Group - C

3. Answer ***any one*** question : 5×1

(a) Find AM of two observations if their GM and HM are 15 and 9 respectively. Also find the two observations.

(b) Find the mean deviation about mean of the following distribution :

x	15	20	25	30	35
Frequency	4	7	10	5	4

Group - D

4. Answer ***any three*** questions :

(a) (i) The AM of the following distribution is 28.8. Find the missing frequency f.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of Students	4	6	20	f	7	3

(ii) Calculate all the quartiles from the following data :

Marks	14	17	23	32	48
No. of students	3	7	10	8	4

5+5

(b) (i) From the table of group index number and group weights given below, calculate the cost of living index :

Group	Group index number	Weight
Food	428	45
Clothing	240	15
Fuel etc.	200	8
House Rent	125	20
Miscellaneous	170	12

(ii) From the following data, find the trend values by 3-yearly moving average method :

Year	2018	2019	2020	2021	2022	2023	2024
Value	2	4	5	7	8	10	13

5+5

(c) (i) The mode of the following distribution is ₹ 66. Find the value of f.

Daily Wages (₹)	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
No. of Workers	8	16	22	28	f	12

(ii) Compute the coefficient of variation (C.V.) from the following data :

Marks in Statistics	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
No. of Students	5	7	28	9	1

5+5

(d) (i) In a certain examination, 10 students obtained the following marks in Mathematics and Statistics. Find the Spearman's rank correlation coefficient.

Student (Roll No.)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Marks in Mathematics	80	38	95	30	74	84	91	60	66	40
Marks in Statistics	85	50	92	58	70	65	88	56	52	46

(ii) You are given that the variance of $x = 9$. The regression equations are $40x - 18y = 214$ and $8x - 10y + 66 = 0$.

Find the correlation coefficient between the two variables and standard deviation of y.

From which line will you estimate x when y is given? 5+5

(e) (i) Find the general cost of living index of 2024 from the following table :

Class	Food	Dress	House Rent	Fuel	Miscellaneous
Class Index	620	575	324	254	280
Weight	30	20	25	15	10

(ii) For the following series of observations, verify that the 4-year centered moving average is equivalent to a 5 year weighted moving average with weights 1, 2, 2, 2, 1 respectively :

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Sales (₹ '00000)	2	6	1	5	3	7	2	6	4	8	3

5+5