

**2025**

**BUSINESS MATHEMATICS AND STATISTICS — HONOURS**

**Paper : DSCC-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  $A$  when  $\begin{pmatrix} 4 & 3 & 2 \\ -5 & 1 & 3 \end{pmatrix} + 5A = \begin{pmatrix} -1 & 3 & 7 \\ 5 & 6 & 3 \end{pmatrix}$ .

(b) Evaluate :  $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^3 - 5x + 2}$ .

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

(d) If  $A + 3B = \begin{pmatrix} 5 & 7 \\ 9 & 4 \end{pmatrix}$  and  $2A - B = \begin{pmatrix} 3 & 1 \\ 1 & 0 \end{pmatrix}$ , find  $A$  and  $B$  matrix.

(e) Evaluate :  $\lim_{x \rightarrow -4} \left[ \frac{1}{x+4} + \frac{8}{x^2 - 16} \right]$ .

(f) Find  $\frac{d^2y}{dx^2}$ , when  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .

**Please Turn Over**

**(4089)**

**Group - B**

2. Answer *any two* questions :

- (a) (i) Find  $n$ , if  ${}^{2n}C_3 : {}^nC_2 = 68 : 3$ .  
 (ii) In how many ways can the letter of the word 'BALLON' be arranged, so that two L's do not come together? 5+5  
 (b) (i) Determine the value of  $K$  for which  $f(x)$  will be continuous at  $x = 1$  where

$$f(x) = \begin{cases} x + 2, & x \leq 1 \\ 3 - Kx^2, & x > 1 \end{cases}$$

- (ii) If  $(x + 4)y = x$ , then show that  $x \frac{dy}{dx} + y(y - 1) = 0$ . 5+5

- (c) If  $A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix}$ , verify that  $A^2 - 3A + 2I_3 = O_3$ , where  $I_3$  and  $O_3$  are identity matrix and null matrix of order 3 respectively. Hence, find  $A^{-1}$ . 10

**Module - II**

**[Business Statistics]**

(Marks : 35)

**Group - C**

3. Answer *any one* question :

5×1

- (a) If AM and GM of two observations are 9 and 7.2 respectively, find the HM and two observations.  
 (b) From the following data, estimate the value of  $y$  when  $x = 2.5$  :

$x$	1	2	3	4	5
$y$	2	2	5	4	6

**Group - D**

4. Answer *any three* questions :

- (a) (i) The median of the following frequency distribution is ₹ 74. Find the missing frequency of the distribution.

<b>Daily wages (₹)</b>	40-50	50-60	60-70	70-80	80-90	90-100
<b>No. of Workers</b>	5	15	20	?	20	15

- (ii) Calculate the mean deviation about the Median from the following data :

<b>Class intervals</b>	2-4	4-6	6-8	8-10
<b>Frequency</b>	3	4	2	1

5+5

- (b) (i) In a contest, judges assessed the performances of eight candidates as shown below :

Candidates	A	B	C	D	E	F	G	H
1st Judge	5	3	2	1	4	7	8	6
2nd Judge	4	2	1	3	5	8	6	7

Using Spearman's formula, obtain the rank correlation coefficient.

- (ii) Find the price index number for 2024 with 2023 as base by relative method using weighted AM.

Commodity	2023		2024
	Price (₹)	Quantity	Price (₹)
A	20	2	25
B	10	3	12
C	12	5	18
D	16	4	16
E	5	7	4

5+5

- (c) (i) Find quarterly trend values from the following data by Moving Average Method using an appropriate period :

Quarter/year	Quarterly output		
	2021	2022	2023
I	52	59	57
II	54	63	61
III	67	75	72
IV	55	65	60

- (ii) If  $x + 2y = 5$  and  $2x + 3y = 8$  be two regression lines, then find the value of  $r_{xy}$ . 5+5

- (d) (i) Find the linear regression equation of  $y$  on  $x$  from the following data :

$x$	1	2	3	4	5
$y$	3	2	5	4	6

Also, find the regression equation of  $x$  on  $y$ .

- (ii) Find the correlation co-efficient from the following data :

$x$	10	12	13	16	17	20	25
$y$	19	22	24	27	29	33	37

5+5

Please Turn Over

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- (e) (i) Using the following data (given in suitable units), calculate Fisher's Ideal Index Number for the year 2023 with respect to the base year 2022 and check whether it satisfies the Time Reversal Test :

Commodities	2022		2023	
	Price (₹)	Quantity	Price (₹)	Quantity
A	6	50	10	60
B	2	100	2	120
C	4	60	6	60

- (ii) Fit a straight line trend equation by the method of least squares from the following data and then estimate the trend values for the year 2025.

Year $x$	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Value $y$ (‘000)	65	80	84	75	77	71	76	74	70	68

5+5