WEST BENGAL STATE UNIVERSITY
BBA Honours 1st Semester Examination, 2021-22

BBAHGEC01T-BBA (GE1)

MODERATION OF BUSINESS MATHEMATICS AND STATISTICS

Time Allotted: 2 Hours
Full Marks: 50

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

1. Answer any *five* questions from the following: $2 \times 5 = 10$

   (a) If $A = \{a, b, c, d, e, f\}$, $B = \{d, e, f, g, h\}$, then show that $(A \cup B)' = A' \cap B'$.

   (b) For two sets A and B, find $A \Delta B$ by Venn diagram.

   (c) If $2\begin{pmatrix} x \\ y \\ z \end{pmatrix} + 3\begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix} = \begin{pmatrix} 8 \\ 13 \\ 21 \end{pmatrix}$, then find x, y and z.

   (d) If $A = \begin{pmatrix} 3 & 2 & 2 \\ 2 & 3 & 2 \\ 2 & 2 & 3 \end{pmatrix}$, show that A^{-1} exists.

   (e) Find the value of x when $\begin{vmatrix} x-1 & 1 & 1 \\ 1 & x+1 & -1 \\ -1 & 1 & x+1 \end{vmatrix} = 0$.

   (f) If $f(x) = \log\dfrac{1-x}{1+x}$, then show that $f(x) + f(y) = f\left(\dfrac{x+y}{1+xy}\right)$.

   (g) If $x = \sqrt{1+t}$ and $y = \sqrt{1-t}$, then find $\dfrac{dy}{dx}$.

   (h) What are the different parts of a statistical table?

   (i) Find the quartiles of the numbers 12, 19, 21, 24, 26, 29, 33, 35, 36.

   (j) The A.M. of 100 numbers is 40. It is seen that one number has been printed wrongly as 53 in place of 83. Find the correct A.M.

2. Answer any *four* questions from the following: $5 \times 4 = 20$

   (a) A, B, C are subset of a universal set S. Prove that
   $[A \cap (B \cup C)] \cap [A' \cup (B' \cap C')] = \phi$

   (b) Evaluate $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix}$.

   (c) For the matrix $A = \begin{pmatrix} 2 & 3 \\ 3 & 5 \end{pmatrix}$, show that $A^2 = 7A - I$. Hence find A^{-1}.

   (d) Examine the maximum and minimum of the function $f(x) = 4 + 2x - x^2$.

(e) When a boy is born, Rs. 500 is placed to his credit in a bank. If the bank pays 6% compounded monthly, how much will the boy receive when he will reach the age of 20?

(f) Construct from the following data a frequency distribution table with 10 equal class intervals.

31, 33, 35, 47, 36, 40, 37, 40, 41, 39, 42, 39, 41, 38, 43, 38, 41, 44, 44, 47, 40, 37, 43, 42, 45, 39, 34, 48, 46, 35, 42, 43, 37, 40, 41, 40

(g) What do you mean by Time Series? Briefly describe the components of time series.

(h) If two variables x and y satisfy the relationship $y = 5 + 6x$, find the correlation coefficient between x and y.

3. Answer any *two* questions from the following: 10×2=20

(a) (i) Solve by Cramer's Rule: 5+5
$$x - 2y + z = -1, \quad 3x + y - 2z = 4, \quad y - z = 1$$

(ii) Find the adjoint matrix

$$A = [a_{ij}] = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & -3 \\ -1 & 2 & 3 \end{bmatrix}$$

(b) (i) Find $\dfrac{d^2 y}{dx^2}$ if $y = t^3 - 3t$, $x = t^2 + 2t$. 5+5

(ii) Show that the maximum rectangle with a given perimeter is a square.

(c) Calculate the A.M. and the Mean Deviation from A.M. from the following frequency distribution. 10

Values	20-29	30-39	40-49	50-59	60-69	70-79
Frequency	5	11	18	22	16	8

(d) The marks obtained by 10 students in Mathematics and Statistics are as follows: 10

Roll No.	1	2	3	4	5	6	7	8	9	10
Marks in Mathematics	78	36	98	25	75	82	90	62	65	39
Marks in Statistics	84	51	91	60	68	62	86	58	53	47

Find Spearman's rank correlation coefficient.

(e) From the following data find Fisher's Index Number: 10

Commodity Rate / Unit Quantity	Base Year	Current Year	Base Year	Current Year
A	8	7	100	110
B	8.5	9	80	90
C	13	8	50	55

(f) Fit a straight line trend by method of least square and estimate the value for 2020. 10

Year	2010	2011	2012	2013	2014	2015	2016	2017
Value	8	9	10	6	7	9	12	8

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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