



**WEST BENGAL STATE UNIVERSITY**  
B.Com. Honours 2nd Semester Examination, 2021

**FACHGEC02T-B.Com. (GE2)**

**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.*

**GROUP-A**

**Answer any two questions from the following**

(5+5)×2 = 20

1. (a) Without using Venn diagram, for any sets  $A$ ,  $B$  and  $C$ , prove that

$$A - (B \cup C) = (A - B) \cap (A - C).$$

- (b) If  $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ , show that  $A^2 - 5A + 7I_2 = 0$ , where  $I_2$  and  $0$  are second order identity matrix and second order zero matrix respectively.

2. (a) A loan of Rs. 4,00,000 is to be paid on equal half-yearly instalments in 4 years. If the rate of compound interest be 10% p.a. Find the value of each instalment.
- (b) A farmer can afford to buy 800 meters of wire fencing. He wishes to enclose a rectangle field of large possible area. What should the dimensions of the field be?
3. (a) Draw a pie chart to present the following data on the proposed outlay during a Five-years plan of a government.

Item	Rs. (in Crores)
Agriculture	1,20,000
Industry and Minerals	90,000
Irrigation and power	60,000
Education	80,000
Communication	50,000

- (b) Determine the relative importance for food group, given that the cost of living index number for 1985 with 1980 as base is 175 from the following figures:

Group	Food	Clothing	Fuel	Rent	Miscellaneous
% increased in expenditure	65	90	20	150	70
Weight	?	12	18	20	10

4. (a) If  $e^{xy} = 4(1 + xy)$  and  $e^{xy} \neq 4$  then show that  $\frac{dy}{dx} = -\frac{y}{x}$ .

(b) Calculate mean deviation about mean and its coefficient from the following data:

$x$	10	11	12	13	14
$f$	3	12	18	12	3

5. (a) Show that  $\begin{vmatrix} 1 & x & x^2 - yz \\ 1 & y & y^2 - zx \\ 1 & z & z^2 - xy \end{vmatrix} = 0$

(b) In what time will a sum of money double itself at 5% compound interest?

(Given  $\log 2 = 0.3031$  and  $\log 1.05 = 0.0212$ )

6. (a) What do you mean by census and sample survey? Discuss their comparative advantages.

(b) What are the main components of Time series? What are the advantages and disadvantages of moving average?

### GROUP-B

Answer any *two* questions from the following

15×2 = 30

7. (a) The median and the mode of the following daily wages distribution of 230 workers are known to be Rs. 33.50 and Rs. 34 respectively. Find missing frequencies.

10

Wages (Rs.)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	16	?	?	40	?	4

(b) The age of 50 persons are given below:

5

42 48 36 50 49 45 31 48 43 50  
 47 37 32 40 47 41 39 45 49 43  
 36 38 37 39 32 52 31 56 54 40  
 51 55 46 41 58 42 52 31 44 32  
 36 33 38 60 36 58 41 33 59 60

Arrange the data in a frequency distribution with 8 equal classes.

8. (a) The grade of 9 students at the College test ( $x$ ) and the University examination ( $y$ ) are as follows:

7

$x$	77	50	71	72	81	94	96	99	67
$y$	82	66	78	84	47	85	99	99	68

(b) Solve by Cramer's Rule:

8

$$2x + 2y + z = 13, \quad 4y + z = 17, \quad -3x + 2y = 3$$

9. (a) Divide the number 36 into two factor such that the sum of their squares is the least possible. 6

(b) If  $y = e^{m \sin^{-1} x}$ , then show that  $(1-x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - m^2 y = 0$ . 6

- (c) Find mode of the following data: 3

Marks	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
No. of students	7	10	16	32	24	18	10	5	1

- 10.(a) Calculate the Median and the Mean Deviation from median from the frequency distribution table. 10

Score:	20-29	30-39	40-49	50-59	60-69	70-79
No of Students:	5	11	18	22	16	8

- (b) If  $5x - 6y + 90 = 0$  and  $15x - 8y - 130 = 0$  are two regression equations then identify the regression equation of  $y$  on  $x$  and  $x$  on  $y$ . 5

- 11.(a) Fit a straight line trend by method of least square and estimate the value for 1976 and 1977. 10

Year	1972	1973	1974	1975	1976	1977	1978	1979
Value	9.7	10.1	10.2	10.7	11.9	12.9	12.4	14.8

- (b) Find the mode from the following frequency distribution 5

Marks:	0-10	10-20	20-30	30-40
Number of students:	2	4	9	7

- 12.(a) Find  $x$ , if the ratio between Laspeyre's and Paasche's index number in the following data is 28:27. 8

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
Food	1	10	2	5
Others	1	5	$x$	2

(b) If  $A = \begin{pmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{pmatrix}$  then show that  $A^2 - 3A + 2I = 0$  and hence find  $A^{-1}$ . 7

**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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