

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.

B.Com.(ISM) END SEMESTER EXAMINATIONS APRIL-2023

SEMESTER - IV

20UBIAT4004 - Business Mathematics and Statistics -II

Total Duration : 2 Hrs 30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Find matrices x and y of order to such that,

$$2x - 3y = \begin{bmatrix} 2 & 5 \\ 3 & 1 \end{bmatrix}; 3x + 2y = \begin{bmatrix} 7 & 1 \\ 4 & 5 \end{bmatrix}$$

2. If the matrix A is given by $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$. Prove that it satisfies the relation $A^2 - 4A + 3I = 0$ where I stands for the unit matrix of order 2.

3. Two numbers are in the ratio 3:4. If 6 be added to each term of the ratio then the new ratio will be 4:5. Find the numbers.

4. Calculate by the weighted aggregate method the index number from the following data.

Commodity	Base year	Current year	Weight
Rice	30	40	10
Wheat	20	30	5
Pulses	40	50	6
Oil	35	40	5
Milk	40	50	10

5. The sales of a commodity in tonnes varied from Jan 1979 to Dec 1979 as follows:

Months	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Sales of a commodity (in tonnes)	280	300	280	280	270	240	230	230	220	200	210	200

Fit a trend line by the method of semi average.

6. From the following data calculate the four-year moving average and determine the trend values. Find the short-term fluctuations.

Year	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Value	50	36.5	43	44.5	38.9	38.1	32.6	41.9	41.1	33.3

Contd...

7. You are working as a purchase manager for a company, the following information has been supplied to you by two manufacturers of electric bulbs.

	Company A	Company B
Mean life in hrs	1,300	1,248
Standard deviation in hrs	82	93
Sample size	100	100

Which brand of bulbs are you going to purchase if you desire to take a risk of 5%?

8. A sample of 200 people with a particular disease was selected out of these, 100 were given a drug and the others were not given any drug. The results are as follows:

	Number of people		
	Drug	No drugs	Total
Cured	65	55	120
Not cured	35	45	80
Total	100	100	200

Test whether the drug is effective or not.

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

9. Solve the matrix method:

$$2x + 4y + z = 5; x + y + z = 6; 2x + 3y + z = 6$$

10. i) Three vessels contain mixtures of milk and water in the proportions 3:1, 4:1 and 5:1. The contents of the three vessels are mixed in the proportion $x:y:1$. If the resulting mixture contains milk and water in the proportion 7:2. Find y in terms of x .
- ii) If the square of x varies as the cube of y and $x=3$ when $y=4$, find the value of y when $x = 1/\sqrt{3}$.
11. Calculate Laspeyre's index number, Paasche's price index and Marshall-Edgeworth index for the following data.

Commodity	1980		1981	
	Price	Quantity	Price	Quantity
A	20	15	30	10
B	30	18	40	15
C	10	20	45	10
D	15	25	25	5

12. Calculate seasonal indices by the ratio to moving average method from the following data.

	Wheat prices in rupees per quintal			
Quarter/year	1972	1973	1974	1975
I	75	86	90	100
II	60	65	72	78
III	54	63	66	72
IV	59	80	85	93

13. A company appoints four salesman A, B, C and D and observe their sales in 3 seasons- summer, winter and monsoon. The figures in lakhs are given in the following table.

	Salesman				Total
Seasons	A	B	C	D	
Summer	36	36	21	35	128
Winter	28	29	31	32	120
Monsoon	26	28	29	29	112
Total	90	93	81	96	360

Carry out an analysis of variance.
