

M.B.A.- I (CBCS Pattern) Semester-I
PCB1F06 - Quantitative Techniques

P. Pages : 2

Time : Three Hours



GUG/S/25/10679

Max. Marks : 70

- Notes : 1. Attempt **any five** questions.
2. All questions carry equal marks.

1. From the data given below, find the missing frequency. If the arithmetic mean is 28, find the median: **14**

Profit per shop (₹ '000)	0-10	10-20	20-30	30-40	40-50	50-60
Number of shops	12	18	27	-	17	6

2. A research company summarized advertising expenditure and sales results as follows: **14**

	Adv. Exp. (₹ crore)	Sales (₹ crore)
Mean	20	200
S.D.	18	170
Karl Pearsons's		
Correlation coeff (r)	0.6	
Derive the two regression equations.		

3. Below are given the annual production figures (in thousand tonnes) of a fertilizer factory **14**

Year	2014	2015	2016	2017	2018	2019	2020
Production	70	75	90	91	95	98	100

- i) Fit a straight line trend by the method of least squares and tabulate the trend values.
ii) Convert your annual trend equation into a monthly trend equation.

4. A management is faced with the problem of choosing one of the three product for manufacturing. The potential demand for each product may turn out to be good, fair or poor. The probabilities for each type of demand were estimated as follows: **14**

Product	Type of Demand		
	Good	Fair	Poor
A	0.75	0.15	0.10
B	0.60	0.30	0.10
C	0.50	0.30	0.20

The estimated profit or loss under the three states of demand in respect of each product may be taken as

	₹	₹	₹
A	35,000	15,000	5,000
B	50,000	20,000	Loss of 3,000
C	60,000	30,000	20,000

Prepare the expected value table and advise the management about the choice of the product.

5. A manufacturing company has a certain piece of equipment that is inspected at the end of each day and classified as just overhauled, good, fair or inoperative. If the item is inoperative it is overhauled, a procedure that takes one day. Let us denote the four classifications as states 1, 2, 3, and 4 respectively. Assume that the working condition of the equipment follows a Markov chain with the following transition matrix: 14

$$P = \begin{matrix} & \begin{matrix} \text{Tomorrow} \\ 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} \text{P = Today} \\ 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \begin{bmatrix} 0 & 3/4 & 1/4 & 0 \\ 0 & 1/2 & 1/2 & 0 \\ 0 & 0 & 1/2 & 1/2 \\ 1 & 0 & 0 & 0 \end{bmatrix} \end{matrix}$$

If it costs Rs. 125 to overhaul a machine (including lost time) on the average and Rs. 75 as production lost if a machine is found inoperative, then using the steady. State probabilities, compute expected per day cost of maintenance.

6. Apply MODI method to obtain optimal solution of transportation problem 14

	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	19	30	50	10	7
S ₂	70	30	40	60	9
S ₃	40	8	70	20	18
Demand	5	8	7	14	34

Use VAM method for initial basic feasible solution.

7. Use graphical method to solve the following LP problem. 14

Maximize $Z = 2x_1 + 3x_2$

Subject to constraints

i) $x_1 + x_2 \leq 30$

ii) $x_2 \geq 3$

iii) $0 \leq x_2 \leq 12$

iv) $0 \leq x_1 \leq 20$

v) $x_1 - x_2 \geq 0$

and $x_1, x_2 \geq 0$

8. Explain the Graphical method of solving an LP problem. 14

9. Enumerate Hungarian method for solving Assignment problem. 14

10. Write short note **any two**. 14

a) Quartile Deviation.

b) Types of correlation.

c) Characteristics and application of Markov Chian.

d) Simplex method.
