

Com: 5896-07.

(4 Hours)

[ Total Marks : 100 ]

- N.B.** (1) Question No. 1 is compulsory.  
 (2) Attempt any four questions out of remaining six questions.  
 (3) Assume suitable data where necessary. State them clearly.  
 (4) Use graphs and sketches to illustrate your answers where necessary.

1. (a) Define probability. State and explain the multiplication law of probability. 20  
 (b) Explain (i) Slack variable (ii) Artificial variable and its use.

2. Determine mean, median, mode, variance and standard deviation for the following data : 20

136, 124, 141, 165, 135, 145, 145, 137, 125, 142, 160, 132,  
 147, 146, 164, 149, 147, 146, 153, 137, 128, 163, 150, 146,  
 147, 155, 138, 129, 150, 155, 161, 169, 137, 142, 131, 152,  
 157, 164, 169, 140, 147, 146, 131, 140, 120, 140, 135, 148,  
 162, 133, 146, 120, 144, 136, 150, 156, 144, 156, 151, 147,  
 158, 155, 151, 145, 160, 157, 145, 159, 157, 132

Prepare Histogram, less than Ogive curve.

3. (a) For the data given in Question No. 2. Calculate :— 12  
 (i)  $M_2, M_3$  and  $M_4$  about origin  
 (ii) Moment of Kurtosis  
 (iii) Coefficient of Kurtosis  
 (iv) Coefficient of Skewness  
 (v)  $Q_2, P_{75}, D_{30}$ .

(b) Prepare normal distribution curve for the data in Question No. 2 and determine what percentage of data lie between  $\bar{x} \pm \sigma$  range. 8

4. (a) Consider a project that yields an average cash flow of Rs. 500 lakhs with a standard deviation of Rs. 60 lakhs. Calculate the following probabilities : 10  
 (i) Cash flow will be more than Rs. 560 lakhs  
 (ii) Cash flow will be less than Rs. 420 lakhs  
 (iii) Cash flow will be between Rs. 460 lakhs and Rs. 540 lakhs  
 (iv) Cash flow will be more than Rs. 680 lakhs.

(b) Each of three identical jewellery boxes has two drawers. In each drawer of the first box there is a gold watch. In each drawer of the second box there is a silver watch. In one drawer of the third box there is a gold watch while in the other there is a silver watch. If we select a box at random and open one of the drawers and find it to contain a silver watch. What is the probability that the other drawer has the gold watch ? 10

5. (a) Fit the least square curve for the data : 10

x	1.2	1.8	3.1	4.9	5.7	7.1	8.6	9.8
y	4.5	5.9	7.0	7.8	7.2	6.8	4.5	2.7

Determine value of y for x = 5, 10, 15.

- (b) Describe, random sampling methods. 5  
 (c) Describe any one distribution function. 5

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Applied Statistics & Quantitative Techniques  
M.E (C) Cond. Engg Sem I PDE  
Con. 5896-BB-8715-07.

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6. (a) Solve the following transportation problem :-

Destination \ Source	1	2	3	4	Supply
A	1	5	3	4	100
B	4	2	2	4	60
C	3	1	2	4	120
Demand	70	50	100	60	

Find an optimal solution. Are there any other solutions ?

(b) Solve by graphical method :-

Maximise  $Z = 3x_1 + 2x_2$   
 S.T.  $8x_1 + x_2 \geq 8$   
 $2x_1 + x_2 \geq 6$   
 $x_1 + 3x_2 \geq 6$   
 $x_1 + 6x_2 \geq 8$   
 $x_1, x_2 \geq 0$

7. (a) Solve by Simplex method :-

Maximise  $Z = \frac{3}{4}x_1 - 20x_2 + \frac{1}{2}x_3 - 6x_4$   
 S.T.  $\frac{1}{4}x_1 - 8x_2 - x_3 + 9x_4 \leq 0$   
 $\frac{1}{2}x_1 - 12x_2 - \frac{1}{2}x_3 + 3x_4 \leq 0$   
 $x_3 \leq 1$

(b) Write notes on :-

- (i) Alternate optima
- (ii) Surplus variable
- (iii) Slack variable
- (iv) Degenerate solution.