

26023879



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Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, MAY 2026**Fourth Semester**

Faculty of Science

Branch IX—Statistics

ST4E08—STATISTICAL COMPUTING—3

(2016—2018 Admissions—Mercy Chance)

Time : Three Hours

Maximum Weight : 30

*Answer any **three** question.**Each question carries weight 10.*

1. A high voltage power supply should have a nominal output voltage of 350 Volts. A sample of 4 units are selected each day and tested for process control purposes. The data shown below give the difference between the observed reading on each unit and the nominal voltage times ten i.e.,

$$x_i = (\text{observed voltage on unit } i - 350) \times 10$$

S. No	1	2	3	4	5	6	7	8	9	10	11	12
X_1	6	10	7	8	9	12	16	7	9	15	8	6
X_2	9	4	8	9	10	11	10	5	7	16	12	13
X_3	10	6	10	6	7	10	8	10	8	10	14	9
X_4	15	11	5	13	13	10	9	4	12	13	16	11

- (a) Set up $\bar{X}$ and R charts on this process. Is the process in statistical control ?
- (b) If specifications are at 350 ± 5 Volts, comment on the process capability.
2. Set up an EWMA control chart for the process mean with the target value $\mu_0 = 13$, $\sigma = 1$, $\lambda = 0.10$ and $L = 2.8$ to the data given below and interpret the result.

I	:	1	2	3	4	5	6	7
x_i	:	12.15	13.21	12.98	13.00	13.05	12.80	13.02

Turn over



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3. The following data shows the quantity demanded of a certain commodity, its price and consumer's income. Test whether there is any multicollinearity among the exogenous variables :

Year	:	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Demand	:	3.8	4.2	5.1	6.2	7.1	9.1	8.1	10.2	12.1	13.8
Price	:	17	12	10	7	7	5	4	3	3	2
Income	:	15	19	28	41	51	53	55	71	84	90

4. (a) Find the sequence, that minimizes the total time required for performing the following jobs on 3 machines in the order ABC.

Job	:	1	2	3	4	5	6
Machine A	:	8	3	7	2	5	1
Machine B	:	3	4	5	2	1	6
Machine C	:	8	7	6	9	10	9

- (b) Using the following cost matrix, determine (i) Optimal job assignment ; (ii) The cost of assignments :

<i>Mechanic</i>	<i>Job</i>				
	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10





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5. (a) A stockist has to supply 400 units of a product every Monday to his customer. He gets the product at Rs. 50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs. 75 per order. The cost of carrying inventory is 7.5 % per year of the cost of product. Predict EOQ, Frequency of orders and number of orders, total incremental cost and total cost.

- (b) Solve the following LPP by dynamic programming :

$$\text{Maximize } Z = 50x_1 + 100x_2$$

$$\text{subject to } 2x_1 + 3x_2 \leq 48$$

$$x_1 + 3x_2 \leq 42$$

$$x_1 + x_2 \leq 21$$

$$x_1, x_2 \geq 0.$$

6. The following data relates to the national income (y) and investments (x) for a period of 10 years :

y	:	80.4	86.4	91.6	94.4	98.1	99.5	100.5	102.6	105.0	110.5
x	:	4.7	6.3	3.6	4.5	7.8	9.9	12.1	13.1	13.7	15.7

Fit the model $y = a + bx + u$ to the data and test for the presence of autocorrelated errors.

(3 × 10 = 30)

