

No. of Printed Pages : 5 **MSTL-002(Set-I)**

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Practical Examination

December, 2024

MSTL-002(SET-I) : INDUSTRIAL STATISTICS-LAB

Time : 3 Hours

Maximum Marks : 50

Note : (i) Attempt any *two* questions.

(ii) Solve the questions in Microsoft Excel.

(iii) Use of Formulae and Statistical Tables

Booklet for PGDAST is allowed.

(iv) Mention necessary steps, hypotheses,
interpretation, etc.

1. (a) The following data is related to the life (in hours) of 15 random samples of 5 electric bulbs each, drawn at intervals of one hour from a production process : 15

Sample Number	Life-times (in hours)				
	x_1	x_2	x_3	x_4	x_5
1	1620	1685	1660	1760	1800

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2	1501	1585	1525	1590	1650
3	1675	1702	1686	1567	1625
4	1650	1625	1572	1630	1640
5	1500	1980	1659	1643	1660
6	1634	1755	1625	1690	1770
7	1635	1723	1614	1535	1550
8	1482	1791	1533	1619	1497
9	1706	1524	1625	1504	1670
10	1530	1432	1380	1690	1724
11	1490	1500	1605	1595	1650
12	1590	1535	1762	1590	1625
13	1460	1490	1635	1587	1555
14	1722	1608	1665	1590	1530
15	1470	1409	1650	1590	1550

Draw the $\bar{X}$ and R charts and comment whether the process is under control or not. If not, draw the revised control charts.

- (b) A nationwide mail-order house desires to verify the accuracy of its clerical work in completing invoices. Subgroups of 200 mail-orders are taken each day for 30 consecutive days for inspection. An invoice containing at least one of the possible errors is defined as defective. The

number of defectives found in each of these
30 groups are as follows : 10

7	5	6	3	4	10	3	2	5	8
6	1	2	3	5	4	8	9	7	20
3	5	4	2	3	7	6	4	3	5

Construct a suitable control chart of the given data and comment on the state of control. Also construct a revised control chart, is required.

2. The sales data of an automobile company during three financial years are given below :

15+5+5

Month	Year		
	2021	2022	2023
April	514	1204	1033
May	1230	1907	1608
June	1396	1989	2670
July	1446	2373	1483
August	1339	2148	1926
September	2075	3467	3495
October	1313	1613	1721
November	1646	2162	1427
December	1925	2091	1536
January	1909	2551	2428
February	1865	1900	2445
March	3640	3786	3366

- (a) Compute the seasonal indices for 12 months using ratio-to-trend method.
- (b) Obtain deseasonalised valued.
- (c) Plot the given data along with deseasonalised values.
3. The given data on monthly sales (in ₹ '000s), monthly advertisement cost (in ₹ '000s) and price per litre of juice (in ₹) were obtained for 20 months to explore the relationship of sales with advertisement cost and price of juice :

5+10+10

Month	Sales	Advertisement cost	Price of juice
1	100	9	72
2	115	10	76
3	52	6	59
4	85	8	68
5	135	10	60
6	58	5	58
7	90	8	70
8	60	7	65
9	45	4	54

10	125	11	83
11	86	7	64
12	80	7	66
13	65	6	61
14	95	8	66
15	80	5	57
16	125	11	81
17	45	5	59
18	95	9	71
19	70	6	62
20	120	10	75

- Prepare a scatter matrix plot to get an idea about relationship among the variables.
- Develop a regression model and perform its analysis at 5% level of significance.
- Cheek linearity and normality assumptions for the fitted regression model.

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