

**POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)****Term-End Examination**

00385

June, 2017

**MSTL-002/S2 : INDUSTRIAL STATISTICS LAB SET-2***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) A new production line is designed to dispense 12 ounces (oz) of a drink into each can as it passes along the line. Regardless of the care taken, there will be some variability in the amount of drink dispensed per can. After calibration of machinery and training of the assembly line personnel, five observations on the amount of drink (X) dispensed per can are taken each hour for a 24-hour period. The data obtained are shown in the following table :

Sample Number	Weight (oz) per can				
	1	2	3	4	5
1	12.046	12.006	12.139	12.112	12.139
2	12.091	12.118	11.850	11.931	11.863
3	11.952	11.862	11.899	11.999	12.139
4	11.674	11.881	11.886	11.921	11.886
5	12.020	12.016	12.227	12.004	11.887
6	11.821	11.989	11.866	12.104	12.028
7	12.077	12.038	11.949	12.039	12.103
8	11.867	11.971	12.016	11.866	11.124
9	12.063	12.038	11.858	11.985	11.969
10	12.042	12.059	12.086	12.024	11.915
11	12.014	11.747	11.965	11.953	11.944
12	11.949	11.894	11.951	12.076	12.023
13	12.168	11.985	12.060	11.910	11.884
14	11.974	11.964	12.183	12.054	11.794
15	11.799	12.118	11.886	12.036	11.977

16	12.021	11.993	12.061	11.969	11.814
17	12.002	11.834	11.966	11.948	12.299
18	12.128	11.986	11.911	12.019	11.980
19	11.946	11.806	12.049	11.976	12.053
20	11.956	12.066	11.911	11.937	12.040
21	12.246	11.947	11.937	12.128	12.005
22	11.947	12.000	11.984	11.838	12.038
23	11.994	12.136	11.908	12.001	11.909
24	12.124	11.862	11.904	12.073	12.072

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

15

- (b) The standard for a process producing tin plates in a continuous strip is five defects in the form of pin-holes or visual blemishes per hundred feet. Based on the following set of 25 observations giving the number of defects per 100 feet, can it be concluded that the process is under control ?

Inspection No.	No. of Defects	Inspection No.	No. of Defects
1	3	14	6
2	2	15	6
3	2	16	9
4	4	17	5
5	4	18	2
6	4	19	6
7	6	20	5
8	4	21	11
9	1	22	6
10	7	23	6
11	5	24	8
12	5	25	2
13	4		

If the process is not under control, draw the revised control chart.

10

2. A company conducted a study on its employees to see the relationship of several variables with an employee's I.Q. For this purpose, thirty-five employees were randomly selected and one I.Q. test as well as five different personality tests were given to them. Each employee's I.Q. was recorded along with scores on five tests. The data are shown in the following table :

Employee	Tests					I.Q.
	I	II	III	IV	V	
1	83	80	78	77	67	99
2	73	85	67	80	63	92
3	81	80	71	81	68	94
4	96	86	82	83	56	99
5	84	73	75	75	68	94
6	72	74	71	67	59	79
7	84	79	84	84	69	97
8	54	86	61	69	53	92
9	86	85	79	78	76	94
10	42	71	60	80	56	86
11	83	72	72	78	74	98
12	63	86	65	85	56	83
13	69	76	64	85	61	98
14	81	84	65	79	64	96
15	50	85	71	65	75	76
16	82	79	82	79	71	98
17	72	78	82	65	61	91
18	80	84	61	74	52	93
19	89	77	81	78	52	98
20	83	84	76	79	70	93
21	71	85	72	64	56	78
22	83	74	81	63	76	96
23	79	79	77	67	75	91
24	85	80	61	68	61	93
25	41	78	84	69	53	85
26	82	82	83	69	74	97
27	62	75	62	67	69	82
28	68	83	81	82	59	97
29	55	76	81	83	62	95
30	49	77	69	63	55	75
31	84	73	73	67	68	76
32	74	85	82	75	66	93
33	82	76	86	64	69	95
34	69	75	60	61	63	72
35	85	82	85	83	62	95

Determine the most appropriate regression model for the employees' I.Q. using stepwise approach at 5% level of significance and interpret the results. Does the final regression model satisfy the linearity and normality assumptions ?

25

3. The data given below gives the average monthly prices (in ₹ ) of a commodity for four years :

Month	Year			
	2010	2011	2012	2013
January	1800	2000	2200	2400
February	2000	2200	1900	2400
March	1800	1900	2000	2200
April	1700	1800	1800	2000
May	1500	1600	1700	1800
June	1600	2000	1800	2200
July	1700	2400	2400	2500
August	1900	2300	2500	2600
September	2100	2300	2600	2700
October	2300	2400	2400	2600
November	2300	2400	2500	2700
December	2400	2600	2700	2900

- (a) Calculate the seasonal indices using moving average method.  
 (b) Obtain the deseasonalised values.  
 (c) Estimate the trend line for deseasonalised data by method of least squares.  
 (d) Plot the given data and the deseasonalised values.

12+4+5+4