MSTL-001 (Set-1)

POST GRADUATE DIPLOMA IN APPLIED STATISTICS
(PGDAST)

Basic Statistics Lab

Duration : 3 hours Maximum Marks : 50

Note : 1. Attempt any two questions.

2. Solve the questions in Microsoft Excel.

3. Use of formulae and Statistical Tables Booklet for PGDAST is allowed.

4. Mention necessary steps, hypotheses, interpretations, etc.

1. (a) A company employed 160 employees for a factory. The company's management is worried about high absenteeism rate in the organization. The following table shows vacation (in days) availed in a year and the number of employees who availed vacations: (9+8)

Vacations availed in a year	No. of employees
0-10	3
10-20	17
20-30	28
30-40	43
40-50	32

50-60	18
60-70	8
70-80	7
80-90	3
90-100	1

(i) Construct the histogram and both ogives.

(ii) Compute the coefficient of skewness ($\gamma 1$) and kurtosis (γ_2) and interpret the results.

(b) A local pizza restaurant and a branch of a National chain are located across the street near by a college campus. The local pizza restaurant advertises that it delivers to the dormitories faster than the National Chain. In order to examine whether this claim is valid, 20 pizzas from the Local Pizza restaurant and 20 pizzas from the National chain are ordered at different times. The delivery times (in minutes) are shown in the given table: (4+4)

Local Restaurant	
15	19
12	13
14	21
17	14

National Chain	
21	23
16	14
18	16
15	17

18	18
19	17
13	20
22	19
12	12
21	20

19	21
20	22
17	15
18	15
15	12
23	21

At 5% level of significance, is there any evidence that the

(i) Variances of the delivery times of local pizza restaurant and National chain are equal?

(ii) Mean delivery time for the local pizza restaurant is less than that for the national chain?

Assume that the delivery times are normally distributed:

2. (a) The cutting speed of four types of tools are being compared in an experiment. Size cutting materials of varying degrees of hardness are to be used as experimental blocks. The data on the measurement of cutting time (in seconds) are given in the following table: (6+6+6)

Tool	**Cutting Material**					
	1	**2**	**3**	**4**	**5**	**6**
1	16	15	12	13	8	14
2	28	18	16	18	16	9
3	17	11	17	12	18	12
4	11	14	14	15	11	15

(i) Analyse the design at 1% level of significance, and test whether four different tools produce the same result or not.

(ii) Is the effect of each cutting material same for all cutting tools?

(iii) If the results are significant, do the pairwise comparison between them.

(b) The production manager of a company that manufactures electric heaters believes that at least 10% of the heaters are defective. For testing her belief, she took a random sample of 20 heaters and recorded her observations in the following table: 7

Sample No.	Defective
1	No
2	No
3	No
4	No
5	Yes
6	Yes
7	No
8	Yes
9	Yes
10	No
11	No

12	No
13	Yes
14	No
15	No
16	Yes
17	No
18	No
19	No
20	Yes

Test her belief at $\alpha = 0.05$.

3. (a) A researcher wants to find out the degree of association between sugar prices and wheat prices. She collected the data, shown in the following table, relating to the prices of sugar and wheat in 20 randomly selected months from the last 25 years: 15

Month	**Price of wheat**	**Price of Sugar**
1	8	10
2	9	11
3	7	13
4	10	12

5	6	15
6	12	18
7	14	20
8	11	18
9	12	22
10	15	24
11	17	23
12	16	22
13	19	27
14	21	29
15	23	31
16	26	32
17	27	35
18	28	33
19	29	36
20	30	37

Compute the spearman's rank correlation coefficient for the given data.

(b) A plant has installed two machines say, Machine 1 and Machine 2 producing polythene bags. During the installation, the manufacturer of the machines has stated that there is a variation in the number of bags produced at the end of the day. To check the manufacturer's statement, a researcher has taken a random sample of the bags for both machines, and recorded in the following table: 10

Machine 1	18	19	19	18	17	19	18
	19	18	19	17	18	18	19
Machine 2	16	17	17	17	16	18	16
	16	17	17	16	16	17	16
	18	18	17	16			

Test the statement of the manufacturer.

at $\alpha = 0.05$.

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