No. of Printed Pages : 7 **MSTL-003(Set-I)**

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Practical Examination

June, 2026

MSTL–003(Set-I) : BIOSTATISTICS 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, hypothesis, interpretations, etc.

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1. (a) A researcher wants to check the effect of smoking on Respiratory Tract Infections (RTIs). He/She selects 50 smokers as well as 50 non-smokers and then sends them to an internal medicine department of a hospital to diagnose the Respiratory Tract Infections. The data are as follows :

Data of Smoking and Respiratory Tract Infections

Respiratory Tract Infections	Smokers	Non-Smokers
Yes	35	22
No	25	38
Total	60	60

Test the hypothesis that the proportions of the person having respiratory tract infections are different in smokers and non-smokers groups at 1% and 5% levels of significance. 15

(b) A random sample of 495 patients who visited to a hospital was taken and their sitting-working hours along with the status of lower back pain on 5-point Likert scale were recorded :

Sitting (in hours)	**Lower Back Pain**				
	No Pain	**Mild**	**Moderate**	**Severe**	**Very Severe**
< 2	18	24	8	7	6
2 to 4	22	21	17	15	7
4 to 6	20	19	15	13	11
6 to 8	18	19	16	18	14
8 to 10	8	17	21	21	23
10 to 12	6	15	28	23	25

Test whether sitting-working hours and lower back pain are associated with each other or not at 5% level of significance. 10

2. A hypothetical data of 24 patients on age, weight and systolic blood pressure (SBP) are given as follows :

Age (in years)	Weight (in kg)	SBP
42	50	130
60	58	121
40	44	140
52	64	120
42	52	80
40	57	90
41	56	100
44	55	110
49	61	95
41	77	110
37	39	120
32	42	90
35	40	130
46	73	125
40	52	110
45	84	100

44	77	122
40	46	105
54	60	115
34	50	85
42	75	112
44	35	98
55	65	110
30	58	115

For this data : 25

(i) Fit an appropriate regression model.

(ii) Test the significance of the individual model coefficients at 5% level of significance.

(iii) Check the linearity and normality assumptions of the fitted model.

3. A researcher investigates the number of patients (Y) arriving at a hospital's emergency unit per day.

X_1 : Number of doctors available on duty,

X_2 : Average waiting time in minutes,

A random sample of 20 days is observed and the data are given as follows :

Day	X_1 (Doctors)	X_2 (Waiting Time)	Y (No. of Patients)
1	3	20	12
2	4	25	15
3	5	30	18
4	2	15	10
5	6	35	20
6	3	22	13
7	7	40	22
8	4	28	16
9	5	24	17
10	6	32	19
11	2	18	9
12	3	26	14
13	4	30	15
14	5	34	18
15	6	36	20

16	7	38	21
17	2	20	11
18	3	23	12
19	4	27	16
20	5	31	17

(i) Fit a Poisson regression model, where Y follows a Poisson distribution.

(ii) Calculate the value of – 2 (log-likelihood). 25

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