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

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Practical Examination

June, 2026

MSTL–003(Set-II) : 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 Table Booklet for PGDAST is allowed.

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

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1. (a) A student selected 350 employees of 7 different professions (50 from each profession) and some of them were suffering from Obsessive-Compulsive Disorder (OCD). The given table shows the number of employees having OCD as well as not having OCD in various departments : 15

OCD	**Departments**						
	A	B	C	D	E	F	G
Yes	20	52	82	94	84	55	71
No	44	28	30	24	14	67	59

Test whether proportions of employees having obsessive-compulsive disorder are same for all departments or not at 1% level of significance.

(b) Suppose 20 patients suffering from brain tumor included in a study were assigned for radiotherapy. To study the survival pattern, they all were followed

upto death. The data so obtained are given as follows :

Patient ID	Survival Time (in months)
001	34
002	2
003	3
004	2
005	15
006	22
007	28
008	11
009	07
010	05
011	8
012	26
013	05
014	16
015	2
016	7
017	1
018	18
019	10
020	5

Estimate the survival function, CDF, PDF and hazard function. 10

2. A study was conducted to investigate the relationship between stress and certain other variables. The following data were collected on a sample of 15 corporate executives :

Measure of Stress	Firm Size	No. of Years in Present Position	Annual Salary (in thousands)	Age
100	802	15	300	38
50	324	8	200	52
10	367	5	200	27
27	293	10	540	36
90	287	13	52	34
60	495	4	27	45
16	391	6	26	50
180	167	9	52	60
34	588	16	34	44
17	402	2	28	39

70	117	8	42	41
140	591	11	84	58
10	195	4	31	51
105	593	5	38	63
75	474	8	41	30

(i) Draw a scatter plot matrix to get an idea about the relationship among the variables. 5

(ii) Fit a multiple linear regression model and perform its related analysis at 5% level of significance. 10

(iii) Does the fitted regression model satisfy the linearity and normality assumptions ? 10

3. A researcher studies the number of defects (Y) found in manufactured electronic components during inspection. Two explanatory variables are recorded : (i) X_1 : Machine operating hours per day, X_2 : Worker experience (in years). A random sample of 20 observations is collected as follows :

Sample	X_1 (Hours)	X_2 (Experience)	Y Number of (Defects)
1	5	2	3
2	6	3	4
3	7	5	6
4	4	1	2
5	8	4	7
6	5	3	3
7	9	6	8
8	6	4	5
9	7	3	4
10	8	5	6
11	4	2	2
12	5	4	3
13	6	5	4
14	7	6	5
15	8	7	6
16	9	5	7
17	4	3	2
18	5	2	3
19	6	4	4
20	7	5	5

(i) Fit a simple Poisson regression model for the number of defects based on machine operating hours. 10

(ii) Fit a multiple Poisson regression model for the number of defects based on two explanatory variables. (X_1 and X_2). 10

(iii) Compute the values of 2 (log-likelihood) for both fitted models. 5

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