

GUJARAT TECHNOLOGICAL UNIVERSITY**BPHARM – SEMESTER I • EXAMINATION – SUMMER - 2013****Subject code: 220001****Date: 27-05-2013****Subject Name: Applied Mathematics (Biostatistics)****Time: 02:30 pm to 05:30 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain: Standard error, Degree of freedom, Fiducial limits for population mean. **06**
 (b) Discuss merits and demerits of sampling. Discuss simple random sampling. **05**
 (c) Using the following data, find the equation of the two lines of regression. **05**

Variable	Mean	std Deviation	Coefficient of correlation
X	40	5	r=0.8
Y	30	4	

- Q.2** (a) Discuss Null hypothesis, alternate hypothesis with types of error in test of hypothesis. **06**
 (b) A random sample of 20 famotidine injection from a batch gives a mean active ingredient content of 42 mg and the standard deviation of 5 mg. Test the hypothesis that the population mean is 40 mg. ($t_{19,0.05} = 2.09$) **05**
 (c) The table below gives the age of tablet machine of certain make and annual maintenance costs. Obtain the regression equation for costs related to age. **05**

Machine age (years)	2	4	6	8
Maintenance cost (thousand Rs)	10	20	25	30

- Q.3** (a) Write a note on procedure for ANOVA for two way classification. **06**
 (b) What do you mean by biostatistics? Explain its importance in Pharmacy. **05**
 (c) The following data shows diastolic blood pressure and cholesterol levels of randomly selected men. Find the coefficient of correlation between these two parameters. **05**

Diastolic B.P.	80	75	90	74	75	110	70	85	88	78
Cholesterol	307	259	341	317	274	416	267	320	274	336

- Q.4** (a) Explain i) Wash out period ii) Carry over effect iii) Replicate design. **06**
 (b) In a study of dependence of oral cancer on smoking habit held at cancer hospital, following data were obtained on 180 individuals. **05**

	non smokers	moderate smokers	heavy smokers
Cancer	7	12	20
No Cancer	62	50	29

Test the hypothesis that the presence or absence of cancer is independent of smoking habit. (Chi square tab: $_{2, 0.05} = 5.991$)

- (c) An antibiotic producing company has called 15 persons for interview to fill 10 vacancies of salesman. The ranks are given by interview board consisting of sales manager and a psychologist. Find the Spearman's rank correlation coefficient and interpret your result. **05**

Rank by Sales Manager	1	3	2	4	6	5	7	9	8	11	10	12	14	13	15
Rank by Psychologist	2	3	1	5	4	6	8	7	9	10	12	11	13	14	15

- Q.5** (a) Thirty microgram of Methcobalamin was given intramuscularly every four week to six patients of pernicious anaemia. The results are given below. Do the data indicate improvement in haemoglobin level? ($t_{5, 0.05} = 2.57$) **06**

Patient	Haemoglobin gm %	
	Before therapy	After 3 months therapy
1	10.3	13.0
2	11.3	13.4
3	14.7	16.0
4	11.3	13.6
5	11.7	14.0
6	12.5	13.8

- (b) The demand for a particular spare in a factory was found to vary from day to day. By using chi square test for goodness of fit, test the hypothesis that the number of parts demanded has no association with the days of the week. (Chi square tab_{5, 0.05} = 11.07) **05**

Day	Mon	Tue	Wed	Thur	Fri	Sat
No. of parts demanded	1124	1125	1110	1120	1126	1115

- (c) Write a note on “ Regression coefficient and line of regression”. **05**

- Q. 6** (a) Write a note on “Chi-square test”. **06**

- (b) Blood glucose level (per100 ml) of human is compared with rabbits. Apply proper statistical test to know whether there is any significant difference between blood glucose levels of human and rabbits. ($t_{18,0.05} = 2.101$) **05**

Human	100	112	90	125	115	137	145	140	152	143
Rabbits	145	135	125	151	140	159	178	200	184	172

- (c) Two granulations were prepared by different procedures. Seven random samples of powdered mixture were collected from each batch and assayed for active material. Test whether two samples comes from population having similar variance ($F_{6, 6, 0.05} = 4.28$). **05**

Granulation A	20.4	20.6	20.6	20.7	21.0	20.9	19.8
Granulation B	20.2	21.0	20.4	19.0	21.5	18.9	21.8

- Q.7** (a) Discuss various non- parametric tests. **06**

- (b) The following data gives the yields of 12 plots under 4 varieties of herbal crop. Test using one way ANOVA whether there are significant differences among the four varieties. ($F_{\text{tab}(3,8,0.05)} = 4.07$) **05**

A	B	C	D
200	230	250	300
190	270	300	270
240	150	145	180

- (c) What is a crossover design? Discuss merits and demerits of crossover design. **05**
