Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. Pharmacy Sem-II Remedial Examination Nov/ Dec. 2010

Subject code: 220001 **Subject Name: Applied mathematics (Biostatistics)**
Date: 27/11/2010 **Time: 10:30am-01:30pm**
Total Marks: 80

Instructions:

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

Q.1

(a) Explain the following terms related to testing of hypothesis **05**
I. Null Hypothesis
II. Alternate Hypothesis
III Level of Significance
IV Type I and Type II error
V Degree of freedom

(b) Discuss correlation with classification. **05**

(c) The following data shows figures (in thousands) for imports of fluconazole powder and exports for its finished product. Find the correlation coefficient between import and export **06**

Export	10	11	14	14	20	22	16	22
Import	12	14	15	16	21	26	21	15

Q.2

(a) Using the following data given below, find the equation of the two lines of regression **05**

Variable	Mean	Std. Deviation	Coefficient of Correlation
X	40	5	0.8000
Y	30	4	

(b) A Beer's law plot is constructed by plotting absorbance versus concentration. The concentration in microgram per ml and absorbance are given herewith. Find the equation of line. **08**

Conc.	1	2	3	5	10
Absorbance	0.100	0.360	0.570	1.090	2.05

Estimate the concentration of test solution has an absorbance of 1.65.

(c) Discuss with suitable examples objectives and method of sampling briefly. **03**

Q.3

(a) Suppose a population consists of four laboratories A, B, C and D producing a 3, 2, 6 and 4 kg of drug respectively. Draw all possible samples of size 2 and find the mean weight of drug for every sample. **03**

(b) In a nutritional study, 5 patients were given a usual diet plus vitamin A and D tablets while the second comparable group of 7 patients was taking the usual diet. After 12 months, the gain in weight was noted as given in the table below. Can we say that vitamins A and D were responsible for this difference? **08**
Patients on vitamins (group A): 11, 13, 12, 14, 10
Patients on usual diet (group B): 12, 9, 8, 15, 14, 9, 10

$t_{(10, 0.05)} = 2.228$

(c) Write procedure for analysis of variance for one way classification. **05**

Q.4

(a) The weight of 10 tuberculosis patients on admission and at the end of 12 months of treatment with drug regimen daily, given below. The data was sampled from clinical trial. Examine the gain in weight is statistically significant. **08**

Patient	1	2	3	4	5	6	7	8	9	10
On admission	49	41	37	41	42	37	39	38	41	35
At 12 months	52	43	46	52	46	38	42	41	42	38

$t_{(9, 0.05)} = 2.262$

(b) Tablet dissolution was measured in vitro for 10 generic formulations. These products were also tested in vivo. Results of these studies showed the following time to 80% dissolution and time to peak (in vivo, T_p in hours) **08**

Formulation	1	2	3	4	5	6	7	8	9	10
Time (min)	17	25	15	30	60	24	10	20	45	28
T_p (hr)	0.8	1.0	1.2	1.5	1.4	1.0	0.8	0.7	2.5	1.1

Calculate correlation coefficient and test for significance (versus true correlation coefficient = 0, at 5 % level). $t_{(8, 0.05)} = 2.306$

Q.5

(a) Write a note on F test with applications. **06**

(b) Write the difference between regression and correlation. **04**

(c) Enumerate the various experimental designs for clinical trial and explain any one in detail. **06**

Q. 6

(a) It is suspected that four method of analysis in laboratory are not accurate. A known sample is analyzed using each method and replicate assays performed each with following results: **08**

Method A	Method B	Method C	Method D
10	9	8	9
11	10	9	9
10	11	8	8

By applying one way ANOVA, test whether the mean assay is same for the four different method of analysis. $F_{(3,8)}$ at 5 % level = 4.07

(b) A pharmaceutical company appoints four medical representatives A, B, C and D in chemotherapy division observes their sale in three seasons: Summer, Winter and Monsoon. The figures (in lakhs of Rs) are given in following table. **08**

Medical Representative/Season	A	B	C	D
Summer	6	4	8	6
Winter	7	6	6	9
Monsoon	8	5	10	9

1. Do the Medical representative significantly differ in performance?
2. Is there significant difference between the seasons?

$F_{(3,6)}$ at the 5 % level = 4.76 and $F_{(2,6)}$ at the 5 % level = 5.14

Q.7

(a) In a sample of 100 persons, blood group proportions as observed and expected are given below. Find if the observed distribution fits to the hypothetical (expected) distribution. **04**

Blood Group	A	B	AB	O
Observed	23	35	5	37
Expected	42	9	3	46

Given for 3 degree of freedom $\chi 2$ at 0.05 level = 7.818

(b) Write a note on WILCOXON signed rank test. **05**

(c) Attack rates among the vaccinated and unvaccinated against measles are given below. Prove the protective value of vaccination by chi square test at 1% significance level. **07**

Vaccinated and measles attacked: 10
Vaccinated and measles non – attacked: 90
Unvaccinated and measles attacked: 26
Unvaccinated and measles non – attacked: 74
Given for 01 degree of freedom $\chi 2$ at 0.01 level = 6.635

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