

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014****Subject code: 2713107****Date: 06-01-2015****Subject Name: Statistics for Biomedical Engineers****Time: 02:30 pm - 05:00 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) Write a short note on descriptive statistics. **07**
 (b) Explain the difference between statistics and biostatistics with appropriate case study. **07**

- Q.2** (a) What is variable? Explain the various types of variable in statistics with example. **07**
 (b) What is data? Explain the various source of data available for the statistics study. **07**

OR

- (b) Explain the box-and-whisker plot with below given example. **07**

GRF Measurements When Trotting of 20 Dogs with a Lambe Ligament

14.6	24.3	24.9	27.0	27.2	27.4	28.2	28.8	29.9	30.7
31.6	31.6	32.3	32.8	33.3	33.6	34.3	36.9	38.3	44.0

- Q.3** (a) Define given terms with graph. **07**
 1) Kurtosis 2) Mesokurtic 3) Leptokurtic 4) Platykurtic
 (b) Define Probability for statistics and also explain the various types of probability and characteristics with appropriate case study. **07**

OR

- Q.3** (a) Compute the marginal probability P(L) of the data given in the table **07**

Table: Frequency of Family History of Mood Disorder

Family History of Mood Disorders	Early = 18(E)	Later > 18(L)	Total
Negative (A)	28	36	63
Bipolar disorder (B)	19	38	57
Unipolar (C)	41	44	85
Unipolar and bipolar (D)	53	60	113
Total	141	177	318

- (b) Explain the Bayesian inference with appropriate example. **07**
- Q.4** (a) Write a short note on Bayes's Rule **07**
 (b) Define below terms with appropriate example. **07**
 1) False positive 2) False negative 3) Sensitivity 4) Specificity 5) Predictive value positive 6) Predictive value negative 7) Statistics inference

OR

- Q.4 (a)** A medical research team wishes to assess the usefulness of a certain symptom in the diagnosis of a particular disease. In a random sample of 770 patients with the disease, 742 reported having the symptom. In an independent random sample of 1280 subjects without the disease, 22 reported that they had the symptom. **07**
1. In the context of this exercise, what is a false positive?
 2. What is a false negative?
 3. Compute the sensitivity of the symptom.
 4. Compute the specificity of the symptom.
 5. Suppose it is known that the rate of the disease in the general population is .001. What is the predictive value positive (PV+) of the symptom?
 6. What is the predictive value negative (PV-) of the symptom?
- (b)** 13 HIV-positive patients who were treated with highly active antiretroviral therapy (HAART) for at least 6 months. The CD4 T cell counts ($\times 106/L$) at baseline for the 13 subjects are listed below. **07**

230	58	205	313	207	227	245
173	103	181	105	301	169	

Treat the above data set as a sample and compute the following;

- a) The mean, b) The median, c) The mode, d) The range, e) The variance, f) The standard deviation, g) The coefficient of variation, h) The interquartile range
- Q.5 (a)** Explain the difference between normal Distribution and standard normal distribution with Application. **07**
- (b)** What is use of Estimation in statistics? And also explain the various types of estimation available for statistics with case study. **07**

OR

- Q.5 (a)** Explain the f-test and t-test with appropriate case study. **07**
- (b)** The purpose of a study was to determine the effectiveness of an integrated outpatient dual-diagnosis treatment program for mentally ill subjects. The authors were addressing the problem of substance abuse issues among people with severe mental disorders. A retrospective chart review was carried out on 50 consecutive patient referrals to the Substance Abuse / Mental Illness program at the VA San Diego Healthcare System. One of the outcome variables examined was the number of inpatient treatment days for psychiatric disorder during the year following the end of the program. Among 18 subjects with schizophrenia, the mean number of treatment days was 4.7 with a standard deviation of 9.3. For 10 subjects with bipolar disorder, the mean number of psychiatric disorder treatment days was 8.8 with a standard deviation of 11.5. We wish to construct a 95 percent confidence interval for the difference between the means of the populations represented by these two samples. **07**
