Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2713107 **Date: 16/05/2016**

Subject Name: Statistics for Biomedical Engineers

Time:02:30 pm to 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)** What is biostatistics? What can be done with Biostatistics? Explain the application of Biostatistics. **07**

(b) What do you mean by groping of data? RBCs number in lac/mm^2 of 30 persons of species were measured as follow: **07**

25	31	27	34	25	31	30	35	32	25
23	26	34	42	35	32	29	34	35	26
35	33	39	35	29	27	33	32	36	28

1) Prepare simple frequency distribution table.
2) Find Mean, Median, Mode, Variance and Standard deviation.

Q.2 **(a)** What is Estimation? Explain the types of estimation and estimator with appropriate example. **07**

(b) What are the different methods of graphical representation of data? Explain them. **07**

OR

(b) What do you mean by data, Population, sample variable, parameter, class interval, frequency distribution, cumulative frequency distribution, secondary data? **07**

Q.3 **(a)** Studied common breath metabolites such as ammonia, acetone, isoprene, ethanol, and acetaldehyde in five subjects over a period of 20 days. Each day, breath samples were taken and analyzed in the early morning on arrival at the laboratory. For subject A, a 25-year-old female, the ammonia concentration in parts per billion (ppb) followed a normal distribution over 20 days with mean 491 and standard deviation 119. What is the probability that on a random day, the subjectôs ammonia concentration is between 292 and 649 ppb? (Area of Z in table between - Ð to -1.67 is 0.0475 and - Ð to 1.33 is 0.9082). **07**

(b) Define the below given terms with suitable examples. **07**

1) False Positive 2) False Negative 3) Sensitivity 4) Specificity

OR

Q.3 **(a)** With the suitable example explain the Bayesô rule and also define the role of Bayes rule in statistics. **07**

(b) Explain the below given terms with examples. **07**

1) Prior Probability 2) Posterior Probability 3) PV^+ & PV^-

Q.4 **(a)** Define the role of p and P/2 value in statistical interpretation with suitable diagram. **07**

(b) 1) What is a stem-and-leaf plot? How does it differ from a bar graph? **07**

2) What is a box plot? What additional information does this type of display give that is not available from either a bar graph or stem-and-leaf plot?

OR

Q.4 **(a)** What is the difference between the critical-value method and the p-value method of Hypothesis testing? Explain with suitable example. **07**

(b) From the studies have shown that women with many children are less likely to get Ovarian cancer. In a new study, data are collected from 20 women ages 40-49 with ovarian cancer. The mean parity (number of children) of these women is 1.5 with standard deviation 1.4. Suppose the mean number of children among women in the general population in this age group is 2.5. **07**

(a) What test can be used to test the hypothesis that women with ovarian cancer have fewer children than women in the general population in the same age group?
(b) Perform the test using the critical-value method.
(c) What is the p-value based on the test?
(d) What do you conclude from this study?

Q.5 **(a)** Write a brief note on Two sample test for Binomial Properties. **07**

(b) A researcher wishes to determine if vitamin E supplements could increase cognitive ability among elderly women. In 1999 the researcher recruits a sample of elderly women age 70-80. At the time of the enrollment into the study, the women were randomized to either take Vitamin E, or a placebo for five months. At the end of the five-month period, the women were given a cognition test. Higher scores on this test indicate better cognition. The mean and standard deviation of the test scores of 81 women who took vitamin E supplements was 27 and 6.9 respectively. The mean and standard deviation of the test scores of the 90 women who took placebo supplements was 24 and 6.2, respectively. **07**

(a) Compute a 95% confidence interval for the mean difference in cognition test scores between Vitamin E and placebo groups.
(b) What statistical test would you perform to compare the mean scores?
(c) Are there limitations to this study for drawing conclusions about whether vitamin E can enhance cognitive ability in elderly women?
(d) What would you conclude from these study results?

OR

Q.5 **(a)** Write a brief note on Bayesian Inference. **07**

(b) Explain the various supportive tools for statistical estimation with appropriate case study. **07**

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