

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER 2013****Subject Code: 153702****Date: 29-11-2013****Subject Name: Applied Statistics & Environmental Instrumentation****Time: 10.30 am - 01.00 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) Calculate the mean and standard deviation for the following table giving the age distribution of 542 members. **07**

Age (in years)	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of members	3	61	132	153	140	51	2

(b) How do we select an analytical method for a particular study? Explain how to determine performance characteristics of an instrument with brief description of figure of merits. **07**

Q.2 (a) A man is dealt 4 spade cards from an ordinary pack of 52 cards. If he is given three more cards, find the probability p that at least one of the additional cards is also a spade. **07**

(b) For the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment: **07**

Treatment	No. of patients		
	Favorable	Not Favorable	Total
New	140	30	170
Conventional	60	20	80
Total	200	50	250

OR

(b) Obtain the equations of two lines of regression for the following data. Also obtain the estimate of X for $Y=70$ **07**

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

Q.3 (a) A computer while calculating correlation coefficient between two variables X and Y from 25 pairs of observations obtained the following results: **07**

$$n=25, \Sigma X=125, \Sigma X^2=650, \Sigma Y=100, \Sigma Y^2=460, \Sigma XY=508$$

If was, however, later discovered at the time of checking that he had copied down two pairs as, 'X- 6,8', 'Y-14, 6' while the correct values were 'X- 8,6', 'Y-12, 8'. Obtain the correct value of correlation coefficient.

(b) What do you mean by one tailed and two tailed test of Hypothesis. Discuss different types of error which occur during hypothesis testing. **07**

OR

- (a) A department in a works has 10 machines which may need adjustment from time to time during the day. Three of these machines are old, each having a probability of $1/11$ of needing adjustment during the day, and 7 are new, having corresponding probabilities of $1/21$.
Assuming that no machine needs adjustment twice on the same day, determine the probabilities that on a particular day
- (i) Just 2 old and no new machines need adjustment.
- (ii) If just 2 machines need adjustment, they are of the same type. **07**
- (b) Discuss about term, Origin and scope of statistics. What are the properties of good estimator? **07**

- Q. 4** (a) Explain all components of UV-visible spectrophotometer with neat sketch. Write down advantages of double beam spectrophotometer over single beam spectrophotometer. **07**
- (b) What is chromatography? State the basic types of chromatography. State the advantages of chromatography. Give the difference between stationary phase and mobile phase in chromatography. **07**

OR

- (a) State the principle of Raman spectroscopy and give the difference between Raman Spectroscopy and Infrared Spectroscopy. **07**
- (b) Write a short note on Gas chromatograph. Explain the merits and demerits of the gas chromatograph. **07**

- Q.5** (a) Write the working principle of the flame photometer. Which parameters can be measured using flame photometer? **07**
- (b) A solution containing 2mg of any ion in 100ml was observed to transmit 76% incident light compared to an appropriate blank. Find out absorbance of the sample. What fraction of light would transmit by the solution when it is diluted by a factor of 2? **07**

OR

- (a) What is Standard Hydrogen Electrode? Explain its working principle with sketch. **07**
- (b) Write a short note on High Performance Liquid chromatograph . Differentiate between UPLC and HPLC. **07**
