

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI • EXAMINATION – WINTER • 2014

Subject Code: 162501

Date: 26-11-2014

Subject Name: Statically Methods and Quality Control

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)** Three road construction firms, X, Y and Z, bid for a certain contract. From past experience, it is estimated that the probability that X will be awarded the contract is 0.40, while for Y and Z the probabilities are 0.35 and 0.25. If X does receive the contract, the probability that the work will be satisfactorily completed on time is 0.75. For Y and Z these probabilities are 0.80 and 0.70. **10**

- I. What is the probability that Y will be awarded the contract and complete the work satisfactorily?
- II. What is the probability that the work will be completed satisfactorily?
- III. It turns out that the work was done satisfactorily. What is the probability that Y was awarded the contract?

- (b)** State Baye's Theorem. Give its application. **04**

- Q.2 (a)** Compute mean, median variance and standard deviation for the following set of group data. **08**

Speed (Km/Hr)	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Frequency	10	40	150	175	75	15	10

- (b)** Explain "Ogives" with suitable example. **06**

OR

- (b)** Explain various methods of data presentation with suitable example. **06**

- Q.3 (a)** The mean number of letters received each year by the university requesting information about the programs offered by a particular department is 98.8. Assume that letters are received randomly throughout a year which consists of 52 weeks. **10**

- I. What is the probability of receiving no letters in a particular week?
- II. What is the probability of receiving two or more letters in a particular week?
- III. What is the probability of receiving no letters in any four-week period?
- IV. What is the probability of having two weeks in a specified four-week period with no letters?

- (b) Give properties of Binomial Distribution. 04

OR

- Q.3 (a) The manufacturer of a new fiberglass tire claims that its average life will be at least 40,000 miles. To verify this claim a sample of 12 tires is tested, with their lifetimes (in 1,000s of miles) being as follows: 10

Tire	1	2	3	4	5	6
Life	36.1	40.2	33.8	38.5	42	35.8

Tire	7	8	9	10	11	12
Life	37	41	36.8	37.2	33	36

Test the manufacturer's claim at the 5 percent level of significance.

- (b) Explain Type-I and Type-II Error in Hypothesis Testing. 04

- Q.4 (a) An insurance company has 25,000 automobile policy holders. If the yearly claim of a policy holder is a random variable with mean 320 and standard deviation 540, Determine the probability that the total yearly claim exceeds 8.3 million. Assume yearly claim follows normal distribution. 08

- (b) Explain Chi-Square "Test for Goodness of Fit" with suitable example. 06

OR

- Q.4 (a) MS sheets (0.0064" thick) are spot-welded and their shear strengths are tabulated below: 08

Observation No	1	2	3	4	5	6	7	8	9	10
SS: Shear strength (in pounds)	680	800	780	885	975	1025	1100	1030	1175	1300
WD: Weld diameter (in 0.001 inches)	190	200	209	215	215	215	230	250	265	250

Establish a linear relationship between shear strength (SS) and weld diameter (WD) with appropriate hypothesis. Comment on the same.

- Q.4 (b) Explain Acceptance Sampling with suitable example. 06

- Q.5 (a) Successive samples of 50 screws are drawn from the hourly production of an automatic screw machine, with each screw being rated as either acceptable or defective. This is done for 20 such samples with the following data resulting. 07

Sample	Defective	Sample	Defective	Sample	Defective	Sample	Defective
1	6	6	2	11	1	16	1
2	5	7	1	12	3	17	0
3	3	8	0	13	2	18	2
4	0	9	2	14	0	19	1
5	1	10	1	15	1	20	2

- (b) Explain properties of Expectations and Variance of a Random Variable. 07

- Q.5 (a) A bin of 5 transistors is known to contain 3 that are defective. The transistors are to be tested, one at a time, until the defective ones are identified. Let N_1 be the number of tests made until the first defective is spotted and N_2 be the number of additional tests until the second 07

defective is spotted; find the joint probability distribution of N_1 and N_2 .
Also find $E[N_1]$ and $E[N_2]$

(b) Explain X-bar and R Control Charts with suitable example

07
