

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013****Subject code: 732803****Date: 15-05-2013****Subject Name: Quality Engineering & Management****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.
4. Area property table should be provided.

- Q.1** (a) Describe the procedure to find the process capability of lathe. **07**
(b) Apply fish bone diagram to solve the problem of blow holes in castings. **07**
- Q.2** (a) Assuming that the life in hours of an electric bulb is random variable following normal distribution with mean of 200 hours and standard deviation of 400 hours. Find the expected number of bulbs from a random sample of 2000 bulbs having a life **07**
1. More than 3000 hours
2. Between 2600 and 2800 hours
- (b) A certain product has been statistically controlled at a process average of 36 and a standard deviation of 1.00. The product is presently being sold to two users who have different specification requirements. User A has established a specification of 38.0 ± 4.0 for the product and user B has specification of 36.0 ± 4.0 . **07**
1. Based on the present process set up what percent of the product produced will not meet the specifications set up by user A?
2. What percent of the product will not meet the specifications of user B?
3. Assuming that the two users' needs are equal, a suggestion is made to shift the process target to 37.0. At this suggested value, what percent of the product will not meet the specifications of user A?
4. At the suggested process target what percent of the product will not meet the specifications of user B?
5. Do you think that this shift to a process target of 37.0 would be desirable? Explain your answer.

OR

- (b) Describe briefly the $\bar{X}$ -R Sum Test **07**
- Q.3** (a) Explain the OC curve with reference to sampling inspection and the meaning of the following terms: **07**
1. AQL
2. LTPD
3. IQL
4. Producer's risk
5. Consumer's risk
- (b) What is ATI? How will you compute the ATI for single sampling plan? **07**

OR

- Q.3** (a) In one life testing plan 63 items tested for 500 hours with replacement and with an acceptance number of 5. This plan was stipulated for an approximate value of 0.10 for the producer's risk of rejection of a lot having a mean life of 10,000 **07**

hours and for an approximate value of 0.10 for the consumer's risk of acceptance of a lot having a mean life of 3333 hours. Compute the respective values of these two risks.

- (b) Define the terms: 07
1. MTBF
 2. MTTR
 3. Reliability
 4. System reliability
 5. Availability

- Q.4** (a) Describe the process of operation of quality circles in brief. 07
 (b) Discuss OEE model. 07

OR

- Q.4** (a) How does re-engineering help in product design for manufacture? 07
 (b) Explain concurrent engineering with its benefits and applications. 07

- Q.5** (a) Discuss the significance of SWOT analysis in quality design. 07
 (b) Discuss ANOVA analysis as means to achieve quality standards. 07

OR

- Q.5** (a) A certain product is comprised of two components: X and Y. Component X has a random failure rate of one in every ten years, while component Y's random failure rate is one in every five years. This product has a mean time to wear-out of eight years with a standard deviation of one year. 07
1. What is the probability that component Y will fail during a year of operation?
 2. What is the probability that component X will perform reliably for a year?

- (b) The monthly incomes from a random sample of workers in a factory are shown below. 07

Monthly Income
 (In \$1,000)

4.0
 5.0
 7.0
 4.0
 6.0
 6.0
 7.0
 9.0

- a. Compute the standard error of the mean (in dollars).
- b. Compute the margin of error (in dollars) at 95% confidence.
- c. Compute a 95% confidence interval for the mean of the population. Assume the population has a normal distribution. Give your answer (in dollars).
