Printed Pages : 2 **Roll No.** | | | | | | | | | | | **NPI801**

B. TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

QUALITY CONTROL

Time : 3 Hours ***Max. Marks : 100***

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Attempt all parts of the following question: **10 x 2 = 20**

(a) Differentiate between: Cost of quality and Value of quality.

(b) State the guiding principles of total quality control.

(c) State the objectives of $\bar{X}$ and R charts.

(d) State the applications of group control chart.

(e) Write short note on Systematic sampling.

(f) Write short note on ISO – 3951.

(g) Define reliability.

(h) Write the short note on MTBF.

(i) Define Quality Circle.

(j) Define Quality in sales & services.

SECTION – B

2 Attempt all five questions from this section: **5 x 10 = 50**

a) Attempt any *TWO* parts of the following:

i. What are the benefits of statistical quality control?

ii. Describe the characteristics of Just in Time production.

iii. State and explain the responsibilities of quality manager.

b) Attempt any *TWO* parts of the following:

i. What is meant by natural tolerance of the process?

ii. Determine the control limits for $\bar{X}$ and R charts if $\sum \bar{X} = 357.50, \sum R = 9.90$, number of subgroups $= 20$. It is given that $A_2 = 0.18, D_3 = 0.41, D_4 = 1.59$ and $d_2 = 3.735$. Also find the process capability.

iii. What do you mean by warning limits and action limits? Explain the use of warning limits.

c) Attempt any *TWO* parts of the following:

i. Differentiate between Single Sampling Plan and Double Sampling Plan.

ii. A single sampling plan uses a sample size of 15 and an acceptance number 1. Using hypergeometric probabilities, compute the probability of acceptance of lots of 50 articles with 2% defectives.

iii. A known sigma variables acceptance plan for a one sided specification uses $n = 25$ and $k' = 1.97$. Compute the probability of acceptance of a 3% defective lot by assuming that the frequency distribution in the lot is normal and σ' is estimated correctly, where symbols have their usual meaning.

d) Attempt any *TWO* parts of the following:

i. State and explain the factors to be considered in designing for reliability.

ii. Describe in briefly the availability of single repairable system using Markov model.

iii. A certain type of electric component has a uniform failure rate of 0.00001 per hour. What is its reliability for a specified period of service of 10,000 hours?

e) Attempt any *TWO* parts of the following:

i. Explain the need of quality assurance system in industries.

ii. Describe in brief the evaluation of Six Sigma quality approach.

iii. Describe the basic organizational structure of Quality Circles

SECTION – C

Attempt any three of the following questions: 3 x 10 = 30

3. Explain the importance of controlling tools, gauges and test equipment in inspection planning.

4. A manufacturer uses injection moulding to produce plastic insulation barrier. He inspects 100 barriers daily, picked randomly from production and determines the number of defectives through visual inspection. He wishes to use the data accumulated during 10 days period to construct an attribute control chart for the number of defectives. The results of the daily inspection of 100 barriers are shown:

Sample Lot Number	1	2	3	4	5	6	7	8	9	10
Sample size	100	100	100	100	100	100	100	100	100	100
Number of defectives	8	7	12	5	18	2	10	16	14	6

Does the attribute control chart reveal that the process is under control?

5. A single sampling acceptance criteria for any desired $P_{0.50}$ is given by the approximate relation: $n = \frac{c+0.67}{P_{0.50}}$, where $n =$ sample size, $c =$ acceptance number, $P_{0.50} =$ fraction defective for which the probability of acceptance is 0.50. A vender selects $P_{0.50} = 0.020$. The vender chooses the acceptance number 1. Find how many lots are likely to pass vender's inspection.

6. A light weight component in an electrical assembly has a reliability of 0.70. Provision of two redundant units can be tolerated with no appreciable effect on weight specifications. If two redundant units of the same components are installed, what will be the compound reliability of the three?

7. Describe the various steps necessary for obtaining ISO: 9000 standard registration.