B.Tech- 8

QAR

Set-1

QUALITY ASSURANCE AND RELIABILITY

Full Marks : 70

Time : 3 hours

Answer **Q. No. 1** and any **five** from the rest

The figures in the right-hand margin indicate marks

Draw neat sketch wherever necessary

Use of Normal and Poisson distribution tables is permitted

1. Briefly answer *all* the following questions : 2 × 10

   (*a*) Define Type-I error in a control chart.

   (*b*) For what value of process capability ratio there will be maximum percentage of rejection of items ?

   (*c*) What would be ASN for a single sampling plan with sample size 100 and acceptance number 5 ?

(*Turn Over*)

(d) Give Taguchi's definition of quality.

(e) What is orthogonal array ?

(f) What is kaizen ?

(g) What is PDCA cycle ?

(h) What is ISO 18000 ?

(i) Mean cycles between failures is 100,000. What should be warranty period (in cycles) if the producer is willing to pay for repair of maximum 10% of devices ?

(j) How is reliability different from quality ?

2. Samples each of size 4 are taken from a CNC machining centre at regular interval of one hour. After 20 samples, $\Sigma \bar{X} = 500$ and $\Sigma R = 20$. Customer specification limits are 25 ± 1. For sample size of 4, take $c_2 = 0.79798$, $d_2 = 2.059$ and $A_2 = 0.729$.

(a) What should be the control limits for $\bar{X}$ chart so as to have a false alarm rate of 1% ?

(Continued)

(b) If all the points plotted on $\bar{X}$ chart are within the two control limits, will there be any rejection of item ? If yes, what would be the percentage of rejection ?   10

3. Plot AOQ curve for a single sampling plan with lot size 1000, sample size 50 and acceptance number 1.   10

4. (a) Explain the concept of Taguchi's method of robust design.   5

(b) Operation on target is more important than conformance to specification in Taguchi's philosophy. Discuss.   5

5. Differentiate between :   10

   (i) Off-line and on-line quality control

   (ii) Inner array and outer array

   (iii) Signal and noise

   (iv) Full factorial design and partial factorial design.

(Turn Over)

6. What will be the system reliability for the assembly given below if the reliability of each component is 95% ? Assume perfect switching. 10
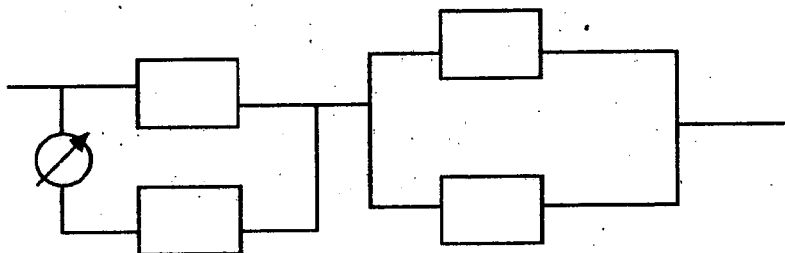
7. (a) What is quality circle ? Briefly describe the role of a facilitator of this circle. 5

(b) What will be the probability of survival of an item till 100h of operation if its MTBF is 1000h ? 5

8. Write short notes on any *two* of the following : 10

(i) Quality Function Deployment

(ii) TQM

(iii) ISO 14000.

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