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E – 2394

Reg. No. :

Name :

**Eighth Semester B.Tech. Degree Examination, May 2018
(2013 Scheme)**

13.806.1 : INDUSTRIAL QUALITY CONTROL (MPU)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Compare control limits with specification limits.
2. How will you calculate process capability ?
3. What is a 'defect' and 'defective' ?
4. Define AQL.
5. Define consumer's risk.
6. What is the difference between 100% inspection and sampling inspection ?
7. What is Pareto analysis ?
8. Define system reliability.
9. What is blocking in experimental design ?
10. What is Latin square design : **(10×2=20 Marks)**

P.T.O.



PART – B

Answer **any one full** question from **each** Module. **Each full** question carries **20** marks.

Module – I

11. a) Outline the procedures required to construct \bar{X} and R charts. **10**
- b) You are given the values of sample mean (\bar{X}) and the range (R) for 10 samples of size five each. Draw mean and range charts and comment on the state of the control. **10**

Sample No.	1	2	3	4	5	6	7	8	9	10
X bar	43	49	37	44	45	37	51	46	43	47
R	5	6	5	7	7	4	8	6	4	6

OR

12. a) Briefly explain the control charts for attributes. **10**
- b) A manufacturer uses injection moulding to produce a plastic insulation barrier. He inspects 100 batteries daily, picked randomly from production and determines the number of defectives by visual examination. He wishes to use the data accumulated during a 10 day period to construct an attribute control chart for no of defectives. The results of the daily inspection of 100 batteries is shown in the following table :

Sample lot number	Sample size	Number of defectives, np
1	100	8
2	100	7
3	100	12
4	100	5
5	100	18
6	100	2
7	100	10
8	100	16
9	100	14
10	100	6
Total	1000	98

Does the attribute control chart reveal that the process the under control ? **10**



Module – II

13. a) Explain the following : 10
- i) AOQ curves.
 - ii) ATI.
- b) Suppose that a single sampling plan with $n = 150$ and $c = 2$ is being used for the receiving inspection where the vendor ships the product in lots of size $N = 3000$. 10
- i) Draw the OC curve for this plan.
 - ii) Draw the AOQ curve and find the AOQL.

OR

14. a) Compare the following : 10
- i) Single sampling plan.
 - ii) Double sampling plan.
 - iii) Multiple sampling plan.
- b) In a double sampling plan, 2% AOQL specimen acceptance/rectification plan $n_1 = 32$, $c_1 = 0$, $n_2 = 38$, $c_2 = 2$, $N = 1000$. Determine : 10
- i) The probability of acceptance of a 2% defective lot.
 - ii) The average total inspection.

Module – III

15. a) Define the following : Maintainability, availability, reliability, failure rate and hazard rate. 10
- b) An electric circuit consists of 5 silicon transistors, 3 silicon diodes, 10 composition resist of and 2 ceramic compositor connected in series configuration. The hourly failure rate of each component is given below : Silicon transistors $\lambda_t = 4 \times 10^{-5}$; Silicon diode $\lambda_d = 3 \times 10^{-5}$; composition resistor $\lambda_r = 4 \times 10^{-5}$ ceramic capacitor $\lambda_c = 2 \times 10^{-4}$. Calculate the reliability of the circuit for 10 hour when the components follow exponential distribution. Find also MTBF. 10

OR

16. a) With a neat sketch, explain the various stages of product life cycle. 10
- b) Explain the various steps involved in the product development. 10



Module – IV

17. a) Explain the seven steps of experimental design processes with the help of suitable example. **10**
- b) Differentiate the factorial design and full factorial design. **10**

OR

18. a) Explain in detail about the Taguchi's quality loss function. **10**
- b) Explain control factors and noise factors. **10**

(4×20=80 Marks)
