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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; June - 2017

Quality Assurance and Reliability

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) SQC Table is permitted to use. iii) Assume suitable missing data, if any.

UNIT - I

1 a. List and explain different dimensions of quality. 10

b. Write a note on : 10
i) Hidden Quality Costs ii) Sporadic and Chronic Quality problems.

2 a. Define and explain the concept of quality assurance. 5

b. Explain the planning and performing audits on activities. 10

c. List the ingredients of quality audit program. 5

UNIT - II

3 a. Explain the SPC and Mention the reasons for variability. 10

b. Explain the Type - I error and Type - II error with a neat diagram. 10

4 a. List the proceedings for X-bar and Range of control charts for variables. 6

b. Subgroups of 5 items each are taken from a manufacturing process at regular intervals. A certain quality characteristics is measured and $\bar{x}$ and R values are compared for each subgroups. After 25 subgroups $\sum \bar{x} = 357.50$ and $\sum R = 8.80$. Compute the control chart limits. All the points on both charts are within the limits. If the specification limits fall at 14.40 ± 0.40. What conclusions can you draw about at ability of existing process to produce items within these specifications. Suggest possible ways in which the situations can be improved. 14

UNIT - III

5 a. List the differences between : 6
i) Defects and defectives ii) C - charts and U - charts.

b. A textile manufacturer initiates the use of C- chart to monitor the number of imperfections found in a bale of cloth. It is same length, width and fiber composition. A total 191 imperfections were found in the last 25 bales inspected. The four highest and lowest counts were as follows : 14

Highest	Lowest
22	4
19	4
14	5
12	5

i) Calculate the 3 control limits ii) Is the process in control?
iii) If not what aimed value of C1 and control limits would you suggest for the future period.

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6 a. Explain the advantages of control charts for Attributes. 6

b. The table given below shows the inspection results of screws. Plot a suitable control chart and offer your comments on the behavior of the process. 14

Lot No.	1	2	3	4	5	6	7	8	9	10
No. of Items Inspected	135	162	140	155	188	166	138	144	161	158
Rejected	11	19	9	14	9	16	10	12	11	16

UNIT - IV

7 a. List the advantages and disadvantages of sampling inspection. 6

b. A single sampling plan is as follows: N = 5000; n = 100; C = 3 14

i) Plot the O.C. Curve

ii) Determine the AQL and LTPD for P_r = 10% and C_r = 15% respectively

iii) Determine the ATI of the above plan for 1.5% defective the incoming lot.

8 a. Explain the characteristics of good sampling plan. 5

b. A double Sampling plan is as follows: 15

N = 4000,

$n_1 = 100$ $C_1 = 1$ $r_1 = 4$ $P^1 = 0.0125$

$n_2 = 150$ $C_2 = 7$ $r_2 = 8$

Calculate Pa, ATI, AOQ, ASN of the above plan.

UNIT - V

9 a. Explain the failure pattern for complex products. 10

b. A series system has 3 independent parts A, B and C which have an MTBF of 100, 400 and 800 hrs respectively find : 10

i) MTBF of the system

ii) Failure rate of the system in failures per million hrs

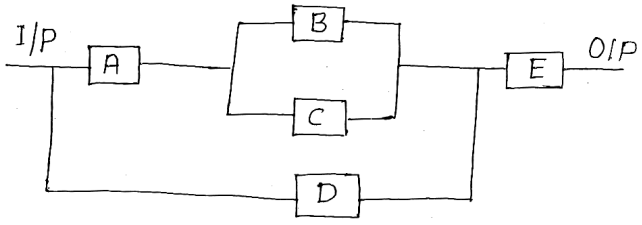
iii) Failure of the systems in percent failure for 1000 hrs

iv) Reliability of the systems for 30 hrs.

10 a. Write short notes on the following : 6

i) MTTR ii) MTBF.

b. Determine the reliability of the systems for 20 hrs of operating period. The configuration is given below. The failure rate per hrs are also given $\lambda_A = 0.01$, $\lambda_B = 0.015$, $\lambda_C = 0.02$, $\lambda_D = 0.02$, $\lambda_E = 0.025$. 14



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