

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

18IP53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Quality Assurance and Reliability

Time: 3 hrs.

Max. Marks: 100

Note: i) Answer any FIVE full questions, choosing ONE full question from each module.
ii) Use of SQC table is permitted

Module-1

- 1 a. Define Quality List and explain the ten factors a product should have to perform satisfactorily. (10 Marks)
- b. Explain the concept spiral of progress in quality with a neat sketch. (10 Marks)

OR

- 2 a. Explain the concept "Quality Assurance". List the important activities assigned to the Quality Assurance. (10 Marks)
- b. What is quality survey or Quality Audit? Explain the scope of quality Audit. (10 Marks)

Module-2

- 3 a. Distinguish between chance and assignable causes, and also explain the reasons for variation due to chance and assignable causes. (10 Marks)
- b. Following are the inspection results of water bottles for nineteen observations. Calculate the average fraction defective and 3 sigma control limits, construct the control chart and state whether the process is in statistical control.

Sample no	No of defectives	Fraction defectives	Sample no	No of defectives	Fraction defectives
1	724	48	11	736	47
2	763	83	12	739	50
3	748	70	13	723	47
4	748	85	14	748	57
5	724	45	15	770	51
6	727	56	16	756	71
7	726	48	17	719	53
8	719	67	18	757	34
9	759	37	19	760	29
10	745	52			

(10 Marks)

OR

- 4 a. Explain the following with neat sketches;
 - i) Trend type in Assignable Cause
 - ii) Shift type in Assignable Cause

(10 Marks)

- b. The following table gives the number of missing rivets noted at aircraft final inspection. Find \bar{C} compute trial control limits and plot control chart for C. What values of C' would you suggest for the subsequent period?

Air Plane No	No of Missing rivets	Air Plane No	No of Missing rivets	Air Plane No	No of Missing rivets	Air Plane No	No of Missing rivets
1	8	7	08	13	09	19	11
2	16	8	11	14	25	20	09
3	14	9	21	15	15	21	10
4	19	10	12	16	09	22	22
5	11	11	23	17	09	23	07
6	15	12	16	18	14	24	28
						25	09

(10 Marks)

Module-3

- 5 a. For the following data calculate the mean and standard deviation.

Cell Boundaries	Frequency
382.5 – 387.5	385
387.5 – 392.5	390
392.5 – 397.5	395
397.5 – 402.5	400
402.5 – 407.5	405

(10 Marks)

- b. A Machine shop produces steel pins. The width of 100 pins was checked after machining and data was recorded as follows.

- a) Find the arithmetic mean, standard deviation and variance.
b) What percentage of the pins manufactured has width of 9.52 to 9.63?

	Width in (MM)	Frequency		Width in (MM)	Frequency
1	9.50 – 9.51	6	5	9.58 – 9.59	22
2	9.52 – 9.53	2	6	9.60 – 9.61	08
3	9.54 – 9.55	20	7	9.62 – 9.63	06
4	9.56 – 9.57	32	8	9.64 – 9.65	04

(10 Marks)

OR

- 6 a. Define variations. List the different types of variations and reasons for variation. (10 Marks)
b. Control charts for \bar{X} and R are maintained on certain dimensions of a manufactured part measured in MM. The subgroup size is 04. The value of \bar{X} and R are computed for each subgroup. After 20 subgroups $\sum \bar{X} = 412.83$ and $\sum R = 3.39$. Compute the values of 3 sigma limits for the \bar{X} and R charts and estimate the value of σ' on the assumption that the process is in statistical control.

(10 Marks)

Module-4

- 7 a. Explain the concept sampling Inspection. List the advantages of sampling Inspection. (10 Marks)
b. Explain with a neat sketch of Ideal operating characteristic (OC) curve. (10 Marks)

OR

- 8 a. Explain the following with its neat flow diagram.
i) Single sampling Plan (10 Marks)
ii) Double sampling plan (10 Marks)
b. Mention the important characteristics of good Acceptance Plan. (10 Marks)

Module-5

- 9 a. Mention the reasons why Design Engineers have a tendency to specify tight tolerances. (10 Marks)
b. Explain the concept statistical tolerance with an Example and also explain the meaning of Reproducibility and Accuracy. (10 Marks)

OR

- 10 a. Explain the need for a Reliable product and also explain the Integration of Quality and Reliability functions with a neat sketch. (10 Marks)
b. Mention the basic elements of Reliability. Explain the failure pattern for complex product with a neat sketch. (10 Marks)

* * * * *