U.S.N ☐☐☐☐☐☐☐☐☐☐

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; July / Aug. - 2022
Quality Assurance and Reliability

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes

The Students will be able to:
CO1: Understanding the fundamentals of quality function and concept of quality assurance.
CO2: Demonstrate the concept of statistical process control and control charts for variables.
CO3: Analyze the controls chart for fraction non-confirming (defective) development and operation of control chart.
CO4: Analyze the various sampling inspection.
CO5: Estimate the reliability and life testing.

<u>*Note:*</u> *I) PART - A is compulsory. **Two** marks for each question.*

*II) PART - B: Answer any <u>**Two**</u> sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Define quality.	2	L1	CO1	PO1
b.	What is control chart?	2	L1	CO3	PO1
c.	Describe process capability.	2	L1	CO2	PO1
d.	What is DSP?	2	L1	CO4	PO1
e.	What is redundancy?	2	L1	CO5	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	What are the right dimensions of the quantity? Explain.	9	L2	CO1	PO1
b.	Explain briefly Appraisal costs and prevention cost with examples.	9	L2	CO1	PO1
c.	Briefly explain planning and performing audit activities.	9	L3	CO1	PO1
	UNIT - II	**18**			
2 a.	Explain chance and assignable causes with examples.	9	L2	CO2	PO1
b.	With a neat sketch explain Basic principles of control chart.	9	L2	CO2	PO1

c. The following are $\bar{X}$ and R values for 20 subgroups and 5 readings.

The specifications for this product are 37±10,

Sub Groups	$\bar{X}$	R	Sub Groups	$\bar{X}$	R
1	34.0	4	11	35.8	4
2	31.6	4	12	38.4	4
3	30.8	2	13	34.0	14
4	33.0	3	14	35.0	4
5	35.0	5	15	33.8	7
6	32.2	2	16	31.6	5
7	33.0	5	17	33.0	5
8	32.6	13	18	28.2	3
9	33.8	19	19	31.8	9
10	37.8	6	20	35.6	6

(For this question: 9, L3, CO2, PO1)

Determine control limits and plot $\bar{X}$ and R chart.

UNIT - III   **18**

3 a. Explain control chart for variables and attributes.   6   L2   CO3   PO1

b. The following data refer to the production and number of defectives for 15 consecutive days. Each day 400 units were inspected.

Days	No. of defectives	Days	No. of defectives
1	2	9	18
2	5	10	8
3	0	11	6
4	14	12	0
5	3	13	3
6	0	14	0
7	1	15	6
8	0		

    12   L3   CO3   PO1

Plot 100p(np) chart and what control limits do you adopt for future production.

c. Prepare a "C" chart based on the evidence of the cloth length given below.

100 m cloth length No.	No. of Minor defects	100 m cloth length No.	No. of Minor defects
1	2	6	0
2	3	7	2
3	1	8	1
4	4	9	4
5	4	10	2

    12   L3   CO3   PO1

Is it process under control?

UNIT - IV   **18**

4 a. Explain DSP with a neat flow diagram.   6   L2   CO4   PO1

b. Write a note on;

i) LTPD   ii) AOQ   iii) ATI

    12   L2   CO4   PO1

c. A DSP is as follows N = 5000, n_1 = 100, n_2 = 100, C_1 = 0, C_2 = 1 and P = 0.01. Calculate P_a, ATI and AOQ.

    12   L2   CO4   PO1

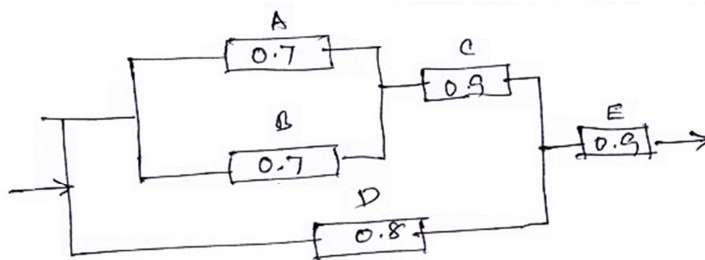**UNIT - V**   **18**

5 a. Explain the following:

i) Reliability   ii) Failure rate   iii) MTBF

    6   L2   CO5   PO1

b. Calculate the reliability of the system shown below,

    12   L2   CO5   PO1

c. Describe the various techniques of increasing reliability.   12   L2   CO5   PO1