LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **STATISTICS**

FIRST SEMESTER – **NOVEMBER 2022**

PST1MC05 – STATISTICAL QUALITY CONTROL

Date: 02-12-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A				
Answer ALL the questions				
1	**Answer the following**		**(5 x 1 = 5)**	
a)	Distinguish between non-conforming unit and non-conformity.		K1	CO1
b)	What is the need for CUSUM chart?		K1	CO1
c)	Write the major uses of data from a Process capability analysis.		K1	CO1
d)	Define ATI		K1	CO1
e)	Define sequential sampling by variables.		K1	CO1
2	**Match the following**		**(5 x1 = 5)**	
a)	Control Chart for attributes	Mean and range chart	K2	CO1
b)	Cusum chart	Single Sampling Plan	K2	CO1
c)	PCA	p chart	K2	CO1
d)	Attribute sampling plan	Histogram, pp plot	K2	CO1
e)	Control charts for Variables	Small shift	K2	CO1
SECTION B				
	Answer any THREE of the following		**(3x10=30)**	
3	What are the various patterns in the control chart?		K3	CO2
4	When do we use control chart based on coefficient of variation? and obtain the control limits with an example.		K3	CO2
5	Describe process capability ratios with illustrations.		K3	CO2
6	Explain the procedure for chain sampling plan.		K3	CO2
7	Explain the acceptance sampling by variables with its advantages and disadvantages.		K3	CO2
SECTION C				
	Answer any TWO of the following in 500 words		**(2x12.5=25)**	
8	A fraction nonconforming control chart with n=400 has the following parameters UCL=0.0809, CL=0.0500 and LCL=0.0191 a) What would be the corresponding parameters for an equivalent control chart based on number nonconforming? b) Find the probability of type I Error. c) What is the probability that a shift in the process fraction nonconforming to 0.03 will be detected on the first sample following the shift?		K4	CO3
9	Set up a moving average control chart using μ=10,σ=1 and w=5 and draw conclusion for the following data i: 1 2 3 4 5 6 7 8 9 10 x_i: 9.45 7.99 9.29 11.66 12.16 10.18 8.08 11.46 9.2 10.34		K4	CO3
10	A process is in control with $\bar{\bar{X}}$ =199 and $\bar{R}$ =3.5. The process specifications are 200±8 a) Estimate the potential capability. b) Estimate the actual capability.		K4	CO3

<table>
<tr><td></td><td>c) Estimate the fraction defective.</td><td></td><td></td></tr>
<tr><td>11</td><td>Describe Continuous sampling plans with illustrations and also write few situations where these plans are applied.</td><td>K4</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION D</td></tr>
<tr><td></td><td>Answer any ONE of the following in 1000 words</td><td colspan="2">(1x15=15)</td></tr>
<tr><td>12</td><td>Briefly explain Deming’s 14 points.</td><td>K5</td><td>CO4</td></tr>
<tr><td>13</td><td>Describe designing a variables sampling plan with a specified OC Curve.</td><td>K5</td><td>CO4</td></tr>
<tr><td colspan="4">SECTION E</td></tr>
<tr><td></td><td>Answer any ONE of the following in 1000 words</td><td colspan="2">(1x20=20)</td></tr>
<tr><td>14</td><td>a) Construct EWMA chart for the following data using $\lambda=0.2,\mu=10,\sigma=1$ and L=3: (14)
<table>
<tr><td>i</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Xi</td><td>10.5</td><td>6</td><td>10</td><td>11</td><td>12.5</td><td>9.5</td><td>6</td><td>10</td><td>10.5</td><td>14.5</td></tr>
</table>
Interpret the results.
b) Write the V Mask procedure. (6)</td><td>K6</td><td>CO5</td></tr>
<tr><td>15</td><td>Draw OC, AOQ, ATI curves for a single sampling plan with n=120 and c=2. Also obtain the value for AOQL.</td><td>K6</td><td>CO5</td></tr>
</table>

##########