Indian Statistical Institute, Bangalore

M.S. (QMS) First Year

Second Semester – Statistical Process Control II

Mid Term Exam Duration: 2 Hrs Date: February 22, 2016 Max Marks: 50

1. Explain the following dominance system with examples. Suggest suitable process control mechanism for each one of them. [15]

a) Operator dominant process
b) Setup dominant process
c) Raw material dominant process

2. An injection moulding machine producing plastic component with the help of a mould. The mould has 4 cavities, producing one component from each cavity, at a time. The inspection results of components are summarized below: [10]

Day	No. of parts checked	No. of parts rejected from			
		Cavity 1	Cavity 2	Cavity 3	Cavity 4
1	500	8	11	1	3
2	500	3	6	8	4
3	500	1	10	2	6
4	500	7	2	6	2
5	500	12	5	6	3
6	510	7	4	4	10
7	510	2	7	1	1
8	500	2	2	3	8
9	500	10	6	1	7
10	510	7	6	6	9

Device a suitable control chart. Comment above the process.

3. In a short run production system, a machine can produce three parts. The critical characteristics of the parts are 10 ± 0.5, 12 ± 0.5 and 15 ± 0.5. Develop a suitable control chart which can ensure a minimum C_p value of 1.33 for all the parts. Calculate the control chart limits. [10]

4. A product has two quality characteristics. The nominal values of the quality characteristics and their sample covariance matrix have been determined from the analysis of 20 preliminary samples of size n=10 as follows [15]

$$\bar{\bar{x}} = \begin{bmatrix} 3.0 \\ 3.5 \end{bmatrix} \qquad s = \begin{bmatrix} 1.40 & 1.02 \\ 1.02 & 1.36 \end{bmatrix}$$

Calculate phase I limits.

Data on another 5 samples of size n=10 given below. Is the process under statistical control?

Sample No.	$\bar{x}_1$	$\bar{x}_2$
1	3.2	3.9
2	3.7	4.0
3	4.1	4.7
4	2.8	3.0
5	3.2	3.6

Suggest phase II limits.

5. Write short notes on any two of the following: [5*2 = 10]

a) steps of SPC implementation
b) limitation of T^2 control chart
c) SPC vs EPC