LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

SIXTH SEMESTER – NOVEMBER 2011

ST 6605/S 651 – STATISTICAL PROCESS CONTROL

Date : 05-11-2011 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

Section A

Answer all questions **(10 × 2 = 20)**

1. Define statistical process control.
2. What is Box plot?
3. Mention any two advantages of control chart.
4. When do you say the process is out of control?
5. Explain 3-sigma limits.
6. Mention the difference between c – chart and u – chart.
7. What is the difference between defect and defective?
8. Define producer's risk and consumer's risk.
9. Write the expression for AOQ of a double sampling plan.
10. Mention advantages of acceptance sampling.

Section B

Answer any five questions **(5 × 8 = 40)**

11. Explain the different types of patterns that can occur in a control chart. What can you say about the process?

12. Mention the theoretical base of p-chart and set up its control limits.

13. Describe the operating procedure of double sampling plan.

14. Explain the theory behind the construction of control limits for $\overline{X}$ and S chart.

15. Define the terms i) Specification Limits and ii) Natural Tolerances with an illustrations.

16. Explain the OC curve of a control chart in detail.

17. Discuss the process capability analysis using a control chart.

18. Explain 'Chance' and 'Assignable' causes of variation in detail giving examples.

Section C

Answer any two questions **(2 × 20 = 40)**

19. a) Explain the Stem and Leaf plot with an illustration. (10+10)
    b) Explain different dimensions of quality.

20. a) Sixteen circuits were randomly selected from a company manufacturing personal computers and inspected for the number of defects per circuit were as follows:

Box Number:	1	2	3	4	5	6	7	8	9	10
No. of defects:	12	15	9	14	18	26	8	6	11	12

Box Number:	11	12	13	14	15	16
No. of defects:	16	13	19	18	14	21

Construct the control limits for C-chart and verify whether the process is in control.

b) Explain the different approaches in the construction of u – chart with variable sample size. (10+10)

21. a) Derive the control limits for $\bar{X}$ and R chart.

    b) Construct $\bar{X}$ and R chart for the following data and comment on it.

Sample number	Observations		
1	52	49	54
2	50	55	54
3	54	50	51
4	53	51	52
5	52	55	51
6	50	52	49
7	51	54	50
8	49	53	50
9	53	55	49
10	54	56	51
11	51	49	53
12	49	55	50
13	51	50	54

(10+10)

22. a) What is meant by acceptance sampling? Mention the situations it is most likely to be useful.

    b) Explain Single Sampling plan in detail.

    c) Obtain the expression for AOQ in a single sampling plan. (5+10+5)