



M 4458

Reg. No. :

Name :

V Semester B.A./B.Sc./B.Com./B.B.A./B.B.A. T.T.M./B.B.M./B.C.A./B.S.W./
B.A. Afsal UI Ulama Degree (CCSS – Reg./Supple./Improv.)

Examination, November 2013

CORE COURSE IN STATISTICS

5 B09 STA : Statistical Quality Control and Operations Research

Time: 3 Hours

Max. Weightage : 30

Instruction : Use of calculators and statistical tables are permitted.

PART – A

Answer any ten questions :

(Weightage 1 each)

1. What is meant by quality of a product ?
2. Define the assignable causes of variation.
3. What are the advantages of process control ?
4. Give the logic of drawing 3σ limits.
5. What is the basic difference between \bar{X} chart and R chart ?
6. Define – Consumer's risk.
7. Define :
 - i) AQL
 - ii) AOQL.
8. What are the components of a linear programming problem ?
9. What is degeneracy in transportation problem ?
10. Distinguish between defect and defectives.
11. Define : Assignment Problem.

(10×1=10)

P.T.O.



PART – B

Answer **any six** questions :**(Weightage 2 each)**

12. Give the advantages of statistical quality control.
13. Distinguish between chart for variables and chart for attributes.
14. Discuss single sampling plan.
15. What are the limitations of linear programming ?
16. Explain the concept of duality in linear programming.
17. Show that transportation problem is a special case of linear programming.
18. During an examination of equal lengths of cloth, the following number of defects were observed :
2, 3, 4, 0, 5, 6, 7, 4, 3, 2.
Draw appropriate control chart and comment on the process control.
19. Solve the L.P.P. by graphical method :
Maximize $Z = X_1 + X_2$
Subject to constraints
 $X_1 + X_2 \leq 1$,
 $-3X_1 + X_2 \geq 3$ and $X_1, X_2 \geq 0$.
20. Obtain initial basic feasible solution to the following transportation problem by North-West corner rule :

Origin	Destination			Supply
	D ₁	D ₂	D ₃	
O ₁	2	7	4	5
O ₂	3	3	1	8
O ₃	5	4	7	7
O ₄	1	6	2	14
Demand	7	9	18	

(6×2=12)



PART – C

Answer **any two** questions :

(Weightage 4 each)

- 21. Explain the relationship between control limits and natural tolerance limits.
- 22. The following table shows the mean and range for ten samples of size five each. Draw \bar{X} and R chart and comment on the state of control.

Sample number :	1	2	3	4	5	6	7	8	9	10
Sample mean :	11	12	11	11	12	9	10	8	10	11
Sample range :	7	4	8	5	7	4	8	4	5	3

- 23. Solve the L.P.P. by Simplex method :

$$\text{Maximize } Z = X_1 + X_2 + 3X_3$$

Subject to constraints

$$3X_1 + 2X_2 + X_3 \leq 3$$

$$2X_1 + X_2 + 2X_3 \leq 2 \text{ and } X_1, X_2, X_3 \geq 0.$$

- 24. Explain the need and utility of statistical quality control in industry.

(2x4=8)
