

Reg. No.....

Name.....

B.Sc. DEGREE END SEMESTER EXAMINATION OCTOBER 2017**SEMESTER –5: STATISTICS FOR B.Sc. COMPUTER APPLICATIONS****COURSE: 15U5CRCST6: STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH***(For Regular 2015 admission)*

Time: Three Hours

Max. Marks: 75

*Use of Scientific calculators and Statistical table permitted***PART A**Answer **all** questions. Each question carries **1** mark.

1. Explain degeneracy
2. When do you say that a transportation problem is unbalanced?
3. Explain a loop in transportation table.
4. State one application of OR.
5. Define a fair game.
6. Distinguish between p -chart and np -chart.
7. Explain warning limits.
8. Define a defect.
9. Name a control chart which can be used to control the variability.
10. Define consumer's risk.

PART B

Each question carries 3 marks. Maximum marks from this part is 15

11. Distinguish between transportation problem and assignment problem.
12. Solve the game with payoff matrix.

P=

	B1	B2
A1	5	12
A2	3	6

13. Explain North-West corner method for finding basic feasible solution.
14. Explain the role of control charts in SQC.
15. Distinguish between product control and process control.

16. Explain 3σ -limits and probability limits.
17. What are the important attribute control charts in common use?

PART C

Each question carries **5** marks. Maximum marks from this part is 20

18. Give outline of simplex method in linear programming.
19. Solve the following LPP by the graphical method

$$\text{Maximize } Z = 5x_1 + 7x_2$$

Subject to

$$x_1 + x_2 \leq 4, \quad 3x_1 + 8x_2 \leq 24, \quad 10x_1 + 7x_2 \leq 35, \quad x_1, x_2 \geq 0$$

20. Solve the following game whose payoff matrix is given below.

		Firm B				
		B1	B2	B3	B4	B5
Firm A	A1	3	-1	4	6	7
	A2	-1	8	2	4	12
	A3	16	8	6	14	12
	A4	1	11	-4	2	1

21. Give any three reasons for the popularity of control charts
22. Thirty samples each of size seven have been collected to establish control over a process. The following data were collected. $\sum_{i=1}^{30} \bar{X}_i = 2700$ and $\sum_{i=1}^{30} R_i = 120$. Calculate the trial control limits of \bar{X} chart and R chart. Also estimate the process standard deviation, by assuming that R-chart is in control. (for $n=7$, $A_2=0.419$, $D_3=0.076$, $D_4=1.924$, $d_2=2.704$)
23. If all points in an \bar{X} chart falls within the control limits, can we conclude that the process is in control. Describe the theoretical reasoning of the same.

PART D

Each question carries **10** marks. Maximum marks from this part is 30

24. Solve the LPP using simplex method:

$$\text{Max: } Z = 16x_1 + 17x_2 + 10x_3$$

$$\text{Subject to: } x_1 + x_2 + 4x_3 \leq 2000, \quad 2x_1 + x_2 + x_3 \leq 3600, \quad x_1 + 2x_2 + 2x_3 \leq 2400, \quad x_1 \leq 30$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

25. A manufacturer has distribution centers at X, Y and Z. These centers have availability 40,20,and 40 units of his product. His retail outlets at A, B, C, D and E require 25,10,20,30,and 15 units respectively. The transport cost (in rupees) per unit between each center outlet is given below.

Distribution	Retail outlet				
Centre	A	B	C	D	E
X	55	30	40	50	40
Y	35	30	100	45	60
Z	40	60	95	35	30

Determine the optimal distribution to minimize the cost of transportation.

26. Discuss the statistical basis of control chart technique. Explain in detail \bar{X} and R charts.
27. Using the following data, construct a suitable control chart.

Day	No. inspected	No. of defectives
1	196	39
2	210	25
3	210	28
4	210	43
5	210	15
6	174	6
7	180	14
8	196	3
9	181	10
10	184	25
11	130	15
12	190	6
13	130	22
14	130	8
15	196	8
16	208	9
17	204	5
18	210	5
19	180	7
20	180	15
