

**B.Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2024****SEMESTER 5 : STATISTICS FOR COMPUTER APPLICATION****COURSE : 19U5CRCST6 : STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH***(For Regular 2022 Admission and Supplementary 2021/2020/2019 Admissions)*

Time : Three Hours

Max. Marks: 75

(Use of Scientific calculator and statistical tables are permitted)

**PART A**

(Each Question carries 1 mark. Maximum marks from this part is 10)

1. Chance variation in respect of quality control of a product is
  - a) tolerable
  - b) not effecting the quality of a product
  - c) uncontrolable
  - d) all of the above
2. What is UCL and LCL of c chart?
3. Define decision variables.
4. What is the specification limits of a process?
5. Define feasible solution of transportation problem.
6. Discuss revised control limits
7. Define basic feasible solution of transportation problem.
8. Define basic feasible solution.
9. Define unbalanced transportation problem.
10. What are assignable causes?
11. Discuss the importance of R chart
12. What are chance causes?

**PART B**

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

13. Explain Vogel's approximation method.
14. A company has three operational departments weaving, processing and packing with capacity to produce three different types of cloth namely suitings, shirtings and woollens yielding a profit of Rs.2, Rs.4, and Rs.3 per metre respectively. One metre of suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minute in packing. Similarly one metre of requires 4 minutes in weaving, 1 minute in processing and 3 minutes in packing. One metre of woollens requires 3 minutes in each department. In a week, total runtime of each department is 60, 40 and 80 hrs for weaving, processing and packing respectively. Formulate the linear programming problem to find the product mix to maximize the profit.
15. Explain the disadvantages of OR.
16. Discuss the meaning of control in control charts
17. You are given the values of sample range for ten samples of size 5 each. Draw range charts and comment on the state of control of the process

Sample no	1	2	3	4	5	6	7	8	9	10
Range	7	4	8	5	7	4	8	4	7	9

18. What is the rationale behind the setting of control limits?

19. Find the optimal solution to the following assignment problem.

	<b>x</b>	<b>y</b>	<b>z</b>
<b>a</b>	18	17	16
<b>b</b>	15	13	14
<b>c</b>	19	20	21

**PART C**

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

20. Find the initial feasible solution using Vogel's Approximation method.

	A	B	C	D	Supply
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Demand	7	5	3	2	

21. Discuss the control chart for fraction defective  
 22. Solve the following LPP using simplex method.  
 Maximize  $z=7x_1+5x_2$  subject to  $x_1+2x_2\leq 6, 4x_1+3x_2\leq 12, x_1\geq 0, x_2\geq 0$ .  
 23. What are the uses of SQC?  
 24. Explain Degeneracy in LPP  
 25. Differentiate between p chart and c chart in the context of SQC

**PART D**

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

26. Explain clearly the following terms :  
 a) Process Control    b) Natural Tolerance Limits  
 c) Specification limits    d) Acceptance sampling  
 27. Solve the following LPP using simplex method.  
 Maximize  $z=4x_1+10x_2$  subject to  $2x_1+x_2\leq 50, 2x_1+5x_2\leq 100, 2x_1+3x_2\leq 90, x_1\geq 0, x_2\geq 0$ .  
 28. Using the following cost matrix find the optimal job assignment and associated cost.

	<b>J1</b>	<b>J2</b>	<b>J3</b>	<b>J4</b>	<b>J5</b>
<b>M1</b>	1	3	2	3	6
<b>M2</b>	2	4	3	1	5
<b>M3</b>	5	6	3	4	6
<b>M4</b>	3	1	4	2	2
<b>M5</b>	1	5	6	5	4

29. Discuss the statistical basis of control chart technique. Explain in detail Xbar chart and R chart.