Reg. No…….. Name …… **19U549**

B. Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2019

SEMESTER **–5: STATISTICS (CORE COURSE)**

COURSE: **15U5CRCST6: STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH**

(Common for Regular 2017 Admission & Improvement 2016/Supplementary 2016/2015 Admissions)

Time: Three Hours Max. Marks: 75

PART A

***Answer all questions*. *Each question carries 1 mark*.**

1. State any two advantages of OR.
2. Define the objective function of LPP.
3. Describe an assignment problem giving a suitable example.
4. Give any two areas of application of an assignment problem.
5. Define a surplus variable.
6. What do you mean by assignable causes of variability?
7. What is meant by specification limits of a process?
8. What is the importance of R -chart?
9. What is meant by natural tolerance of a process?
10. What is a control chart?

PART B

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

11. Prove that the transportation problem has a triangular basis.
12. What do you mean by optimal solution of a LPP?
13. Describe an algorithm to solve an assignment problem.
14. Give a rule for determining a saddle point.
15. What is the rationale behind the setting of control limits?
16. Describe the construction of P –chart.
17. What is the theme behind the use of R chart in SQC?

PART C

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

18. Solve the dual of the following problem graphically

    Minimize $z = x + y$ subject to $2x + y \geq 8$, $3x + 7y \geq 21$, $x, y \geq 0$.

19. Solve the following game whose payoff matrix i 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

20. Explain two-phase method with a suitable example.
21. What are the advantages of SQC?
22. What is meant by process control in industrial statistics?
23. How will you prepare control charts of fraction defectives?

PART D

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

24. Use the simplex method to solve the following problem
    Maximize z = 4x + 10y subject to 2x + y ≤ 50 ,2x +5 y ≤ 100, 2x +3 y ≤ 90, x, y ≥ 0.
25. Consider the problem of assigning five operators to five machines, the assignment costs are given below:

Operator	Machine				
	A	B	C	D	E
1	25	29	31	42	37
2	22	19	35	18	26
3	39	38	26	20	33
4	34	27	28	40	32
5	24	42	36	23	45

    Assign the operators to different machines so that the total cost is minimized.
26. What is a control chart? Explain the basic principles underlying the control charts. Discuss the role of control charts in manufacturing process.
27. Each day a sample of 50 items from a production process was examined. The number of defectives found in each sample was as follows:
    6, 2, 5, 1, 2, 2, 3, 5, 3, 4, 12, 4, 4, 1, 3, 5, 4 ,1, 4, 3, 5, 4, 2, 3.
    Draw a suitable control chart and check for control. What control limits would you suggest for future use?

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