Reg. No…………………………………………. Name……………………………………………. **20U550**

B. Sc. DEGREE END SEMESTER EXAMINATION – OCT. 2020: JANUARY 2021

SEMESTER – 5: STATISTICS (CORE COURSE)

COURSE: 15U5CRCST6 – STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH

(Common for Regular 2018 admission and Improvement 2017/

Supplementary 2017/2016/2015 admissions)

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. What do you mean by a general LPP?
2. Define artificial variable.
3. State one advantage of duality.
4. The number of basic variables in the balanced TP with 4 rows and 5 columns is ………
5. What do you mean by an unbalanced assignment problem?
6. Define two person zero sum game.
7. Define process control.
8. What do you mean by a mean chart
9. List out the control limits for σ-chart.
10. A curve showing the probability of accepting a lot of quality p is known as……….

PART B

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

11. How will you find whether a LPP has got an alternative optimal solution or not, from the optimal simplex table?
12. How to resolve degeneracy in a LPP?
13. Write the dual of the following LPP.
    Maximum of $Z = 6x + 8y$, subject to $5x + 2y \le 20, x + 2y \ge 10 \,\&\, x, y \ge 0$
14. Find the value of the following game

$$\begin{array}{cc} & \text{Player B} \\ \text{Player A} & \begin{bmatrix} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{bmatrix} \end{array}$$

15. Distinguish between control chart for variables and control chart for attributes.
16. Explain 3σ limits and probability limits.
17. Explain NWC Rule for finding out basic feasible solution.

PART C

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

18. Write the Simplex algorithm for minimizing a LPP.
19. Find the initial feasible solution to the following TP using VAM

Destination						
Faculty		D1	D2	D3	D4	Supply
	F1	3	3	4	1	100
	F2	4	2	4	2	125
	F3	1	5	3	2	75
	Demand	120	80	75	25	

20. Construct a mean chart for the following

Sample (of 6 items) No.	1	2	3	4	5	6	7
Sample means	74	34	64	15	73	54	43
Sample range	6	4	6	8	4	7	7

Given A_2= 0.483

21. Explain the construction of a control chart.
22. Write short notes on
    1. Tolerance limits.
    2. Acceptance control level.
    3. Rejection control level.
23. Solve the following game $\begin{bmatrix} 4 & -4 \\ -4 & 4 \end{bmatrix}$

PART D

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

24. (a) Construct a p chart for the fraction defectives and interpret the same.

Sample (of 100 items each) No.	1	2	3	4	5	6	7	8	9	10
No. of defectives	6	12	16	7	7	11	3	11	8	4

(b) If on an average, there are 5 defective units out of every 100 units, what would be the maximum number of defective articles in a batch of 500, when the production process is in control.

25. Maximise $Z = 10x_1 + 6x_2 + 2x_3$

Subject to
$$-x_1 + x_2 + x_3 \geq 1$$
$$3x_1 + x_2 - x_3 \geq 2$$
$$x_1, x_2, x_3 \geq 0$$

26. Solve the following TP

Destination						
Origins		D1	D2	D3	D4	Supply
	O1	6	1	9	3	70
	O2	11	5	2	8	55
	O3	10	12	4	7	70
	Demand	85	35	50	45	

27. A company has 5 jobs to be done on five machines. Any job can be done on any machine. The cost of doing the jobs in different machines is given below. Assign the jobs for different machines so as to minimize the total cost.

Jobs	**Machines**				
	A	**B**	**C**	**D**	**E**
1	13	8	16	18	19
2	9	15	24	9	12
3	12	9	4	4	4
4	6	12	10	8	13
5	15	17	18	12	20

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