

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper – XII)
OPERATIONS RESEARCH

Day & Date: Friday, 11-10-2019
 Time: 11:30 AM To 02:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Neat diagrams must be drawn wherever necessary.
 4) Graph papers will be supplied if required.

Q.1 Fill in the blanks by choosing correct alternatives given below.**14**

- 1) In graphical method of solving a LPP, the bounded region is known as _____ region.
 - a) solution
 - b) basic solution
 - c) feasible solution
 - d) Optimal
- 2) In LPP the condition to be satisfied is _____.
 - a) Constraints have to be linear
 - b) Objective function have to be linear
 - c) both [a] and [b]
 - d) none of the these
- 3) The feasible region of a L.P.P. has four extreme points: A(0,0), B(1,1), C(0,1) and D(1,0). Optimal solution for minimization problem with the objective function $z = 2x - 2y$ is _____.
 - a) a unique solution at C
 - b) a unique solution at D
 - c) an alternate solution at a line segment between A and B
 - d) An unbounded solution
- 4) In final (optimum) simplex table, if net evaluation $z_j - c_j = 0$ for at least one non- basic variable, then there will be _____.
 - a) infeasible solution
 - b) unbounded solution
 - c) no solution
 - d) alternate solution
- 5) The Penalty in VAM represents difference between _____ cost of respective row /column.
 - a) Two Largest
 - b) smallest two
 - c) largest and smallest
 - d) none of these
- 6) In assignment problem the minimum number of lines covering all zeros in a reduced cost matrix of order 8 can be _____.
 - a) at the least 8
 - b) 8
 - c) at the most 8
 - d) other than 8
- 7) In non-degenerate solution of a transportation problem with m origins and n destinations, the number of allocated cells is _____.
 - a) Not equal to $m+n-1$
 - b) Not equal to $m+n+1$
 - c) Equal to $m+n+1$
 - d) None of these
- 8) The procedure for solving the sequencing problem is known as _____.
 - a) S.M. John's algorithm
 - b) S.M. Johnson's algorithm
 - c) S.M. Johny's algorithm
 - d) none of these

- 2) Find initial basic feasible solution to the following transportation problem using Matrix Minima method:

	D1	D2	D3	D4	Availability
O1	23	27	16	18	30
O2	12	17	20	51	40
O3	22	28	12	32	53
Requirement	22	35	25	41	

Q.4 A) Answer the following questions. (Any Two) 10

- 1) Write the steps involved in the procedure of Monte Carlo simulation.
- 2) Give the procedure of generating n random observations from exponential distribution.
- 3) Find the IBFS of the following LPP :

$$\text{Maximize } z = x_1 + x_2 + 3x_3$$

Subject to:

$$3x_1 + 2x_2 + x_3 \leq 3 \quad 2x_1 + x_2 + 2x_3 \leq 2$$

And $x_1, x_2, x_3 \geq 0$

B) Answer the following question. (Any One) 04

- 1) Suggest the best strategy using the EMV Criteria for the following decision making problem:

Payoff (Profits) Table

Strategies	States of nature			
	S ₁	S ₂	S ₃	S ₄
D ₁	20	15	12	-3
D ₂	15	8	7	10
D ₃	5	10	15	12
P(S _i)	0.3	0.4	0.2	0.1

- 2) Give the steps involved in minimax regret criterion.

Q.5 Answer the following questions. (Any Two) 14

- 1) Solve the following LPP graphically.

$$\text{Maximize } z = 3x_1 + 4x_2$$

Subject to: $4x_1 + 2x_2 \leq 80, 2x_1 + 5x_2 \leq 180$
 and $x_1, x_2 \geq 0$.
- 2) The following assignment problem shows the costs of assigning five persons to five jobs. Determine the optimum assignment schedule.

		Job				
		1	2	3	4	5
Person	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

- 3) Find the optimal sequence in performing the following five jobs on two machines in the order M₁M₂. Processing times (in hours) are given in the following table:

Job	1	2	3	4	5
Machine M ₁	5	10	6	7	11
Machine M ₂	8	6	2	3	4

Also find minimum total elapsed time and idle times for all machines.