



Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27

B.Sc. STATISTICS – VI SEMESTER

SEMESTER EXAMINATION: APRIL 2022

(Examination conducted in July 2022)

ST – 6218: OPERATIONS RESEARCH

Time: 2½ Hours

Max: 70 Marks

*This question paper contains **Two** printed pages and **Three** parts*

PART A

I Answer any FIVE from the following

3 x 5 = 15

1. Differentiate between slack and surplus variable
2. What is unbalanced assignment problem? How do you rectify it?
3. Explain different costs involved in an inventory model.
4. Define the following terms: i) Pure Strategy ii) payoff matrix iii) saddle point
5. Write the formulae for computing the expected time and its variance in PERT.
6. Discuss the role of artificial variables in solving LP problem.
7. With reference to a queuing model, give the meanings of
 - i) Traffic intensity
 - ii) Queue discipline
 - iii) Steady state

PART B

II Answer any FIVE from the following

7 x 5 = 35

8. A) Express the following LPP in standard form:

$$\text{Minimize } Z = 3x_1 + 4x_2 - 5x_3$$

subject to

$$x_1 + x_2 + x_3 \leq 12$$

$$2x_1 + 3x_2 - 4x_3 \geq 26$$

$$-x_1 + 8x_2 + 3x_3 = 0$$

and $x_1, x_2 \geq 0, x_3$ unrestricted in sign

- B) Explain maximin and minimax principles in game theory.

(4+3)

9. A) How do you identify the following situations in a simple

i) Alternate solution ii) No solution iii) Unbounded solution

10. A) Show that transportation problem can be formulated as a linear programming problem.

B) Discuss matrix minima method to find initial basic feasible solution in transportation problem.

(3+4)

11. Write short notes on i) Quantity discount model ii) Lead time iii) EOQ

12. Discuss the dominance principle for solving a rectangular game without saddle point

13. A) Outline Fulkerson's rule for numbering the nodes in a network
B) Explain the terms i) Activity ii) Merge event iii) Event slack (4+3)
14. A) Describe the $M / M / 1 : FIFO / \infty / \infty$ queueing model.
B) Explain the Johnson's algorithm for sequencing N jobs on two machines. (3+4)

PART C

III Answer any TWO from the following 10 x 2 = 20

15. A) Describe MODI method to determine optimal solution in the transportation problem.
B) Discuss the graphical method of solving a LP problem. (6+4)
16. A) In the $M / M / 1 : FIFO / \infty / \infty$ model obtain the expression for the expected number of customers in the system.
B) Explain the method of determining critical path. (5+5)
17. Stating the assumptions, derive the expressions for (i) The EOQ (ii) Order level in inventory model when shortages are allowed. (10)
