Registration Number:

Date & Session

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

B. Sc (Statistics)– VI SEMESTER

SEMESTER EXAMINATION: APRIL 2023

(Examination conducted in May 2023)

ST 6218 – OPERATIONS RESEARCH

(For current batch students only)

Time: 2½ Hours **Max Marks: 70**

This paper contains TWO printed pages and THREE parts

PART – A

I. Answer any FIVE of the following **3 X 5 = 15**

1. Define Operations Research (O.R). Mention any two characteristics of a good OR model.
2. Define slack and surplus variable in a Linear Programming Problem (LPP).
3. Give the mathematical formulation of a Transportation Problem (TP).
4. Define degenerate and non-degenerate basic feasible solution in TP.
5. Define Pure strategy and Mixed strategy with an example.
6. What do you mean by two-person zero sum game and n-person game?
7. What are Total float and Free float?

PART – B

II. Answer any FIVE of the following **7 X 5 = 35**

8. A) Give two pros and cons of OR models.
   B) Define unbounded solution and infeasible solution in LPP. (4+3)
9. A) Write the algorithm of Big-M method to solve the LPP.
   B) Define degenerate and non-degenerate basic feasible solution of an LPP. (4+3)
10. A) Explain the algorithm of VAM to obtain IBFS solution of a TP.
    B) Define Unbalanced TP. When do you say that TP is balanced? (5+2)
11. A) Describe the steps of Maximin and Minimax Principle for obtaining optimal strategies by two players.
    B) Define assignment problem and give an application of the same. (5+2)
12. A) Give the procedure to obtain backward pass for latest allowable time.
    B) Define Program Evaluation and Review Technique and Critical Path Method. (4+3)

13. A) Define Inventory models. Using the standard notations, write the expression for finding Economic Order Quantity (EOQ) for an inventory model when shortages are allowed.
    B) Discuss the importance of P-system and Q-system in inventory models. (4+3)
14. A) Distinguish between deterministic and probabilistic inventory models.
    B) Briefly discuss the various characteristics of Queuing system. (2+5)

PART – C

III. Answer any TWO of the following **10 X 2 = 20**

15. A) Explain Dominance principle in game theory.
    B) Give any three properties of a game.
    C) Tasks A, B, ……., K constitute a project. The notation A < B means that the task A must be completed before B is started. With the following notations and conditions, draw an arrow diagram to represent the sequence of tasks in a project.
    A < D, I; B < G, F; D < G, F; C < E; E < H, K; G, H < I. (2+3+5)
16. A) Define the following terms in Inventory models:
    a. Demand
    b. Probabilistic inventory model
    c. Shortage cost
    d. Purchase cost
    B) Derive the EOQ and total optimal cost for the inventory model when shortages are not allowed. (4+6)
17. A) Explain Kendall's notation for representing the Queueing models.
    B) Define deterministic queueing models.
    C) Define the following terms in queuing theory:
    a. Reneging
    b. Last In First Out
    c. Queue length
    d. Steady state (4+2+4)

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