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DATE: 26-4-19

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

B.Sc. STATISTICS - VI SEMESTER

SEMESTER EXAMINATION - APRIL 2019

**ST: 6215 – OPERATIONS RESEARCH**

**Time: 2½hrs Max: 70 Marks**

**Supplementary candidates only.**

**Attach the question paper with the answer booklet**

This question paper has **TWO** printed pages and **THREE** parts

**SECTION – A**

**I Answer any FIVE of the following: 5 x 3 = 15**

1. Write a note on role of operations research in decision making process
2. Choose correct alternative from each of the following
3. To solve a LPP by graphical method the number of decision variables should be
	1. 2 b. 3 c. less than 2 d. more than 3
4. In an assignment problem, decision variable can take values
	1. either -1 or 1 b. either 0 or 1
5. either 1 or 2 d. none of the above
6. Which statistical distribution is used by PERT to represent time estimates
	1. Chi-square b. Poisson
7. Normal d. Beta
8. State whether following statements are true or false
	1. A Transportation problem is balanced if it has equal number of rows and columns
	2. In the standard form of L.P.P., the right hand side element of each constraint is non-negative
	3. The shortest of all paths through the network is the critical path.
9. What are the basic characteristics of a queuing system?
10. Write down any threeadvantages of maintaining inventory
11. Define two person zero sum game
12. What is replacement theory?

**SECTION – B**

**II Answer any FIVE of the following: 5 x 7 = 35**

1. A) Write down steps involved in obtaining optimal solution to a linear programming problem using graphical method (4)

B) Describe (M/M/C) : (N / FIFS) model (3)

1. A) Define Linear Programming Problem (2)

B) What is the criterion to identify unbounded solution while solving L.P.P? (2)

C) Differentiate between slack and surplus variable (3)

1. A) What are the steps involved in solving 2xn game problem (5)

B) Define a) pure strategy b) pay off (2)

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1. Explain Hungarian Algorithm (7)
2. A) Define a) float b) critical activity (2)

B) Explain steps involved in critical path method (5)

1. A) Explain various time estimated used project evaluation review technique (PERT) (4)

B) Explain max-min and min-max principle used in game theory (3)

1. A) Derive expression for (EOQ) economic order quantity in inventory model when shortages are not allowed. (5)

B) Explain: i) Lead time ii) Shortage cost (2)

**SECTION – C**

**III Answer any TWO of the following: 2 x 10 = 20**

1. A) Write down the simplex algorithm (7)

B) Briefly explain inventory system with shortages neat diagram (3)

1. A) With usual notations, derive the expressions for expected queue size and average customer in queue in M/M/1 : FIFO/$\infty $ model. (7)

B) Explain expression for average annual total cost with usual notation (3)

(Assuming the value of money does not change with time in replacement problems)

1. A) The following table lists the jobs of a network along with their time estimates.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Activity |  1-4 | 1-3 | 4-5 | 3-5 | 3-6 | 5-6 | 2-6 |
| to | 3 | 3 | 6 | 1 | 3 | 2 | 6 |
| tm | 9 | 6 | 12 | 4 | 9 | 5 | 12 |
| tp | 27 | 15 | 30 | 7 | 27 | 8 | 30 |

1. Draw the project network. (1)
2. Compute average time and variance of each activity (2)
3. Find the critical path (1)

B) A company has three sources and three destinations; the supply and demand in units and corresponding transportation costs are given. The table given below has taken from the solution procedure of the transportation problem. (6)



Answer following questions with brief reasons

* + - 1. Is this balanced transportation problem? b) Is this solution feasible?

c) Is this solution degenerate?d) Compute the value of total cost

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