Register Number:

**DATE: 26-04-2019**

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

B.SC. STATISTICS – VI SEMESTER

SEMESTER EXAMINATION – APRIL 2019

**ST 6217: Operations Research**

Time: 2 ½ Hour Max: 70 marks

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

**PART– A**

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

1. Define infinite solution or unbounded solution in Linear programming problem (LPP).
2. Differentiate between degenerate and non-degenerate with reference to a transportation problem.
3. Explain course of action and states of nature in decision theory.
4. Explain the need of job sequencing.
5. Write a note on Q-system of inventory.
6. Define i) optimistic time ii) pessimistic time and iii) most likely time in project evaluation review technique (PERT).
7. Define traffic intensity in queuing model.

**PART – B**

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

1. A) Define slack and surplus variable (2)

B) A factory engages in the manufacturing of pistons, rings and valves for which the profits per unit are Rs. 10, 6, and 4 respectively. It takes one hour of preparatory work, ten hours of machine work, and two hours of packing & allied formalities for a piston. Corresponding time requirement for piston, rings, and valves are 1, 4, 2 and 1, 5, 6 hours respectively. The total number of hours available for preparatory work, machine work, and packing & allied formalities are 100, 600 and 300 respectively.

i) Formulate an LPP to determine the most profitable mix (3)

ii) Convert above LPP into standard form (2)

1. Explain the steps involved in solving LPP using Penalty method. (7)
2. Explain the steps involved in obtaining optimal sequence of N jobs on three machines. (7)
3. A) Briefly explain payoff matrix. (2)

B) Define i) MaxiMin criterion and ii) MiniMin criterion in decision theory. (5)

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| Activity | to | tm | tp |
| 1-2 | 2 | 6 | 10 |
| 1-3 | 4 | 8 | 12 |
| 2-3 | 2 | 4 | 6 |
| 2-4 | 2 | 3 | 4 |
| 3-5 | 3 | 6 | 9 |
| 4-6 | 6 | 10 | 14 |
| 5-6 | 1 | 3 | 5 |

1. Construct the Network for the following project and obtain the critical path and duration. (7)
2. A) Mention the assumptions involved in Inventory models (3)

 B) Mention any two advantages and disadvantages of inventory. (4)

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

 **PART – C**

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

15. A) Explain any two methods of obtaining initial solution in transportation problem (7)

 B) Explain the (M / M / 2: FIFO) Queuing model (3)

16. A) Explain Hungarian method for solving assignment problem. (6)

 B) Define i) Optimum strategy ii) Mixed strategy (4)

17. A) Discuss “Forward Pass” and “Backward Pass” calculation in Critical path

method (CPM). (4)

B) Define: i) Lead time iii) Depletion (2)

C) An oil company maintains a stock of cans of lubricants. The demand is 150 per month. What should be the order quantity if ordering cost is Rs.16 per order and carrying cost is 20 paise per can per year? Also find number of orders for one year (4)