Code No: R1631034 **R16** SET - 1

III B. Tech I Semester Supplementary Examinations, Dec/Jan-2022-23
OPERATIONS RESEARCH
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A **(14 Marks)**

1. a) What do you mean by standard form of LPP? [2M]
   b) State the difference between the Transportation Problem and Assignment Problem. [3M]
   c) Describe individual replacement policy. [2M]
   d) Define Lead time and reorder point. [3M]
   e) Define holding cost and ordering cost. [2M]
   f) What are the disadvantages of simulation? [2M]

PART –B **(56 Marks)**

2. a) Use penalty method or Big M method to solve Linear Programming Problem. [10M]
   Minimize $Z=4X_1+X_2$
   Subject to $3X_1+X_2=3$
   $4X_1+3X_2 \geq 6$
   $X_1+2X_2 \leq 3$
   $X_1, X_2 \geq 0$
   b) What are the main characteristics of operations research? [4M]

3. a) Find the optimum solution to the Transportation problem , supply and demand and cost elements are [8M]

	Warehouse				
Factory	**W1**	**W2**	**W3**	**W4**	**Supply**
F1	15	25	45	5	6
F2	65	5	35	55	9
F3	35	3	65	15	16
Demand	15	8	7	14	

   b) Explain the importance of sequencing problem. What are the various methods of solving sequencing problems? Briefly explain any one. [6M]

4. A factory has a large number of bulbs all of which must be in working condition. The morality of the bulbs is given in the following table. [14M]

Week	1	2	3	4	5	6
Proportion of bulbs failing during the week	0.1	0.15	0.25	0.35	0.12	0.03

If a bulb fails in service, it costs Rs4.0 to replace but if all bulbs are replaced at a time it costs Rs 1.50 each. Find the optimum group replacement policy. (Assume 500 bulbs are available initially).
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5. a) In a store with one server,10 customers arrive on an average of 6 minutes. Service is done for 12 customers in 7 minutes, find [6M]
   (i) The average no of customers in the system
   (ii) The average queue length
   (iii) The average time a customer spends in the store.
   (iv) The average time a customer waits before being served.
   b) What do you understand by zero - sum and non zero – sum game? What do you mean by strategy, dominance and saddle point? [8M]
6. a) Define inventory. Explain briefly the costs involved in inventory [7M]
   b) An aircraft company uses rivets at a constant rate of 2,500 per year. Each unit costs Rs. 30. The company personnel estimate that it costs Rs.130 to place an order, and that the carrying cost of inventory is 10 percent per year. How frequently should orders be placed? Also determine the optimum size of each order [7M]
7. a) What sort of problems can be solved using dynamic programming. Illustrate with a case study. [7M]
   b) Explain the role of simulation in operations research studies. Give some important applications of queuing theory [7M]