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

III B. Tech I Semester Supplementary Examinations, August-2021

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) State the general linear programming problem (LPP) and put it in the standard form. [2M]

b) Give the mathematical formulation of transportation problem. [2M]

c) Discuss briefly the various types of replacement problems. [2M]

d) Name a few applications of queuing in mechanical engineering. [3M]

e) Discuss the significance of inventory. [3M]

f) Distinguish between mathematical models and simulation models. [2M]

PART – B **(56 Marks)**

2\. a) Write the advantages, limitations and applications of linear programming. [6M]

b) Use Penalty method to maximize $z = 3x_1 - x_2$ [8M]

Subject to the constraints $2x_1 + x_2 \geq 2$;

$x_1 + 3x_2 \leq 3$;

$x_2 \leq 4$

$x_1, x_2 \geq 0$.

3\. a) There are five jobs each of which must go through the machines A, B and C in the order ABC. Determine the sequence that will minimize the total elapsed time. [10M]

Job No	1	2	3	4	5
Machine A	5	7	6	9	5
Machine B	2	1	4	5	3
Machine C	3	7	5	6	7

b) Briefly explain the Vogel's Approximation Method. [4M]

4\. a) Briefly explain what you mean by "individual and group replacement policy" in Replacement Analysis. [6M]

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b) Find the cost period of individual replacement of an installation of 300 lighting bulbs, given the following: [8M]
i) Cost of replacing individual bulb is Rs. 3
ii) Conditional probability of failure is given below:

Week number:	0	1	2	3	4
Conditional probability of failure:	0	1/10	1/3	2/3	0

5. a) How do you classify the queuing models? Explain. [7M]
b) Write the assumptions made in game theory. Solve the following game graphically. [7M]

1	-3
3	5
-1	6
4	1
2	2
-5	0

6. a) Derive EOQ with the assumption involved in. [7M]
b) A manufacturer purchases items in lots of 800 units which is a four months requirement. The cost per unit is Rs. 100 and the ordering cost is Rs. 120 per patch order. The inventory carrying cost is estimated as 20% of the average inventory investment. [7M]
i) Determine the annual variable cost managing the inventory.
ii) How much saving can be obtained from the EOQ purchases?

7. a) Discuss the applications of dynamic programming. [7M]
b) Why simulation is used? Write the typical applications of simulation. [7M]

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