

Roll No.

Total No. of Pages: 02  
Total No. of Questions: 09

B. Tech. (ME) (Sem.-7&8<sup>th</sup>)  
**OPERATIONS RESEARCH**  
Subject Code: ME-406  
Paper ID: [A0840]

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATE:**

1. Section –A, is Compulsory.
2. Attempt any four questions from Section-B.
3. Attempt any two questions from Section-C.

**Section –A**

(10x2=20)

Q.1. Write briefly:

- (a) Explain decision making under conditions of certainty.
- (b) What is redundant constraint?
- (c) What is goal programming?
- (d) What is node in decision tree?
- (e) What is pure strategy in game theory?
- (f) What is use of random numbers in simulation?
- (g) What is deterministic dynamic programming?
- (h) What is Fulkerson's rule in network techniques?
- (i) What is Group replacement policy?
- (j) What is reorder level?

**Section –B**

(4x5=20)

- Q.2. What is role of Optimization in decision making? Define scientific decision making and explain how it affects O.R. decisions?
- Q.3. Explain the application of simulation technique to queuing problems.
- Q.4. A firm is thinking of replacing a particular machine whose cost price is Rs.12,200. The scrap price of this machine is only RS.200. The maintenance costs are found to be as follow:

Year	1	2	3	4	5	6	7	8
Maintenance cost(Rs)	220	500	800	1200	1800	2500	3200	4000

Determine when the firm should get the machine replaced.

- Q.5. Solve the following game and find the value of the game

B

A	6	4	3
	2	4	8

- Q.6. The Demand for a commodity is 100 units per day. Every time an order is placed, a fixed cost of Rs.400 is incurred. Holding cost is Re 0.08 per unit per day. If the lead time is 13 days. Determine the economic lot size and the reorder point.

**Section –C**

**(2x10=20)**

- Q.7. A library wants to improve its service facilities in terms of the waiting time of its borrowers. The library has two counters at present and borrowers arrive according to Poisson distribution with arrival rate 1 every 6 minutes and service time follows exponential distribution with a mean of 10 minutes. The library has relaxed its membership rules and a substantial increase in the number of borrowers is expected. Find the number of additional counters to be provided if the arrival rate is expected to be twice the present value and the average waiting time of the borrower must be limited to half the present value.

- Q.8. Use the two phase simplex method to.

$$\text{Maximize } Z = 2X_1 + X_2 + 1/4 X_3$$

$$\text{Subject to } 4X_1 + 6X_2 + 3 X_3 \leq 8,$$

$$3X_1 - 6X_2 - 4 X_3 \leq 1,$$

$$2X_1 + 3X_2 - 5 X_3 \leq 4,$$

$$X_1, X_2, X_3 \geq 0$$

- Q.9. A project has the following time schedule:

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6
Time in weeks:	2	8	10	6	3	3	7
Activity	4-7	5-7	6-7				
Time in weeks:	5	2	8				

Construct network and determine the total, free, independent and interfering floats and identify the critical path.

\*\*\*\*\*END\*\*\*\*\*