PVP 14

Code: ME6T3

III B.Tech - II Semester – Regular/Supplementary Examinations
AUGUST 2021

OPERATIONS RESEARCH
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) Explain phases of operations research.
b) State the characteristics of transportation problem.
c) Explain Simplex method of solving LPP.
d) Give the mathematical formulation of an assignment problem.
e) Discuss the sequence of steps in Johnson algorithm for sequencing.
f) What is present worth factor and state its importance in replacement?
g) Define pure strategy and mixed strategy in a game.
h) Define i) Balking ii) Reneging.
i) What are the types of inventory?
j) Suppose computations are carried out from the first stage to last stage in DPP, what method of computation is used?
k) What is meant by Monte Carlo simulation?

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. Old punches and dies cost Rs 2 lakhs each but new punches and dies cost Rs 5 lakhs each. The old punch/dies can produce 3 boxes of bullets and new punch/dies can produce 5 boxes of bullets per Week, each box being worth Rs 0.3 lakhs. The maintenance cost per punch/ dies is Rs 1 lakh per week. If only 80 lakhs is available to spend on punch/dies, Determine graphically how much of each kind should I buy to get a profit of more than Rs 6 lakhs per week. Assume that it possible to house only 20 punch/dies. 16 M

3. a) Solve the following maximum transportation problem by using Vogels approximation method. 8 M

	W1	W2	W3	W4	Supply (capacity)
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	08	70	20	18
Demand (requirement)	5	8	7	14	

b) A machine operator has to be perform three operations : turning, threading and knurling on a number of different jobs. The time required to perform these operations for each job is known. Determine the order in which the jobs should

be processed in order to minimize the total time required to turn out all the jobs. Also find the idle times for the three operations. 8 M

Job	Time for turning (minutes) M/C - A	Time for threading (minutes) M/C - B	Time for knurling (minutes) M/C - C
1	6	9	13
2	12	6	14
3	5	4	9
4	5	5	12
5	9	3	7
6	11	1	13

4. a) A machine costs Rs.70,000/-. Operating costs are Rs.600 per year for the first five Years. In the sixth and succeeding years the operating cost increases by Rs.200 per Year. Find the minimum length of time required to hold the machine before it is Replaced. 8 M

b) Reduce the following game by Dominance and find the Game value. 8 M

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

5. a) Interpret different costs involved in inventory. 6 M

b) A small firm producing automobile brake linings estimates the steel requirements for the next year's production at 6000 Kg. The cost of carrying steel in inventories works out to Rs 1 per Kg. per month. The cost of ordering works out at Rs 100 per order. If the cost per kg of steel is Rs 100, find out the economic order quantity, the number of orders per year, and total cost incurred by the firm for one year. 10 M

6. a) Solve the following LPP by dynamic programming: 10 M

Minimize $Z = x_1+3x_2+4x_3$

Subject to $2x_1+4x_2+3x_3 \geq 60$,

$3x_1+x_2+3x_3 \geq 90$

$x_1, x_2, x_3 \geq 0$.

b) Discuss the advantages of simulation technique in solving real-life problems. 6 M