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Question Paper Code: 55704A

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fifth Semester

Mechanical Engineering

15UME504 - OPERATIONS RESEARCH

(Regulation 2015)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Transportation problem is basically a CO1- R
(a) Maximization model (b) Minimization model
(c) Transshipment problem (d) Iconic model
2. The linear function of the variables which is to be maximize or minimize is called CO1- R
(a) Constraints (b) Objective function (c) Decision variable (d) None of them
3. MODI method is also called as CO2- R
(a) North west comer rule (b) Least cost method
(c) U-V method (d) Stepping stone method
4. Johnson's algorithm is used to find for _____ problem. CO2- R
(a) Transportation (b) Travelling salesman (c) Sequencing (d) Assignment
5. The critical path of a network is the CO3- R
(a) Path with the fewest activities (b) Shortest time path through the network
(c) Longest time path through the network (d) Path with the most activities

6. In a CPM / PERT network a dummy activity is necessary when CO3- R
- (a) Two activities have the same starting node
 - (b) Two activities have the same ending node
 - (c) A node does not actually connect to another nod
 - (d) When two activities share the same starting and ending node
7. One of the important basic objective of inventory management is CO4- R
- (a) To calculate EOQ for all materials in the organization
 - (b) To go in person to the market and purchase the materials
 - (c) To employ the available capital efficiently so as to yield maximum results
 - (d) Once materials are issued to the departments, personally check how they are used
8. Group replacement policy is most suitable for CO4- R
- (a) Trucks
 - (b) Infant machines
 - (c) Street light bulbs
 - (d) New cars
9. A mixed strategy game can be solved by CO5- R
- (a) Algebraic method
 - (b) Matrix method
 - (c) Graphical Number of players
 - (d) All of the above
10. This department is responsible for the development of queuing theory CO5- R
- (a) Railway station
 - (b) Municipal office
 - (c) Telephone department
 - (d) Health department

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Solve the following LP problem using simplex method. CO1- App (8)

$$\text{Minimize } Z = 15X_1 + 6X_2 + 9X_3 + 2X_4$$

Subjected to

$$2X_1 + X_2 + 5X_3 + 6X_4 \leq 20$$

$$3X_1 + X_2 + 3X_3 + 25X_4 \leq 24$$

$$7X_1 + X_4 \leq 70$$

$$X_1, X_2, X_3, X_4 > 0$$

12. Solve the transportation problem

CO2- App (8)

	To				
					Supply
	1	2	3	4	6
	4	3	2	0	8
	0	2	2	1	10
Demand	4	6	8	6	

13. Consider the details of a distance network as shown in below

CO3 Ana (8)

- (i) Construct a project network
- (ii) Determine the maximal flow from node 0 to 5

AVC (i-j)	Flow	
	fij	fji
0-1	11	-
0-2	12	-
1-3	12	-
2-1	1	-
2-4	11	-
3-4	7	-
3-5	19	-
4-5	4	-

14. The annual demand for an item is 3200 units. The unit cost is Rs.6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs.150/-. Determine,

CO4- App (8)

- (i) Economic order quantity
- (ii) Time between two consecutive orders
- (iii) Number of orders per year

The optimal total cost

15. A TV repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hours day. What is the repairman's expected idle time each day? How jobs are ahead of the average set just brought in.

CO5-App (8)