

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Master in Computer Application (Integrated MCA) Year II – (Semester-IV) (W.E.F. January 2015)

**Subject Name: Operations Research**

**Subject Code: 4440602**

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NOTE: The following list of programs is an illustrative list showing the kind of lab exercises to be given to students. Thus, the following list, being only an indicative list, should not be wrongly considered as the finally assigned list by GTU. Accordingly, the problems in the lab exams may be different but similar to some of the following types.

1. Develop a generalized program to convert **Primal** into **Dual**. Ask whether the problem is a maximization problem or a minimization problem, number of constraints, type of every constraint constraint(< or >), number of variables and their coefficients in the objective function and constraints. Show the primal and dual both in the output.
2. Develop a generalized program to solve **Transportation problem** by **Northwest Corner Method**. First develop the program for a balanced problem, make a copy of that program and then modify to take care of unbalanced problem. Ask number of sources and destinations and the costs of transportation from every source to every destination. Show allocation at every step, final allocation and total transportation cost.
3. Develop a generalized program to solve **Transportation problem** by **Least Cost Method**. First develop the program for a balanced problem, make a copy of that program and then modify to take care of unbalanced problem. Ask number of sources and destinations and the costs of transportation from every source to every destination. Show allocation at every step, final allocation and total transportation cost.
4. Develop a generalized program to solve **Transportation problem** by **Vogel's Approximation Method**. First develop the program for a balanced problem, make a copy of that program and then modify to take care of unbalanced problem. Ask number of sources and destinations and the costs of transportation from every source to every destination. Show allocation at every step, final allocation and total transportation cost.
5. Develop a generalized **sequencing** program for n jobs and m machines. First develop a program for n jobs two machines, make a copy and then make it general for n jobs m machines. Show the sequence after every iteration, final sequence, total elapsed time and idle times for every machine.
6. A certain item costs Rs. 75 per tonne. The requirement is 8,000 tonnes per year and each time the stock is replenished there is a set – up cost of Rs. 600. The cost of carrying inventory has been estimated at 12.8 per cent of the value of the stock per year. Find

out the optimal order quantity, number of orders required to be placed in a year, number of days between two successive orders and total variable inventory cost. Assume 360 days in a year.

7. A television repairman finds that the time spent on repairing each TV has an exponential distribution with a mean of 15 minutes. He repairs the sets in the order in which they arrive. The arrival of sets follows a Poisson distribution approximately with an average rate of 16 per 8 hour day. Find out for how many hours would the repairman be busy in a day, what is the average number of TV sets in the system and the average waiting time of a TV set in the system.
8. There are 5 workers and their work time to complete their jobs on different machines are given below. Develop a program to solve **Assignment problem** for minimum solution.

	Machine 1	Machine 2	Machine 3	Machine 4	Machine 5
Worker 1	8	5	7	7	8
Worker 2	9	5	6	7	8
Worker 3	6	8	5	6	9
Worker 4	8	10	7	6	5
Worker 5	4	6	5	6	4

9. There are 5 salesman and each of them can work on any one of 5 districts. Table below shows average revenue generated by each of them. Develop a program to solve **Assignment problem** for maximization.

	District 1	District 2	District 3	District 4	District 5
Salesman 1	250	198	206	220	210
Salesman 2	240	220	196	208	212
Salesman 3	260	240	198	220	220
Salesman 4	240	250	194	208	200
Salesman 5	240	220	198	200	204

10. Develop a program to Find Critical Path for following activity table.

Activity	Duration
1-2	6
1-3	8
2-4	3
2-5	5
3-5	9
4-5	6
5-6	8

11. Develop a program to Find Critical Path for following activity table.

Activity	to	tn	tp
1-2	2	6	10
1-3	2	3	4
2-3	7	11	15

2-4	6	14	16
3-4	6	7	14
3-5	6	7	14
4-5	2	6	10