Exam. Code: 0944
Sub. Code: 7080

1019
B.E. (Mechanical Engineering)
Eight Semester
MEC-802: Operation Research

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. For any missing data, male the suitable assumptions.

x-x-x

1. (a) How Operations research is system oriented.
(b)What do you understand by approximations in OR models.
(c) What are Allocation models.
(d) What is infeasible solution in LPP.
(e) What are characteristics of standard form of LPP.
(f) What do you understand by Degeneracy in linear programming.
(g) What is unbalanced transportation problem.
(h) What is asymmetrical Travelling salesman problem.
(i) Write Kendall's notation for representing queuing models.
(j) What is Fulkerson's rule in network techniques.

(1*10= 10)

PART-A (Attempt any two questions)

2. (a) What is role of operation research in Decision making? Define scientific decision making and explain how it affects O.R. decisions.

(b) Discuss the scope and limitations of O.R. (8, 2)

3. (a) A factory manufactures a product each unit of which consists of 5 units of part A and 4 units of part B. The two parts A and B require different raw materials of which 120 units and 240 units respectively are available. These parts can be manufactured by three different methods. Raw material requirements per production run and the number of units for each part produced are given below:

Method	Input per run(units)		Output per run(Units)	
	Raw material 1	Raw material 2	Part A	Part B
1	7	5	6	4
2	4	7	5	8
3	2	9	7	3

Formulate the L.P model to determine the number of production runs for each method so as to maximize the total number of complete units of final product.

P.T.O.

(b) Describe the classification schemes of OR models. (6, 4)

4. Solve the Linear programming problem to

Maximize $Z = 3x_1+2x_2 + 2x_3$

Subject to: $5x_1+7x_2+ 4x_3 \leq 7$

$4x_1 - 7x_2 - 5x_3 \leq 2$

$3x_1+4x_2 - 6x_3 \geq 3$

$x_1, x_2, x_3 \geq 0$ (10)

PART-B (Attempt any two questions)

5. (a) Four different jobs are to be done on four different machines. The set –up and production times are prohibitively high for changeover. Table given below indicates the cost of producing job i on machine j in rupees.

	Machines			
JOBS	A	B	C	D
I	5	7	11	6
II	8	5	9	6
III	4	7	10	7
IV	10	4	8	3

Assign jobs to different machines so that the total cost is minimized.

(b) Distinguish between transportation model and assignment problem. (8, 2)

6. (a) Describe the role of branch & bounding to solve the traveling salesman Problem.

(b) A person repairing radios finds that the time spent on the radio sets has exponential distribution with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately Poisson with an average rate of 15 for 8-hour day, what is the repairman's expected idle time each day. How many jobs are ahead of the average set just brought in. (4, 6)

7. (a) What is difference between PERT & CPM with examples

(b) A project has the following time schedule:

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6
Time in weeks :	4	1	1	1	6	5	4
Activity	5-7	6-8	7-8	8-9	8-10	9-10	
Time in weeks :	8	1	2	1	8	7	

Construct network & compute

(1) T_E & T_L (earliest occurrence and latest occurrence) times for each event.

(2) Float for each activity

(3) Critical path and its duration (2, 8)

X-X-X