2053
B.E. (Mechanical Engineering)
Eighth Semester
MEC-802: Operation Research

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit. For any missing data, make the suitable assumptions.

x-x-x

1. (a) What do you understand by approximations in OR models.
   (b) What is importance of Interdisciplinary teams in Operations research.
   (c) Classify OR models on the basis of degree of abstraction.
   (d) What is unbounded solution in LPP.
   (e) What are characteristics of canonical form of LPP.
   (f) What is significance of duality.
   (g) What is balanced transportation problem.
   (h) What is difference between Slack & Float.
   (i) Write Kendall's notation for representing queuing models.
   (j) What is Looping & Dangling in PERT.

   (10x1)

UNIT - I

2. (a) Discuss the steps used for Constructions of models in OR.

   (b) Discuss in brief the Methodology used in solving an OR Problem.

   (5, 5)

3. A Company is manufacturing products Y and Z. One unit of Product Y requires 4.8 minutes of machining and 10 minutes of assembly time. The profit for product Y is Re. 0.70 per unit. Product Z requires 6 minutes of machining time and 5 minutes of welding time for manufacturing one unit. Profit for Z is Re. 0.90 per unit. The capacity of the machining deptt. available for these products is 1400 minutes per week. The welding deptt. has an idle capacity of 800 minutes/week and assembly deptt. has 1800 minutes/week. Determine the quantities of Y and Z so that total profit is maximized.

   (10)

4. (a) Use Dual simplex method to
   Minimize $\quad Z = 2x_1 + x_2$
   Subject to: $\quad 3x_1 + x_2 \geq 3$
   $\quad 4x_1 + 3x_2 \geq 6$
   $\quad x_1 + 2x_2 \leq 3$
   $\quad x_1, x_2 \geq 0$

   (b) Prove that the dual of the dual is primal.

   (7, 3)

P.T.O.

UNIT - II

5. Assign the jobs to Machines for maximizing profits given in the table:

Machines

JOBS	A	B	C	D	E
I	32	38	40	28	40
II	40	24	28	21	36
III	41	27	33	30	37
IV	22	38	41	36	36
V	29	33	40	35	39

(10)

6. (a) 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.

(b) What is traveling salesman problem? Explain branch & bound method taking suitable example for 5 x 5 matrix.

(5,5)

7. Project consisting of following activities and time (days) is given in table below:

Activity	1-2	1-3	1-4	2-3	2-4	2-5	3-5
Time in days :	5	4	6	7	8	10	11
Activity	4-5						
Time in days :	10						

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

(10)

x-x-x