MCA/M06
Computer Oriented Optimization Techniques
MCA -204

Time : 3 Hours MM:50
Note:- Attempt any Five questions in all, All questions carry equal marks.

1(a) What is the importance of modeling in O.R.? How can these models be classified? 5

(b) Briefly discuss some applications of OR in the functional areas of management? 5

2(a) Explain general solution methods for OR models 5

(b) Write down the opportunities and shortcomings of OR 5

3(a) Rolls of paper having a fixed length and width of 180 cm are being manufactured by a paper mill. These rolls have to be cut to satisfy the following demand:

Width	80cm	45cm	27cm
No. of rolls	200	120	130

Obtain the linear programming formulation of the problem to determine the cutting pattern, so that the demand is satisfied and wastage of paper is minimum. 4

b) Solve graphically the following L.P.P. :

Max. $Z = 3x_1 + 2x_2$ subject to the constraints

$-2x_1 + x_2 = 1, x_1 \leq 2, x_1 + x_2 \leq 3, x_1, x_2 \geq 0.$ 6

4 Use simplex method to solve the following L.P.P :

Max. $Z = 4x_1 + 10x_2$ subject to the constraints

$2x_1 + x_2 \leq 50, 2x_1 + 5x_2 \leq 100, 2x_1 + 3x_2 \leq 90, x_2 \geq 0.$ 10

5 Use duality to solve the following L.P.P. :

$Z = x_1 - x_2 + 3x_3 + 2x_4$ subject to $x_1 + x_2 - 1, x_1 - 3x_2 - x_3 \leq 7, x_3 - 3x_4 = -2, x_j \geq 0$ (1, 2, 3,4)

6 Define an I.P.P. and find the optimum integer solution to the all integer programming problem:

Max. $Z = x_1 + x_2$ subject to the constraints

$3x_1 + 2x_2 \leq 5, x_2 \leq 2, x_1 \geq 0. x_2 \geq 0$ and are integer. 10

7(a) A TV Repairman find that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets on order in which they come in, and if the arrival of sets is approximately passion with an average rate 10 per 8

hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? 5

b) Customers arrive at a sales counter manned by a single person according to a passion process with a mean rate of 20 per hour. The time required a serve a customer has an exponential distribution with a mean of 100 seconds. Find the average waiting time of a customer. 5

8 Use branch and bound method to solve the following:

Max. $Z = 2x_1 + 3\ x_2$ subject to the constraints

$5x_1 + 7\ x_2 \leq 35$, $4x_1 + 9x_2 \leq 36$, $x_1, x_2 \geq 0$ and are integers 10

9 The following are the details of estimated times of activities of a certain project.

Activity	Immediate predecessors	Estimated time (weeks)
A	-	2
B	A	3
C	A	4
D	B,C	6
E	-	2
F	E	8

(a) Find the critical path and the expected time of the project. 3

(b) Calculate the earliest start time and earliest finish time for each activity. 4

(c) Calculate the slack for each activity. 3

10 Write short notes on the following:

(a) Development of OR in India 5

(b) Forward and Backward computation 5