MCA/M08
Computer Oriented Optimization Techniques
MCA -204

Time : 3 Hours MM:50

Note:- Attempt Five questions in all, selecting One question from each unit. All questions carry equal marks.

UNIT-I

1(a) Give detailed account of the methods used in model formulation. 5

(b) What is the role of operations research in decision making? Explain the main phase of O.R. and techniques used in solving an operations research problem. 2

2(a) How can O.R. models be classified? Which is the best classification in terms of learning and understanding the fundamentals of O.R.? 5

(b) Comment on "O.R. is scientific and for enhancing creative and judicious capabilities of decision maker". 5

3(a) Distinguish the following model with suitable examples.
(i) Stochastic and deterministic models
(ii) Static and dynamic models 5

(b) "Much of the success of O.R. applications in the last three decades is due to the computers. "Discuss. 5

UNIT-II

4(a) Formulate the following linear programming problem. A used car dealer wishes to stock-up his lot to maximize his profit. He can select car A, B and C which are valued wholesale at Rs 5000, Rs 7000 and Rs 8000 respectively. These can be sold at Rs 6000, Rs 8500 andRs 10,500 respectively. For each car type, the probabilities of sale are:

Type of Car	A	B	C
Prob. Of sale in 90 days:	0.7	0.8	0.6

For every two cars of B, he should buy one car of type A or C. If he has Rs. 1,00,000 to invest, What should he buy to maximize his expected gain? 5

(b) Find a geometrical interpretation and solution as well for the following L.P. problem.

Maximize $Z= 3X_1 +5X_2$ subject to restrictions

$X_1 +2X_2 \leq 2000$, $X_1 +X_2 \leq 1500$
$X_2 \leq 600$ and $X_1 \geq 0$, $X_2 \geq 0$ 5

5 Maximize $z=3X_1+2X_2+5X_3$,
Subject to the constrains:
$X_1 + 2X_2 \leq + X_3 \leq 430$
$3X_1 + 2X_3 \leq 460$,
$X_1 + 4X_2$ and $X_1, X_2, X_3 \geq 0$ 10

6 Solve the following problem by Dual simplex method:

$z = 2X_1 + X_2$,
subject to $3X_1 + X_2 \geq 3$,
$4X_1 + 3X_2 \geq 6$,
$X_1 + 2X_2 \geq 3$ and $X_1, X_2 \geq 0$ 10

UNIT-III

7(a) What is Queuing Theory? What are the limitations of Queuing Theory? What information can be obtained by analyzing a queuing system? 5

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

8(a) Two repairmen are attending five machines in workshop. Each machine breaks down according to a Poisson process with a mean rate of 20 per hour. The time required to serve a customer has an exponential distribution with a mean of 100 sec. Find the average waiting time of customer. 5

(i) Find the probability that the two repairmen are idle, that one repairmen is idle.

(ii) What is the expected number of idle machines not being serviced? 10

9(a) Consider a queuing system where arrivals are according to a Poisson Distribution with mean 5. Find expected waiting time in the system if the service time distribution is:

(i) Uniform from t=5min. to t=15 min.

(ii) Normal with mean 3 min. and variance 4 min^2 5

(b) Construct the network diagram comprising activities B,C,….Q and N such that the following constrains are satisfied:
B < E, F;C<G,L;E,G<H;
I, H<I; L<M; H<N; H<J;
I, J < P; P<Q.
The notation X<Y means that the activity X must be finished before Y can begin.
5

10 A small project consists of seven activities for which the relevant data are given below:

Activity	Preceding Activities	Activity Duration (Days)
A	----	4
B	----	7
C	----	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

(i) Draw the network and find the project completion time.
(ii) Calculate total float for each of the activities.
(iii) Draw the time scaled diagram. 10