Roll No. ……..

MCA/M09
Computer Oriented Optimization Techniques
Paper : MCA-204 6242

Time : Three Hours [Maximum Marks : 80]

Note :- Question No **1** is compulsory. Attempt **Four** more questions selecting **One** question from each unit.

1(a) How many basic feasible solution are there to a given system of 3 simultaneous linear equation of 4 unknowns? 3

(b) Whether the following statement is True or False. Give reason for your answer :-
Max $4_{X1} + x_2$
Subject to $x_1 + x_2 \leq 8$
or $2_{X1} + x_2 \leq 10$
$x_1, x_2 \geq 10$
Cannot be a linear programming problem. 3

(c) State two O.R. model which have wide commercial applications. 3

(d) How will you solve an assignment problem where a particular assignment is prohibited? 3

(e) In each of the following situations, identify the customer and the server :-
(i) Planes arriving at airport
(ii) Taxi-stand where cabs serve waiting passengers
(iii) Letters processed in a post-office
(ii) Registration for classes in a university
(iii) Legar court cases
(iv) Parking Lot operations. 3

(f) Whether the following statement is True of False. Give reason for your answer:-
"The dual of the problem yield the original problem" 3

(g) What are the applications of Integer Programming models? 3

(h) Write three differences between CPM and PERT. 3

UNIT-I

2(a) What are the principal phases for implementing O.R. in practice? Explain each one. 7

(b) Explain the nature of Operation Research and its limitations. 7

3(a) What is the importance of modeling in O.R? Explain it and also discuss its (modeling) classifications. 7

(b) Discuss the importance of O.R. in decision-making process. Also, discuss scientific method in O.R. 7

UNIT-II

4. Consider the following problem :- 14

Max. $z = 2_{X1} + 2_{X2} + 4_{X3}$

Subject to: - $2_{X1} + x_2 + x_3 \leq 2$

$3_{X1} + 4_{X2} + 2_{X3} \geq 8$

$x_1, x_2, x_3 \geq 0$

(a) Show that Phase I will terminate with a zero artificial basic variable.

(b) Carry out Phase II with zero artificial variable as part of the starting basic solution. Make sure that the artificial variables never assume position values.

(c) Show that zero artificial variable can be driven out of the optimum basis solution of Phase I by selecting an entering variable with a nonzero pivot element in the artificial variable row. Then carry out Phase-II using the new basic solution.

5. Consider the following LP:-

Max. $z = x_1 + 5_{X2} + 3_{X3}$

Solution to:- $x_1 + 2_{X2} + x_3 = 3$

$2_{X1} - x_2 = 4$

$x_1, x_2, x_3 \geq 0$

(a) Write the associated dual problem.

(b) Give the optimal basic variables are x_4 and x_3, determine the associated optimal dual solution. 14

UNIT-III

6. Show graphically that the following problem has no feasible solution, and then verify result using Branch and Bound. 14

Max. $z = 2_{X1} + x_2$

Subject to: - $10_{X1} + 10_{X2} \leq 9$

$10_{X1} + 5_{X2} \geq 1$

$x_1, x_2 > 0$ and integer.

7(a) Solve the following cost minimizing Assignment Problem:-

	S_1	S_2	S_3	S_4	S_5
B					
B_2					
B_3					
B_4					
B_5					

7

(b) Explain the Gomary's cutting plane all- Integer algorithm of an I.P.P. 7

UNIT-IV

8(a) Write a short note on M/M/1 queue and its applications. 7

(b) An opinion survey involves designing and printing questionnaires, hiring and training personnel, selecting participants, mailing questionnaires, and analysis the data. Construct the project network, stating all assumptions. 7

9(a) The following table gives the activities of a construction project and duration:-

Activity	1 - 2	1 - 3	2 - 3	2 - 4	3 - 4	4 – 5
Duration (days)	20	25	10	12	6	10

(i) Draw the network for the project.

(ii) Find the Critical Path. 7

(b) Customers arrive at a first class ticket counter of a theatre in a Poisson distributed arrival rate of 25 per hour. Service time is constant at 2 minutes.

Calculate:-

(i) The mean number in the waiting line.

(ii) The mean waiting time. 7