MCA/M07
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) Discuss the historical development of operations research. Also give the historical development of O.R. in India. 5

(b) What are the main characteristics of an O.R. problem? 5

2(a) Give the application areas of Operations Research. Illustrate how is the application of O.R. in these area beneficial? 5

(b) What do you mean by model? Discuss the importance of models in the solution of OR problems. 5

3(a) Discuss the general methods of solving models. 5

(b) Discuss the classification of models. 5

UNIT-II

4(a) Give flowchart for finding the solution of Simplex method. 5

(b) What do you mean by a 'dual'? How is the concept of dualy useful in solving LPP? Write a LPP in standard form. 5

5(a) Apply two-phase simplex method to

Minimize $Z = -2x_1 - x_2$
Subject to
$x_1 + x_2 \geq 2$
$x_1 + x_2 \leq 4$
$x_1 + x_2 \geq 0$

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(b) What do you man by degeneracy? 3

6 Use branch and bound technique to solve the following I.P.P

Maximize $Z = 7x_1 + 9x_2$
$-x_1 + 3x_2 \leq 6$
$7x_1 + x_2 \leq 35$
$x_1 \geq 0$, $a \leq x_2 \leq 7$
x_1 and x_2 are integers. 10

7(a) Define/ Explain following:

(i) Basic Feasible Solution
(ii) Optimality Condition
(iii) Unbounded Solution
(iv) Convex Set
(v) Primal 5

(b) A farmer has a two acre farm. He can cell all the tomatoes, potatoes and mangoes he can raise. The price he can obtain is Rs. 1.00 per kg for tomatoes, Rs. 2 per kg for potatoes and Rs. 5.00 per kg for mangoes. The average yield per acre is 2,000 kg of tomatoes 3,000 kg of potatoes and 1,100 kg for mangoes. Fertilizer is available at Rs. 1.15 per kg and the amount required be acre is 100 kg each for tomatoes and potatoes, and 50 Kg for mangoes. Labour required for sowing, cultivating and harvesting per acre is 5 man-days for tomatoes and potatoes and 6 man-days for mangoes. A total of 400 man-days of labour are available at Rs. 20.00 per man-day.

Formulate this problem as a linear programming model to maximize the former's total profit. 5

UNIT-III

8(a) A self-service store employs one cashier at its counter. An average of mine customers arrive every five minutes. While the cashier can serve 10 customers in 5 minutes. Assuming Possion distribution for arrival rate andexponential distribution for service rate, find

(i) Average number ofcustomers in the system
(ii) Average queue length
(iii) Average time a customer sepends in the system
(iv) Average time a customer waits before being served. 8

(b) Define the following:

(i) Pure birth process
(ii) Steady state 2

9(a) Draw an event-oriented network for the following data:

Event No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Immediate Predecessors	**____**	**1**	**1**	**2,3**	**3**	**4,5**	**5,6**

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(b) What are the CRM and PERT? How are they useful as O.R. techniques? Give Difference(s) between CPM and PERT 5

(c) Define:

(i) Stack
(ii) Float 2

10 A Project schedule has following characteristics:

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time (days)	4	1	1	1	6	5	4	8	1	2	5	7

(i) Construct a network diagram
(ii) Compute the total float, free float and independent float for each activity.
(iii) Find the critical path and total project duration. 2+6+2=10