Punjab Technical University 2007

M.C.A Computer Aplications COMPUTER BASED OPTIMIZATION

METHODS (MCA - 305) Question paper

Time : 03 hours
Maximum :Marks : 75
Instruction to Candidates:

1) Section - A is compulsory.
2) Attempt any Nine questions from Section - B.
Section - A (15x2=30)
a)Explain briefly the role of computers in OR'

b)Discuss the limitations of OR.

c)Using graphical method, find Max. Z = 5x1 + 3x2 subject to:
5x1+2x2<= 1O. 3x1+5x2 < 15, x1,x2=>0.

d)Explain the following with reference to L.P.P.:
(i) Entering variable.
(ii) Leaving variable.

e)Construct the dual of the problem: Maximize Z = 3x1 + 17x2+ 9x3, subject to x1-x2+x3=>3, -3x1+2x3<= 1, xl,x2,x3=>0.

f)Write down the applications of balanced transportation problem.

g)Explain briefly the loops in transportation problem.

h)Define an Assignment problem.

i)How would you deal with the assignment problems where some assignments are prohibited?

j) Explain the difference between a transportation problem and an assignment problem.

k) An illiterate servant is given 5 cards addressed to 5 different persons residing in the same town. What is the probability that the servant hands over the card to a wrong person?

l) Define conditional probability?

m) What are the limitations of the decision tree approach?

n) What are the advantages of revised simplex method over original simplex method?

o) State the "'Principle of Optimality" in dynamic programming.

Section - B (9 x 5 = 45)

Q2) State the different types of models used in operations research. Explain briefly the general methods for solving these OR models.

Q3) Using-simplex method solve the L.P. problem: Minimize Z = 4x1 + 8x2+ x3, subject to: x, + x, > 2, 2x1 + x3 > 5, x1 X25 x3 > 0.

Q4) Explain the significance of the following variables with examples: (a) Slack variables.
(b) Surplus variables.
(c) Artificial variables.

Q5) Use duality to solve the following L.P.P.:
Maximize Z = 2y, - x, subject to the constraints:
x1+2x2,<=10; x1+x2<=6. x1-x2<=2, x1-2x,<1; x, x2> 0.

Q6) Solve the following transportation problem: To

1 ? 3 4 Supply
1 21 16 25 13 11
2 17 18 14 23 13
3 32 - 27 18 41 19
Demand 6 10 12 15 43

Q 7) Determine the optimal transportation plan from the following table giving the plant to market shipping costs, and qualities required at each market and available at each plant:

W1 W W3
F1 11 20 7 8 50
F2 21 16 10 12 40
F3 8 12 18 9 70
Requirement 30 25 35 40

Assign the jobs to different machines so as to minimize the total cost.

Q8) Four jobs are to be done on four different machines. The cost (in rupees f producing ith job on the jth machine is given below:
Machines

M I M2 M3 M4
J1 15 11 13 15
Jobs J2 17 12 12 13
J3 14 15 10 14
J4 16 13 11 17

Q9) Explain the nature of a travelling salesman problem and give its mathematical formulation.

Q10) A manager has a choice between
(a) A risky contract promising Rs. 7 lakhs with probability 0.6 and Rs. 4 lakhs with probability 0.4, and
(b) A diversified portfolio consisting of two contracts with independent outcomes each promising Rs. 3.5 lakhs with probability 0.6 and Rs. 2
lakhs with probability 0.4. Construct a decision-tree using EVM criteria. Can you arrive at the decision using EVM criteria?

Q11) Use revised simplex method to solve the L.P.P.: Minimize Z = x1 + x2
subject to the constraints: x1 + 2x2 > 7, 4x1 + x2 > 6, x1, x2 > 0.

Q12). Use branch and bound method to solve the following integer L.P.P.: Maximize Z =x1 + 2x2 subject to the constraints: x1 + 2x2 < 12, 4x1 + 3x2 < 14; x,, x2 > 0, and are integers.

Q13) Use dynamic programming to find the value of maximum Z = y1.y2.y3 subject to the constraints: y, + y2 + y3= 5, y,, y2, y3 > 0.