4E 4134

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B.Tech. IV Semester (Main/Back) Examination, June/July - 2015

Electronics and Communication Engineering

4EC5A Optimization Techniques

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Discuss the various operation research techniques. **(8)**

b) A manufacturer produces two types of models A and B. Each model A requires 4 hours of grinding and 2 hours of polishing; where as each model B requires 2 hours of grinding and 5 hours of polishing. The manufacturer has two grinders and three Polishers. Each grinder works for 40 hours a week and each polisher works for 60 hours a week and profit on an A model is Rs 3.00 and on an B model is Rs 4.00 what ever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models so that he maymake the maximum profit in a week? **(8)**

OR

1. a) Solve the following LPP by graphical method

$$Max \quad Z = 3x_1 + 4x_2$$
$$subject \ to \quad 5x_1 + 4x_2 \le 200$$
$$3x_1 + 5x_2 \le 150$$
$$5x_1 + 4x_2 \ge 100$$
$$8x_1 + 4x_2 \ge 80 \quad and \quad x_1, x_2 \ge 0$$

(8)

b) Discuss the importance of operation research in decision making process. **(8)**

Unit - II

2. a) Solve the following LPP by simplex method

$$\begin{aligned} Max \quad & Z = -2x_1 - x_2 \\ subject\ to \quad & 3x_1 + x_2 = 3 \\ & 4x_1 + 3x_2 \geq 6 \\ & x_1 + 2x_2 \leq 4 \quad x_1, x_2 \geq 0 \end{aligned}$$

(8)

b) Use duality to solve the following LPP

$$\begin{aligned} Max \quad & Z = 3x_1 - 2x_2 \\ subject\ to \quad & x_1 \leq 4 \\ & x_2 \leq 6 \\ & x_1 + x_2 \leq 5 \\ & -x_2 \leq -1 \ and \ x_1, x_2 \geq 0 \end{aligned}$$

(8)

OR

2. a) Solve the following problem revised simplex method

$$\begin{aligned} \text{Max } Z \quad = \quad & x_1 + 2x_2 \\ \text{Subject to} \quad & x_1 + x_2 \leq 3 \\ & x_1 + 2x_2 \leq 5 \\ & 3x_1 + x_2 \leq 6 \text{ and } x_1, x_2 \geq 0 \end{aligned}$$

(8)

b) Discuss the effect on optimality by adding a new variable to the following LPP with column coefficient $(3,3,3)^T$ and coefficient in the objective function is 5

$$\begin{aligned} Max \quad & Z = 3x_1 + 8x_2 \\ subject \quad to \quad & x_1 + x_2 = 200 \\ & x_1 \leq 80 \\ & x_2 \geq 60 \quad and \quad x_1 x_2 \geq 0 \end{aligned}$$

(8)

Unit - III

3. a) XYZ airline operating 7 days a week has given the following time table crew must have a minimum layover of 7 hours between flights. obtain pairing flight that minimizes layover time away from home. for any given pairing the crew will be bases at the city that result in the smaller layover **(8)**

	Delhi-jaipur			jaipur-delhi	
FlightNo.	Departure	Arrival	FlightNo.	Departure	Arrival
A1	6.00AM	8.00AM	B1	8.00AM	10.00AM
A2	8.00AM	10.00AM	B2	9.00AM	11.00AM
A3	2.00PM	4.00PM	B3	2.00PM	4.00PM
A4	8.00PM	10.00PM	B4	7.00PM	9.00PM

b) Four engineers are available to design four project. engineer 2 is not competent to design the project B. given the following time estimates needed to each engineer to design a given project, find how should the engineers be assigned to projects so as to minimize the total design time of four project

		A	B	C	D
	1	12	10	10	8
	2	14	Not stable	15	11
Engineers	3	6	10	16	4
	4	8	10	9	7

(8)

OR

3. a) What is degeneracy in transportation problem? explain how to solve the degeneracy in transportation. **(8)**

b) Solve the following transportation problem to find the optimum basic feasible solution

		To		Available
	2	7	4	**5**
	3	3	1	**8**
from	5	4	7	**7**
	1	6	2	**14**
required	**7**	**9**	**18**	

Unit - IV

4. a) Solve Min $f(x_1,x_2)=2x_1^2+2x_1x_2+x_2^2+x_1-x_2$ by taking $P_0(0,0)$ as starting point. $\varepsilon=.01$

from the invariable method in the direction $\begin{pmatrix}1\\0\end{pmatrix}$ for two iteration **(8)**

b) Minimize $f(x)=2x_1^2+2x_1x_2+x_2^2+x_1-x_2$ by taking steepest discent method

starting from $x_1=\begin{pmatrix}0\\0\end{pmatrix}$ **(8)**

OR

4. a) Min

$$f(x)=\frac{1}{3}(x_1+1)^3+x_2$$

subject to $g_1(x_1,x_2)=1-x_2\le 0$

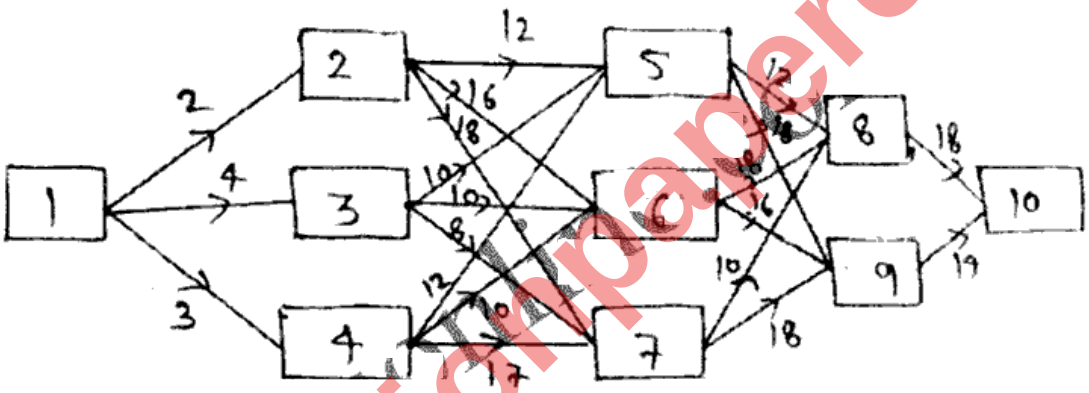
$g_2(x_1,x_2)=-x_2\le 0$

by exterior penalty method and obtain the solution for r=1,10 and ∞ **(8)**

b) Minimize $f(x_1,x_2)=x_1-x_2+2x_1^2+2x_1x_2+x_2^2$ using random walk method from the point $x_0=\begin{pmatrix}0\\0\end{pmatrix}, \lambda=1.0, \varepsilon=.05, and \quad M=100$ **(8)**

Unit - V

5. a) Compute the least cost of travel from city 1 to city 10 using dynamic programming cost of travel is marked in the diagram **(8)**



b) Use dynamic programming to solve the following LPP

Max Z = $6x_1+5x_2$

Subject to $x_1\le 2$

$x_2\le 6$

$6x_1+2x_2\le 18$ and $x_1,x_2\ge 0$ **(8)**

OR

5. a) Discuss the application of dynamic programming **(8)**

b) solve the following using dynamic programing technique

Max $Z=x_1x_2x_3$ **(8)**

subject to $x_1+x_2+x_3=12$

$x_1,x_2,x_3\ge 0$
