

Introduction to Systems Design CD-6873

Con. 5818-07.

(OLD COURSE)

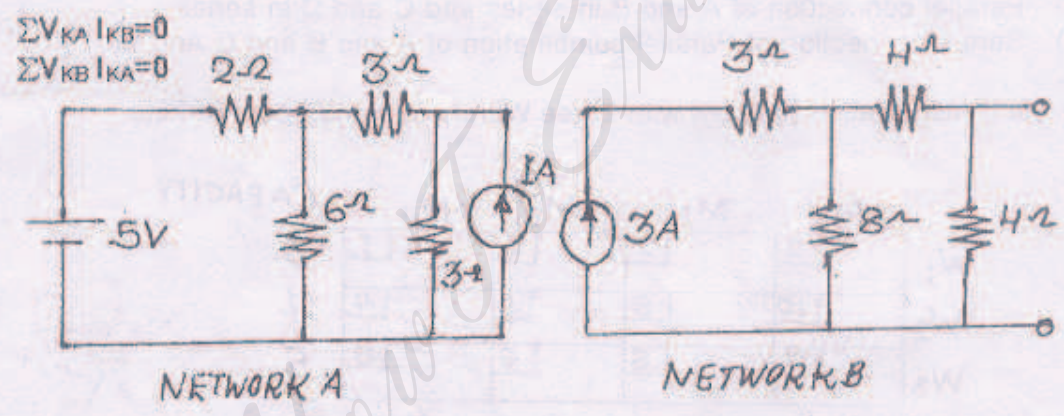
(3 Hours)

[Total Marks : 100

- N.B. (1) Question No. 1 is compulsory.
 (2) Attempt any four out of remaining six questions.
 (3) Assume any suitable data, wherever required but justify the same.

Master

1. (a) Draw Ad-joint for following 20-port Network. 20
 (i) Voltage controlled Current source
 (ii) Current controlled voltage source
 (b) Explain in brief linearly increasing hazard. Derive expression for reliability, probability of failure, failure density and MTTF.
 (c) Explain the term degeneracy. How it can be resolved ?
 (d) How do you recognize that an LP problem is unbounded while using the simplex method ?
 (e) Pertaining to Simplex method define following terms :
 (i) Surplus and slack variables
 (ii) Basic and non-basic variables.
2. (a) State Tellegen's Theorem and prove be the same. Also state the applications. 8
 (b) For the two Networks shown below : 12
 Prove Relations :



Where V_{KA} and I_{KA} are voltage and current in Network A respectively and V_{KB} and I_{KB} are voltage and current in Network B respectively.

3. (a) What are the advantages and limitations of graphical method to solve LPP ? 5
 (b) Use graphical procedure to identify : 15
 (i) The feasible region
 (ii) The region where the slack (or surplus) variable are zero and
 (iii) The optimum solution for LPP problem given below :
 Maximum $f = 3x + 5y$
 Subject to :
 (i) $x \leq 4$ (ii) $2y \leq 12$ (iii) $3x + 2y \leq 18$; $x \geq 0, y \geq 0$.

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4. (a) Find the basic optimum feasible solution of given LPP by Simplex method : 8

Maximize $Z = 2000x_1 + 3000x_2$

Subjected to constraint :

$6x_1 + 9x_2 \leq 100$

$2x_1 + x_2 \leq 20$

$x_1 \geq 0, x_2 \geq 0$

(b) Use two phase Simplex method to solve the LPP given below : 12

Maximize $Z = 5x_1 - 4x_2 + 3x_3$

$2x_1 + x_2 - 6x_3 = 20$

$6x_1 + 5x_2 + 10x_3 \leq 76$

$8x_1 - 3x_2 + 6x_3 \leq 50$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0.$

5. (a) Explain in brief :- 8

(i) Unit Redundancy

(ii) Element redundancy

(iii) Stand by redundancy.

(b) A system consist of four constituent elements A, B, C, D with respective reliability of 0.98., 0.96, 0.99 and 0.98 respectively. What is reliability of the system ? 12

(i) All are connected in series

(ii) All are connected in parallel

(iii) Parallel connection of A and B in series and C and D in series

(iv) Series connection of Parallel combination of A and B and C And D.

6. Consider the transportation problem with Three Warehouse and Four Markets : 20

	M ₁	M ₂	M ₃	M ₄	↓ CAPACITY
W ₁	2	2	2	1	3
W ₂	10	8	5	4	7
W ₃	7	6	6	8	5
DEMAND →	4	3	4	4	

Find out the basic feasible solution of the given transportation problem by VAM method and use further u-v method to improve on initial basic feasible solution.

7. Write short on : 20

(a) Decision Theory

(b) Monte-Carlo Simulation

(c) Big M-method for solution of LPP

(d) Comparison between dual and primal and utility of dual.