B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Applied Electronics and Instrumentation Engineering / Electronics and Instrumentation / Electronics and Communication Engineering

AI 010 706 L03 / EC 010 706 L01 / EI 010 706 L01—OPTIMIZATION TECHNIQUES
(AI, EC, EI)

(2010 Admissions)

[Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Explain different one dimensional minimization methods.

2. Mention certain areas where requirement of linear programming lanes.

3. What is the slope of post optimality analysis.

4. **Define forecasting models.**

5. Explain briefly single server models.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Find the maxima and minima, if any, if the function $f(x) = 4x^3 - 18x^2 + 27x - 7$.
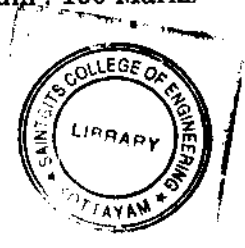
7. Solve the following LP problem graphically

   Minimize $f = -3x_1 + 2x_2$

   subject to $0 \leq x_1 \leq 4$

   $1 \leq x_2 \leq 6$

   $x_1 + x_2 \leq 5$

Turn over

8. Six jobs are to be processed on two machines A and B. Time in hours taken by each job on each machine is given below :

JOBS

	1	2	3	4	5	6
Machine A	5	3	2	10	12	6
Machine B	3	2	5	11	10	7

Determine the optimum sequence of jobs that minimizes the total elapsed time to complete the jobs. Compute the minimum time.

9. Solve the following pay-off matrix for optimal strategies and the value of the game :

$$X \begin{matrix} & Y \\ \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{matrix}.$$

10. Explain the various states in queueing system.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each question carries 12 marks.

11. (a) Minimize $f = 2x_1^2 + x_2^2$ by using the steepest descent method starting from $(1, 2)$.

Or

(b) Find the minimum of $f = x(x - 1.5)$ by starting from 0.0 with an initial step size of 0.05.

12. (a) Solve the following LP problem graphically :

Maximize $f = x_1 + x_2$

subject to $-x_1 + x_2 \leq 2$

$2x_1 + x_2 \leq 4$

$x_1, x_2 \geq 0$.

Or

(b) Use dual simplex method to solve the LPP.

Minimize $Z = -3x_1 - 2x_2$

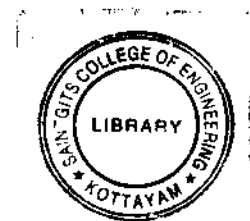subject to $x_1 - x_2 \geq 2$

$x_1 + x_2 \leq 14$

$x_1 + 2 \geq 20$

$x_2 \leq 6$

$x_1, x_2 \geq 0$.

13. (a) Explain how to convert the unbalanced transportation problem into a balanced one.

Or

(b) Using VAM solve the following problem :

	W$_1$	W$_2$	W$_3$	W$_4$	W$_5$	Available
F$_1$	3	4	6	8	9	
F$_2$	2	10	1	5	8	
F$_3$	7	11	20	40	3	
F$_4$	2	1	9	14	16	
Required	40	6	8	18	6	

14. (a) Solve the following game problem using the principle of dominance :

Player Y

$\text{Player X} \begin{bmatrix} 1 & 7 & 2 \\ 6 & 2 & 7 \\ 5 & 1 & 6 \end{bmatrix}$.

Or

Turn over

(b) Solve graphically :

$$\begin{array}{c}\textit{Player } Y\\\textit{Player } X\begin{bmatrix}1 & 3 & 11\\8 & 5 & 2\end{bmatrix}.\end{array}$$

15. (a) Explain the elements of a queuing model.

Or

(b) A barber shop has two barbers and 3 chairs for customers. The customers are assumed to arrive in Poisson fashion at a rate of 5 per hour. Each barber services according to an exponential distribution with a mean 15 minutes. Further if a customer arrives and there are no empty chairs in the shop, he will leave. Compute the expected number of customers in the shop.

(5 × 12 = 60 marks)