

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1434

Roll No.

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M.C.A.

(SEM. III) ODD-SEMESTER THEORY
EXAMINATION 2010-11

COMPUTER BASED OPTIMIZATION TECHNIQUES

Time : 3 Hours

Total Marks : 100

- Note : (1) Attempt all questions.
(2) All questions carry equal marks.

1. Attempt any **two** of the following :— (10×2=20)
- (a) (i) What do you mean by Inventory Control ? Briefly describe the reasons for carrying Inventory.
(ii) Briefly describe the various types of inventories, also describe the different costs associated with inventory control.
- (b) What are stochastic models ? Describe its characteristics and applications.
- (c) A Manual stamper currently valued at Rs. 1,000 is expected to last 2 years and costs Rs. 4,000 per year to operate. An automatic stamper which can be purchased for Rs. 3,000 will last 4 years and can be operated at an annual cost of Rs. 3,000. If money carries the rate of interest 10% per year, determine which stamper should be purchased.

2. Attempt any two questions of the following :— (10×2=20)

- (a) Solve the following Linear Programming Problem using 'Big-M' method :

$$\begin{aligned} \text{Maximize} &= -2x_1 - x_2 \\ \text{subject to} & 3x_1 + x_2 = 3 \\ & 4x_1 + 3x_2 \geq 6 \\ & x_1 + 2x_2 \leq 4 \\ & x_1, x_2 \geq 0. \end{aligned}$$

- (b) Solve the following Linear Programming Problem using 'Dual Simplex' method :

$$\begin{aligned} \text{Minimize } Z &= 3x_1 + x_2 \\ \text{subject to} & x_1 + x_2 \geq 1 \\ & 2x_1 + 3x_2 \geq 2 \\ & x_1, x_2 \geq 0. \end{aligned}$$

- (c) (i) Discuss the role of Artificial variable in the solution of Linear Programming Problem.
- (ii) What do you understand by Non-Degenerate Basic feasible solution, and how it is different from Degenerate Basic feasible solution ?

3. Attempt any two questions of the following :— (10×2=20)

- (a) (i) Describe the procedure to deal with Unbalanced Transportation and Assignment Problem.

(ii) How the Integer Programming Problem is different from Linear Programming Problem ? Describe the mixed integer linear programming problems.

- (b) Determine the 'Initial Basic Feasible Solution' to the following Transportation Problem using the Vogel's

Approximation Method, and then improve that solution to make it optimum :

	W_1	W_2	W_3	W_4	Availability
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Requirement	5	8	7	14	

- (c) Solve the following assignment problem to find the maximum total expected sale :

Area	I	II	III	IV
A	42	35	28	21
Salesman B	30	25	20	15
C	30	25	20	15
D	24	20	16	12

- (a) Attempt any two questions of the following :—

(10×2=20)

- Write the steps to solve the Quadratic Programming Problem using Wolfe's Method.
- What do you understand by Dynamic Programming? State Bellman's principle of optimality in Dynamic Programming.

- (b) Use Wolfe's method to solve the following problem :

$$\text{Minimize } Z = X_1^2 + X_2^2 + X_3^2$$

$$\text{subject to } x_1 + x_2 + 3x_3 = 2$$

$$5x_1 + 2x_2 + x_3 = 5$$

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

(c) Determine x_1 , x_2 and x_3 so as to

$$\text{Maximize } Z = -x_1^2 - x_2^2 - x_3^2 + 4x_1 + 6x_2$$

$$\text{subject to } x_1 + x_2 \leq 2$$

$$2x_1 + 3x_2 \leq 12$$

$$x_1, x_2 \geq 0.$$

5. Attempt any two questions of the following :— (10×2=20)

- (a) Discuss the basic characteristics of queueing system, along with some important applications. Also, differentiate between Steady and Transient state.
- (b) For the Model $(M | M | 1) : (\infty | FCFS)$, obtain the steady-state difference equations. Also find the probability distribution of queue length.
- (c) (i) Find the distribution of Inter-Arrival time for Poisson arrivals in a queueing system.
- (ii) State and prove the Markovian Property of Inter-Arrival times.