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

PAPER ID : 1434 Roll No. | | | | | | | | | | |

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 :

$$\text{Maximize} = -2x_1 - x_2$$

subject to $3x_1 + x_2 = 3$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0.$$

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

$$\text{Minimize } Z = 3x_1 + x_2$$

subject to $x_1 + x_2 \geq 1$

$$2x_1 + 3x_2 \geq 2$$

$$x_1, x_2 \geq 0.$$

(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)**

(i) Write the steps to solve the Quadratic Programming Problem using Wolfe's Method.

(ii) 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 :

Minimize $Z = X_1^2 + X_2^2 + X_3^2$

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 $(M \mid M \mid 1) : (\infty \mid FCFS)$, 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.