Printed Pages : 4

NMCA-315/MCA-315

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

PAPER ID : 214321

Roll No.

M. C. A.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

COMPUTER BASED OPTIMIZATION TECHNIQUES

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions.

1 Attempt any **four** parts of the following : **(4×5=20)**

(a) What is an inventory system ? How to develop an inventory model ?

(b) What is replacement problem ? Describe some important replacement situations.

(c) Describe the all steps to select the best machine.

(d) A truck has been purchased at a cost of Rs. 1,60,000. The value of truck is depreciated in the first three years by Rs. 20,000 each year and Rs. 16,000 per year thereafter. Its maintenance and operating costs for the first three years are Rs. 16,000, Rs. 18,000 and Rs. 20,000 in that order and increase by Rs. 4,000 every year. When interest rate of 10% find the economic life of the truck.

(e) What are the practical limitations on the EOQ Formula ?

(f) Explain the controlled and uncontrolled variables of inventory problem.

2 Attempt any **four** parts of the following : **(4×5=20)**

(a) Solve the following LPP by Simplex Method :

Min $Z = X_1 - 3X_2 + 2X_3$ and Subject to

$3X_1 - X_2 + 2X_3 \leq 7$,

$-2X_1 + 4X_2 \leq 12$,

$-4X_1 + 3X_2 + 8X_3 \leq 10$

$X_1, X_2, X_3 \geq 0$

(b) Solve the following LPP by using Big –M method :

Max $Z = 5X_1 + 6X_2$ and Subject to

$2X_1 + 5X_2 \leq 1500$

$3X_1 + X_2 \geq 1200$

and $X_1, X_2 \geq 0$

Verify the result graphically.

(c) Write the Dual of the following LPP :

(i) Min $Z = X_1 + X_2 + 2X_3$ and Subject to

$X_1 + 2X_2 \geq 3$

$X_2 + 7X_3 \leq 6$

$X_1 - 3X_2 + 5X_3 = 5$

and $X_1, X_2 \geq 0$, X_3 is unrestricted.

(ii) Max $Z = X_1 - 2X_2 + 3X_3$ and Subject to

$-2X_1 + X_2 + 3X_3 = 2$

$2X_1 + 3X_2 + 4X_3 = 1$

and $X_1, X_2, X_3 \geq 0$

(d) Solve the following LPP :

Max $Z = 6X_1 + 8X_2$ and Subject to

$5X_1 + 10X_2 \leq 60$

$4X_1 + 4X_2 \leq 40$

and $X_1, X_2 \geq 0$

Check whether the addition of the constraints $7X_1 + 2X_2 \leq 65$ affects the optimality. If it does, find the new optimal solution.

(e) Solve the following LLP by Graphical method :

Min $Z = 4X_1 + 2X_2$ and Subject to

$X_1 + 2X_2 \geq 2$,

$3X_1 + X_2 \geq 3$,

$4X_1 + 3X_2 \leq 6$

and $X_1, X_2 \geq 0$

(f) Using Dual Simplex method to solve the following LLP :

Min $Z = 3X_1 + X_2$ and Subject to

$X_1 + X_2 \geq 1$,

$2X_1 + 3X_2 \geq 2$

and $X_1, X_2 \geq 0$

3 Attempt any **two** parts of the following : **(2×10=20)**

(a) A team of 5 horses and 5 riders has entered a jumping show contest. The number of penalty points to be expected when each rider rides any horse is shown below :

	R1	R2	R3	R4	R5
H1	5	3	4	7	1
H2	2	3	7	6	5
H3	4	1	5	2	4
H4	6	8	1	2	3
H5	4	2	5	7	1

How should the horses be allotted to the riders so as to minimize the expected loss of the team?

(b) Distinguish between integer programming problem and linear programming problem and write the cutting – plan algorithm.

(c) Solve the transportation problem by Vogel's Approximation Method

					Supply
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Demand	7	5	3	2	**17**

4 Attempt any **two** parts of the following : **(2×10=20)**

(a) Write Kuhn –Tucker conditions and method then solve the following non linear programming problem.

$$Max\ Z = 2X_1^2 + 12X_1X_2 - 7X_2^2$$

Subject to the constraints :

$2X_1 + 5X_2 \leq 98$, Where X_1 and $X_2 \geq 0$

(b) Discuss Wolfe's Method for solving a quadratic programming problem.

(c) Seven units of capital can be invested in four activities with the return from each activity given in the accompanying table. Find the allocation of capital to each activity that will maximize the total return.

Q	G1(Q)	G2(Q)	G3(Q)	G4(Q)
0	0	0	0	0
1	2	3	2	1
2	4	5	3	3
3	6	7	4	5
4	7	9	5	6
5	8	10	5	7
6	9	11	5	8
7	9	12	8	8

5 Attempt any **two** parts of the following : **(2×10=20)**

(a) What is queuing system ? Explain the main characteristics and steady state of queuing system.

(b) Prove that arrival distribution theorem if the arrivals are completely random then the probability distribution of number of arrivals in affixed time interval follows a Poisson distribution.

(c) Explain and derive (M/M/1): (∞/ FCFS): Birth and Death queuing model.
