Printed Pages : 4 **MCA315**

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

PAPER ID : 7312 **Roll No.** | | | | | | | | | |

MCA

(SEMESTER-III) THEORY EXAMINATION, 2012-13

COMPUTER BASED OPTIMIZATION TECHNIQUES

Time : 3 Hours] *[Total Marks : 100*

Note : Attempt **all** Sections.

Section – A

1. Attempt **all** parts. **2 × 10 = 20**

(a) Explain any two limitations of EOQ (Economic Ordering Quantity).

(b) Write any two failure mechanism of items.

(c) What is sensitivity analysis ? Write any one procedure.

(d) What is duality ? Explain with suitable example.

(e) Write the importance of integer programming problems in brief.

(f) What is feasible solution and optimum solution ?

(g) Explain the Bellman's principle of optimality.

(h) Write both the sufficient conditions for maximum and minimum for Lagrangian method.

(i) What are the customer's behaviour in queuing system ?

(j) Explain the queuing system transient state.

Section – B

Attempt any **three** parts : **3 × 10 = 30**

2. (a) The maintenance cost increases with time and the money value decreases with constant rate i.e. depreciation value is given. Then replacement policy will be

(i) Replace if the next period's cost is greater than the weighted average of previous costs.

(ii) Do not replace if the next period's cost is less than the weighted average of previous costs.

Justify the above statements.

(b) Solve the following LPP by the graphical method :

Max $Z = 2x_1 + x_2$

subject to the constraints

$$x_1 + 2x_2 \leq 10,$$

$$x_1 - x_2 \leq 2$$

$$x_1 + x_2 \leq 6,$$

$$x_1 - 2x_2 \leq 1$$

Where $x_1, x_2 \geq 0$

(c) Explain the geometrical interpretation of Branch-and-Bound method by solving the following I.P.P.

Max $Z = x_1 + x_2$,

subject to the constraints

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

$$x_2 \leq 2$$

x_1 and $x_2 \geq 0$ and are integers.

(d) Discuss Wolfe's method for solving a quadratic programming problem.

(e) Establish the probability distribution formula for Pure-Death-Process.

Section – C

3. Attempt any **one** part : **1 × 10 = 10**

(a) What are inventory models ? Give the classification of different inventory models and describe them briefly.

(b) A truck has been purchased at a cost of ₹ 1,60,000. The value of the truck is depreciated in the first three years by ₹ 20,000 each year and ₹ 16,000 per year thereafter. Its maintenance and operating costs for the first three years are assuming an interest rate of 10%. Find the economic life of the truck.

4. Attempt any **one** part : 1 × 10 = 10

(a) Use Big-M method to solve it.

Max $Z = 3x_1 - x_2$

subject to the constraints

$$2x_1 + x_2 \geq 2,$$

$$x_1 + 3x_2 \leq 3,$$

$$x_2 \leq 4$$

and $x_1, x_2 \geq 0$

(b) Use dual simplex method to solve the following L.P.P. :

Min $Z = 6x_1 + 7x_2 + 3x_3 + 5x_4$

subject to the constraints

$$5x_1 + 6x_2 - 3x_3 + 4x_4 \geq 12$$

$$x_2 + 5x_3 - 6x_4 \geq 10$$

$$x_1 + 5x_2 + x_3 + x_4 \geq 8$$

and $x_1, x_2, x_3, x_4 \geq 0$

5. Attempt any **one** part : 1 × 10 = 10

(a) A company has four warehouses and six stores. The cost of shipping one unit from warehouse i to store j is C_{ij}.

$$\text{If } C = C_{ij} = \begin{bmatrix} 7 & 10 & 7 & 4 & 7 & 8 \\ 5 & 1 & 5 & 5 & 3 & 3 \\ 4 & 3 & 7 & 9 & 1 & 9 \\ 4 & 6 & 9 & 0 & 0 & 8 \end{bmatrix}$$

and the requirements of the six stores are 4, 4, 6, 2, 4, 2 and quantities at the warehouse are 5, 6, 2, 9. Find the minimum cost solution with the Vogel's method.

(b) Explain the Hungarian Assignment method to solve an assignment problem. Also write the algorithm.

6. Attempt any **one** part : **1 × 10 = 10**

(a) Use the dynamic programming to show that $-\sum_{i=1}^{n} P_i \log P_i$, subject to $\sum_{i=1}^{n} P_i = 1$, is maximum

when $P_1 = P_2 = P_3 = \ldots\ldots = P_n = \frac{1}{n}$.

(b) A truck can carry Ten (10) ton's of product. Three types of products are available for shipment. Their weights and values are tabulated. Assuming that at least one of each type must be shipped, determine the loading which will maximize the total value.

Type	Value (₹)	Weight (tons)
A	20	1
B	50	2
C	60	2

7. Attempt any **one** part : **1 × 10 = 10**

(a) Four counters are being run on the frontier of a country to check the passports and necessary papers of the tourists. The tourists choose a counter at random. If the arrival at the frontier is Poisson at the rate λ and the service time is exponential with parameter $\lambda/2$, what is the steady average queue at each counter ?

(b) Define the concept of busy period in queuing theory and obtain its distribution for the system M/M/1 : (∞ / FCFS). Show that the average length of busy period is $1/(\mu - \lambda)$.