Printed Page:- 04 **Subject Code:- AMTME0216**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: II - THEORY EXAMINATION (2022-2023)

Subject: Optimization Techniques

Time: 3 Hours **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **15**

1. Attempt all parts:-

1-a. The region common to all the constraints including the non-negativity restrictions is called the ____ (CO1) 1

(a) Feasible space

(b) unique solution

(c) optimum solution

(d) infeasible solution

1-b. In the transportation table, empty cells will be called _____.(CO2) 1

(a) occupied

(b) unoccupied

(c) no

(d) finite

1-c. Quasi-Newton methods for minimization requires the computation of 1

(a) second partial derivatives

(b) Third partial derivatives

(c) First partial derivatives

(d) None of These

1-d. The Operations research technique which helps in minimizing total waiting and service costs is _____(CO4) 1

(a) Queuing Theory

(b) Decision Theory

(c) Both A and B

(d) None of the above

1-e. What contributes to the quality of the solutions in SA? (CO5) 1

(a) Temperature schedule.

(b) Randomness of the search.

(c) Initial conditions.

(d) All of the above.

2. Attempt all parts:-

2.a. Give graphical representation of the below case in LPP. 2

Maximize $z = x_1 + 2x_2$

subject to $x_1 \leq 80$; $x_2 \leq 60$

$5x_1 + 6x_2 \leq 600$; $x_1 + 2x_2 \leq 160$; $x_1, x_2 \geq 0$. (CO1)

2.b. What is meant by decision variable? (CO2) 2

2.c. What are the basic characteristics of a queuing system? (CO3) 2

2.d. Differentiate between pure and mixed IPP. (CO4) 2

2.e. Give the name of any two software packages used for optimization. (CO5) 2

SECTION B **20**

3. Answer any <u>five</u> of the following:-

3-a. Explain the difference between pure strategy and mixed strategy. (CO1) 4

3-b. Give the classification of optimization problems. (CO1) 4

3-c. Explain the mathematical formulation of an assignment problem. (CO2) 4

3-d. How does the problem of degeneracy arise in a transportation problem? (CO2) 4

3.e. Discuss the different discipline of a queuing system. (CO3) 4

3.f. Write a short note on the “sequencing decision problem for n jobs on two machines”. (CO4) 4

3.g. How the application of generative artificial intelligence can be useful in 4

optimization technique? (CO5)

SECTION C **35**

4. Answer any <u>one</u> of the following:-

4-a. A funnel, in the form of right circular cone is to be constructed from a sheet metal. Find the dimensions of the funnel for minimum lateral surface area when the volume is specified 200cm.^{3} [CO1] 7

4-b. Find the dimensions of a cylindrical tin (with top and bottom) made up of sheet metal to maximize its volume such that the total surface area is equal to $A_0 = 24\pi$. [CO1] 7

5. Answer any <u>one</u> of the following:-

5-a. Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and cost is 12 paise/gm. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and cost is 20 paise/gm. The daily minimum requirement of vitamin A & B are 100 and 120 units respectively. Use graphical method to find the cost of product min. (CO2) 7

5-b. A paper mill produces 2 grades of paper namely x and y. Because of raw material restrictions, it cannot produce more than 400 ton of grade x and 300 ton of grade y in a week. There are 160 production hours in a week. It requires 0.2 hours and 1.4 hours to produce a ton of product x and y respectively, with corresponding profits of Rs.200 and Rs.500 per ton. Formulate the above LPP to maximize the profit using the graphical method. (CO2) 7

6. Answer any <u>one</u> of the following:-

6-a. A Bank wants to install ATM machines near a metro station. Discuss how the number of ATM machine should be decided to have a minimum waiting time to the customer. (CO3) 7

6-b. A T.V mechanic finds that the time spent on his jobs has an exponential distribution with mean 30 minutes, if he repairs sets in the order in which they come in. If the arrival of sets is approximately Poisson with an average rate of 10 per eight day, which is the mechanic's expected idle time each day? (CO3) 7

7. Answer any <u>one</u> of the following:-

7-a. Discuss the advantages and dis-advantages of Unconstrained Nonlinear Programming. (CO4) 7

7-b. Write down the Algorithm of Fibonacci method. (CO4) 7

8. Answer any <u>one</u> of the following:-

8-a.	Explain about the basic operations and technologies in Genetic Algorithms.(CO5)		7
8-b.	Explain the process of Simulated Annealing optimization technique. (CO5)		7