Name: Enrolment No:	ⵊUPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Process Optimization   Semester   : VII
Program: B. Tech Chemical Engineering (RP)   Time   : 03 hrs.
Course Code: CHCE3020P   Max. Marks: 100

Instructions: 1) Answer the questions section wise in the answer booklet. 2) Assume suitable data wherever necessary. The notations used here have the usual meanings.

Section – A (30 Marks)

S. No.		Marks	CO
Q 1	What is the difference between linear and nonlinear programming problems?	10	CO1
Q 2	State the possible convergence criteria that can be used in direct search methods.	10	CO1
Q 3	Why is the difference between unimodal and multimodal functions?	10	CO1

Section – B (30 Marks)

Q 4	Construct the augmented Lagrangian function for a constrained optimization problem.	15	CO1
Q 5	Draw a flowchart for finding the optimal solution by the simplex algorithm.	15	CO2

Section – C (40 Marks)

Q 6	Explain the algorithm of conjugate gradient (Fletcher-Reeves) method to determine the optimum of a function. **_OR_** Perform two iterations to Minimize $f = 2x_1^2 + x_2^2$ by using the steepest descent method with starting point (1, 2).	20	CO2
Q 7	The reaction-rate constant for the decomposition of a substituted dibasic acid has been determined at various temperatures as given in Table 1. Use the method of least squares to determine the activation energy E in the equation. $k = Ae^{-E/RT}$, where T is measured in degrees Kelvin.	20	CO2

Table 1: Data on temperature and rate constant

T (^{0}C)	50	70.1	89.4	101
$k \times 10^4$ (h^{-1})	1.08	7.34	45.4	138