

Central Institute of Technology Kokrajhar
Department of Electronics and Communication
Engineering
Optimization Theory (UECE-516C)
End Term Exam

Time: 3 hrs

Session July-Dec. 2024, V Semester

Max mark: 100

Attempt any five questions

1. (a) Under what conditions $F(G(x))$ is a convex function. [10]

(b) Comment on the eigen value of unitary matrix. [10]

2. Explain the concept of convexity in a function. Why is determining whether a function is convex or non-convex important in optimization theory? [20]

3. Comment on the convexity of the following set

$$S = \{\bar{x} : \|\bar{x} - \bar{a}\|_2 \leq \|\bar{x} - \bar{b}\|_2\}$$

4. Proof the following inequality [20]

$$\|\bar{x}\|_1 > \|\bar{x}\|_2 > \|\bar{x}\|_\infty$$

5. Comment on the convexity of the function [20]

$$F(x_1, x_2) = \frac{1}{x_1 x_2} \quad \forall x_1, x_2 > 0$$

6. Let A is $n \times m$ matrix and B is $m \times n$ matrix then proof that

$$|I_n + AB| = |I_m + BA|.$$

[20]