**COMSATS** University Islamabad



Attock Campus

## **Department of Mathematics**

Assignment # 04

Class: BSM-VIII
Subject: Convex Analysis
Instructor: Dr. Atiq ur Rehman

Due Date: 11-6-2025 Course Code: MTH424 Marks: 20

## Note:

• Submit hardcopy of the assignment.

**Question # 1:** Please include the following statement, followed by your signature:

I affirm that I have completed this assignment independently, without collaboration or sharing of information with any other classmate.

**Question # 2:** Let  $f: I \to \mathbb{R}$  and  $g: J \to \mathbb{R}$ , where  $range(f) \subseteq J$ . If f, g are convex and g is increasing, then the composite function  $g \circ f$  is convex on I.

**Question # 3:** Let  $f_{\alpha}: I \to \mathbb{R}$  be an arbitrary family of convex functions and let  $f(x) = \sup_{\alpha} f_{\alpha}(x)$ . If  $J = [x \in I : f(x) < \infty]$  is non-empty then J is an interval and f is convex on J.

**Question # 4:** If  $f_n: I \to \mathbb{R}$  is a sequence of convex functions converging to a finite limit function f on I, then f is convex on I.

**Question # 5:** If  $f: I \to \mathbb{R}$  and  $g: I \to \mathbb{R}$  are both non-negative, decreasing and convex functions, then h(x) = f(x)g(x) is also non-negative, decreasing and convex on I.

**Question # 6:** The class of log-convex functions on an interval *I* is closed under multiplication.

**Question # 7:** The class of log-convex functions on an interval *I* is closed under addition.

