National University of Computer & Emerging Sciences
MT-2008 Multivariable Calculus
Spring 2024

Course Content for Final Exam

Content/Topics	Question set
Limits and Continuity Multivariable Functions: Limit Along Curves, open and closed sets, continuity, Limits at discontinuities, and Limits by converting into polar coordinates.	**Ex 13.2** **[**1-26, 34-35,38-40**]**
Differentiability: Differentials, and Local Linear Approximation	**Ex 13.4** **[**9-26, 33-40**]**
Directional Derivatives and Gradients: Directional Derivatives, Gradients, Properties of gradients, Gradients are Normal to level curves.	**Ex13.6** **[**1-45,53-66**]**
Extreme value of the function of two variables: Absolute & Relative Extrema, Extreme Value theorem, The second order Partial derivative test	**Ex13.8** **[**1-4, 9-18, 31-40**]**
Lagrange Multipliers Method: Constrained-Extremum Principle for Two or Three Variables and One Constraint. **Convex Function & Convex Optimization**	**Ex 13.9[**5-12**]** **(Provided material)**
Multiple Integrals: Double Integral over non-rectangular region Double Integral in polar coordinates, Surface Area of the surfaces of the form $z = f(x, y)$ Triple Integrals	**Ex 14.2** **[**1-12,15-25,47-56**]** **Ex 14.3** **[**1-10, 23-34**]** **Ex 14.4 [**1-10**]** **Ex 14.5 [**1-8**]**
Topics in Vector Calculus: Vector Fields, gradient, divergence, and curl. Line Integrals Green's Theorem	**Ex 15.1 [**17-28**]** **Ex 15.2 [**7-14,19-22**]** **Ex 15.4 [**3-10**]**