
Synopsis Seminar

Seminar Title	: A class of elliptic PDEs involving the (p,q) -Laplacian with constant or variable exponents
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Venue	: Seminar Room(Department of Mathematics)
Date and Time	: 30 Jun 2025 (4:00pm)
Abstract	: Elliptic boundary value problems are a class of partial differential equations with certain conditions called boundary conditions to be satisfied on the boundary of the region. Elliptic partial differential equations have applications in various fields of science and engineering such as reaction-diffusion problems, conservation laws, thin obstacle problem, crystal dislocation, soft thin films, flow through fractal non-smooth domains and elastic properties of fractal media. It is also important in various fields of mathematics such as harmonic analysis, differential geometry, calculus of variations, topology etc. The study of differential equations involving the $p(x)$ -Laplacian operator or the $(p(x), q(x))$ -Laplacian operator is appealing, as these can model processes such as filtration through porous media, electrorheological fluids, image processing and elasticity. Our objective is to study some nonlinear elliptic PDEs involving the (p,q) -Laplacian operator with constant or variable exponents, defined on bounded and unbounded domains. These problems incorporate Hardy potential, indefinite weight, superlinear and sublinear nonlinearities. When studying elliptic problems on an unbounded domain, the primary challenge is the absence of compactness. To address this issue, we apply the method of weight functions and localization technique on bounded subdomains. To demonstrate the existence of weak solutions, we employ the method of sub-supersolutions and the variational methods. In certain cases, we establish the regularity results through the specific theorems. Additionally, the multiplicity of solutions is demonstrated using the symmetric Mountain Pass Theorem.