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Departmental Seminar

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| Seminar Title | : A fuzzy approach to solve fractional differential equations with ABC derivative via homotopy perturbation and Adomian decomposition methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Speaker       | : Nihar Ranjan Mallick                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Supervisor    | : Prof. S. Chakraverty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Venue         | : Seminar Room (Department of Mathematics)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Date and Time | : 30 Jul 2025 (05:00 pm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Abstract      | : Exact solutions of fractional differential equations (FDEs) are sometimes difficult to obtain. Therefore, solutions may be acquired by applying some numerical or semi-analytical methods. Further, the involvement of uncertainty in FDEs may not be neglected because of their applicability in practical problems. In order to handle FDEs in an uncertain environment, fuzzy numbers may be used. In this regard, we discuss the solution for the fuzzy fractional differential equation of order, involving the Atangana Baleanu Caputo(ABC) fractional derivative. Here, triangular fuzzy numbers and Gaussian fuzzy numbers are used as involved initial conditions for the undertaken problem of the fractional ordinary differential equation. The fuzzy FDE is transformed into a parametric form using the double parametric representation of the fuzzy numbers. Then, the equation is solved in terms of the parameters. Here we have implemented the Homotopy perturbation method (HPM) and the Adomian decomposition method (ADM) with a fuzzy-based approach to produce corresponding fuzzy solutions. Additionally, a convergence analysis is provided to ensure the reliability and validity of the proposed solution approach. |