Information of the graduate level course on **Functional Analysis and Applications (MAD007P6E)** at IIT Jammu, India

Course contents:

- Review of normed linear spaces, linear functionals and examples. Hilbert spaces, dual of Hilbert spaces, variational inequalities, orthonormal sets, Adjoint, Hermitian, Normal, unitary operators, Compact operators. Spectral theorem for Compact Hermitian operators.

- Weak and weak* topologies, Banach-Alaoglu theorem, reflexive, separable and uniformly convex spaces, applications of these to calculus of variations.

- Distribution theory: test functions and distributions, Operations with distributions, Convolution of functions and distributions, Fundamental solutions, Fourier transform, Schwartz space, Tempered distributions.

- Sobolev spaces: definition and basic properties, approximation by smooth functions, extension theorems, compactness theorems, Sobolev inequalities, trace theory.

Class timing for the course:

- Tuesday, 4:00 PM to 5:30 PM

- Thursday, 4:00 PM to 5:30 PM

- Friday, 2:00 PM to 3:00 PM (Tutorial class)

Credit system for the course:

- 15 marks for quizzes, Quizzes will be on 30/09/2021, 21/10/2021, 18/11/2021, 09/12/2021 and 30/12/2021.

- 25 marks for Mid-Sem exam. Mid-sem exam will be on November 5, 2021.

- 10 marks for presentation. Date of presentation will be decided later.

- 50 marks for End-Sem exam. End-Sem exam will be on January 5, 2022.

References for the course:

1. S. Kesavan, Functional analysis, Hindustan Book Agency, 2009.

2. S. Kesavan, Topic in Functional analysis and applications, New Age International Publishers, 2008.

3. L.C. Evans, Partial Differential Equations, American Mathematical Society, 1998.

4. T. Nair, Functional Analysis: A First Course, Prentice Hall of India, 2008.