Information of the course on **Linear Algbera and Differential Equations (SMD002U1M)** for B.Tech. 2nd semester at IIT Jammu, India

Instructors:

- Dr. Arvind Kumar (Instructor)
- Dr. Manmohan Vashisth (Coordinator)

Course contents:

- System of Linear equations, Gaussian elimination, matrix operations, Elementary matrices, Determinants, Vector Spaces, subspaces, linear independence, basis and dimensions, coordinates and change of basis, rank, nullity and the fundamental matrix spaces.
- Linear transformation, rank-nullity theorem and its applications, isomorphism, matrix representation of linear transformation, similarity, Eigenvalue and eigenvectors, Cayley-Hamilton theorem (without proof) and its applications, diagonalization.
- First order differential equations, Picard's iterations, Picard's theorem (without proof) and its applications, Second order and higher order linear ODE with constant coefficients, linear independence and Wronskian, Cauchy-Euler equations, method of undetermined coefficients, variation of parameters.
- System of linear equations with constant coefficients, fundamental matrix and matrix methods. Boundary Value problems: Sturm-Liouville eigenvalue problems, Power series method, Laplace transformation method.

Class and tutorial timings for the course:

- Will update, once it is declared by the institute.

Credit system for the course:

- 5 marks for attendance in the class. There will be $15 - 20$ random attendance throughout the semester and a student will get full marks provided he/she has more than 75% of attendance.
- 5 marks for group homework assignments. There will be several groups of students, consisting of atleast 10 students in each group. Each group has to submit detailed solutions of the homework assignment.

- 20 marks for class tests. There will be two class tests of equal marks each. Class test 1 will be sometime during April $10 - 15,\ 2023$ and class test 2 will be sometime during May $27 -$ June $2,\ 2023$.
- 30 marks for mid-sem exam. Mid-sem will be as per the institute time-table.
- 40 marks for end-Sem exam. End-sem will be as per the institute time-table.

References for the course:

1. H. Anton and C. Rorres; Elementary Linear Algebra, 11th Edition, Wiley.
2. D. C. Lay; Linear Algebra its applications, Fifth Edition.
3. G. F. Simmons; Differential Equations with Applications and Historical Notes, 2nd Edition, Tata McGraw Hill.
4. W. E. Boyce and R. C. DiPrima; Elementary Differential Equations, Wiley, 10th Edition.
5. E. A. Coddington; An introduction to ordinary differential Equations, Dover Publications.