INDIAN INSTITUTE OF TECHNOLOGY INDORE
Department of Mathematics
Organizes

Short term Course on

Matrix Computations and its application to System, Signal and Control Problems

February 16-21, 2021

(Sponsored by Quality Improvement Programme (QIP), AICTE / MHRD)

Coordinators: Dr. Sk. Safique Ahmad, Dr. Niraj K. Shukla and Prof. Ram Bilash Pachori

Report of the course

The workshop entitled "*Matrix Computations and its application to System, Signal and Control Problems*" was conducted by the Department of Mathematics of IIT Indore during 16-21 February 2021 under QIP approved by AICTE. In this workshop, lectures were given by various experts both from Indian and abroad. Every day their 6 hrs lectures were conducted, including a discussion among participants and subject experts.

Overview of the course: The course provides knowledge and understanding of matrix computations in various applications. For this, deeper knowledge of theory, methods, algorithms and software is required for different classes of numerical linear algebra problems. Among other things, the course discusses projections, fundamental subspaces, transformations, orthogonality and angles, rank, matrix factors (eg LU, QR, SVD), condition numbers (ill-posed or well-posed problems), direct and iterative methods to solve linear systems of eigenvalue problems, canonical forms using DFT, FFT, for circulent and Hankel matrices in signals, and related problems involving in control, systems and signal and numerical solution of ODE/PDE through MATLAB.

Benefits: It is necessary to bring different topics from the undergraduate curriculum and introduce students and faculty to a developing area in mathematics. Basic matrix computation is a natural topic of this course. The great success of matrix theory mostly lies in their many desired properties such as signals, systems and control. This allows the Teachers to become aware what are the current frontiers of matrix computation and what are the possible further developments and applications of matrix computations. The participants' knowledge about the course content will be raised to the level such that they will be able to use theory fo matrix computation for their teaching and research.

We have received very good response from the participants who had joined from various parts of country and were motivated towards the subjects covered during this workshop.

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The following resource persons were involved as experts in this workshop:

1. Prof. Pradip Sirkar, IIT Kanpur
2. Dr. Punit Sharma, IIT Delhi
3. Dr. Gajendra Kumar Viswakarma, IIT Dhanbad
4. Dr. Md Sajid,Qassim University, Saudi Arabia
5. Dr. Bhupendra Singh, Scientist, CAIR-DRDO, Bangalore
6. Prof. Ram Bilas Pachori, IIT Indore
7. Dr. Niraj Kumar Shukla, IIT Indore
8. Dr. Safique Ahmad, IIT Indore
9. Dr. Isthikhar Ali, Integral University

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