Finishing School Program (Online Internship)-2021

Name of Department	Department of Electrical Engineering
Module Name	**Hands on Training on "Optimization in Power System Operation, Planning and, Application of FACTS Devices**
Module Coordinators	1)Dr. Vikram 2)Prof. Bhavna Rathore 3) Prof. Rahul Sagwal 4)Prof. Manoj Kumar

Module Objectives	The main objective of this Online Finishing School /Summer Internship Program Module is to familiarize the participants with:
	● Power System Planning and Operation
	  ○ Load flow analysis using Gauss Seidel, Newton-Raphson, Fast-Decoupled method
	  ○ Economic Load Dispatch
	  ○ Generation Rescheduling
	  ○ Congestion Management
	  ○ Reactive Power Control
	  ○ Load Frequency Control
	● Flexible AC Transmission System (FACTS) devices and Multilevel Inverter
	  ○ Classification of FACTS Devices
	  ○ Optimal Placement of FACTS Devices
	  ○ Power Electronics switching and Control
	  ○ Future role of High Power Electronics Converters in Power System
	  ○ Advanced control techniques for PWM
	● Power Quality Issues
	  ○ Undervoltage/Overvoltage
	  ○ Swag/Swell
	  ○ Harmonics and Frequency transients
	  ○ Power factor correction
	  ○ Reactive power control
	● Numerical Optimization Techniques
	  ○ Least Square and Nonlinear Least Square methods
	  ○ Interior point methods
	  ○ Quadratic Programming
	  ○ Soft computing techniques:
	    ■ Genetic Algorithm and Differential Evolution etc.
	    ■ Applications of soft-computing techniques in power

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	system operation and planning
Module Contents	- Energy Scenario in India - Introduction of Reactive Power Dispatch - Importance of Reactive power - Load flow Methods: Gauss-Seidel, Newton-Raphson, Fast - Decoupled method - Generation Rescheduling and Congestion Management - Introduction and Need of the of FACTS Devices - Classification of FACTS Devices - Optimal Placement of FACTS Devices - Future role of High Power Electronics Converters in Power Systems - Introduction and Importance of Economic Load Dispatch - Unconstrained and Constrained optimization. - Conventional Optimization Methods:- Least Square and Nonlinear Least Square Methods, Interior point method, and Quadratic Programming. - Introduction to Evolutionary Computing Techniques - Genetic Algorithm and Differential Evolution method - Hands on Training - Quiz /Assessment during and at the end of Session
Module Methodology	Implementation and verification using MATLAB
Module Outcome/ Impact	- After completing this Online Finishing School Program, the participating students will have a complete vision of real-time power systems including planning, operation and control. - They will acquire the knowledge of - Economic Load Dispatch, Reactive Power Dispatch and Optimal Placement of FACTS devices - Various conventional optimization techniques and, Soft computing techniques along with their advantages over the conventional optimization techniques - Power quality issues and challenges - Multilevel inverter control and operation - The participants will be able to apply these optimization techniques on various engineering problems. - This module will help them to enhance their technical as well as programming skills, which will further help them in recruitment and higher studies.
Duration	Approx. 03 Weeks (20 days)
Module Coordinator	Dr. Vikram, Prof. Bhavna Rathore, Prof. Rahul Sagwal, Prof. Manoj Kumar

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Day Wise Schedule

Date	Day	Module Contents to be covered/Interactive Session/Assignment/Quiz/Exercises/Daily practice sheets (DPP)/Tutorial/Project etc (05:00 PM onwards, 2-3 Hrs/ Day)	Faculty
14.05.2021	Friday	Energy: An Introduction to Importance in Current Scenario	Dr. Vikram, Prof. Bhavna Rathore, Prof. Rahul Sagwal, Prof. Manoj Kumar
15.05.2021	Saturday	Revision of MATLAB Basics	Prof. Rahul Sagwal
16.05.2021	Sunday	Introduction to unconstrained and constrained optimization: Hands on Session & Quiz.	Dr. Vikram
17.05.2021	Monday	Load Frequency Control: Introduction and Importance	Prof. Bhavna Rathore & Dr. Vikram
18.05.2021	Tuesday	Importance of reactive power	Prof. Bhavna Rathore
19.05.2021	Wednesday	Load flow methods & ELD	Prof. Rahul Sagwal
20.05.2021	Thursday	Generation Rescheduling & Congestion Management	Prof. Rahul Sagwal
21.05.2021	Friday	FACTS Devices & their application	Prof. Bhavna Rathore
22.05.2021	Saturday	Optimal placement of FACTS Devices	Prof. Bhavna Rathore
23.05.2021	Sunday	Introduction To High Power Converters	Prof. Manoj Kumar
24.05.2021	Monday	Classifications, Power compensation	Prof. Manoj Kumar
25.05.2021	Tuesday	Power Quality Improvement	Prof. Manoj Kumar

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26.05.2021	Wednesday	Hands on Session on MATLAB SIMULATION and Quiz	Prof. Manoj Kumar
27.05.2021	Thursday	Optimization Using MATLAB: Hands on Session	Dr. Vikram
28.05.2021	Friday	Linear and Nonlinear Least Square Methods	Dr. Vikram
29.05.2021	Saturday	Introduction to Soft computing Techniques: Genetic algorithm and Differential Evolution	Dr. Vikram
30.05.2021	Sunday	Concluding Session	Dr. Vikram, Prof. Bhavna Rathore, Prof. Rahul Sagwal, Prof. Manoj Kumar

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Eligibility and Important Instructions :-

1. The Finishing School Program/ Online Summer Internship Program is designed only for pre-final & final year students of **Electrical Engineering Department.**

2. Participants must have Laptop/Desktop with MATLAB software and also preliminary knowledge of MATLAB software.

3. The students may apply online.

4. The Finishing School Program/ Online Summer Internship Program is free for the participants of pre-final year students of MITS.

5. This online module will be conducted under the Finishing School Program which will be considered equivalent to Online Internship of Pre-final year students who could not get any Internship during this situation.

6. Duration of this program will be of five weeks which is equivalent to summer Internship period as per AICTE and our Institute policy. Daily no. of hours of online training may be flexible.

7. Certificates will be issued to candidates who have attendance 75% or more and also score more than 60% in the test.

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Proposal for Finishing School Program for all Pre-Final Year Students

Name of Department	Department of Electrical Engineering
Module Name	**Biomedical Signal and Image Processing using MATLAB/OCTAVE Platform**
Module Coordinators	1) Dr. Arun Kumar Wadhwani 2) Dr. Sulochana Wadhwani 3) Dr. Punjan Dohare 4) Dr. Hemlata Shakya

Module Objective	The module is designed for the engineering students with following objectives:
	
	• To understand the basic signals in the field of biomedical.
	• To study origins and characteristics of some of the most commonly used biomedical signals, including ECG, EEG, evoked potentials, and EMG.
	• To understand Sources and characteristics of noise and artifacts in bio signals.
	• To understand use of bio signals in diagnosis, patient monitoring and physiological investigation.
	• To explore research domain in biomedical signal processing.
	• To understand the basics of image processing.
	• To explore the research domain in image processing which includes image manipulation, image understanding.
	• To understand the image analysis and image enhancement, image segmentation.
	• Hands on training on OCTAVE-
	  • It will teach how to use Octave to perform calculations, plot graphs, and write simple programs. This is heavily used in industry and academia, gives the user the opportunity to learn the syntax where funding and licence restrictions prevent the use of commercial packages like MATLAB.
	  • In many real-world engineering problems, the data can be expressed as matrices and vectors. It can be thought of as a very powerful, programmable, graphical calculator.
	  • Octave makes it easy to solve a wide range of numerical problems, allowing you to spend more time experimenting and thinking about the wider problem.
	
	This course is prepared for the engineering students with a good background in Signals and Systems. Students in other engineering

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	disciplines also be able to follow this course.
Module Content	Introduction to Biomedical signal, Filtering for Removal of artifacts, Waveform Analysis, Frequency-domain Analysis, Fuzzy distance measure tool for abnormality detection, Introduction to image processing, Image analysis and image enhancement, Image segmentation using MATLAB platform.Hands-on session on OCTAVE software an open source platform (An alternative of MATLAB)
Module Methodology	The Internship is divided into three parts: - • In the 1st section, online lectures will be conducted. • In the 2nd section hands-on training will be conducted on the MATLAB/OCTAVE Platform. • In the 3rd section students will have to submit report.
Module Outcome/ Impact	On completion of this internship, students are able to: • Understand the basic learning of OCTAVE platform • Understand the image processing and image analysis • Understand origin of bio electric signal • Know the sources of distortions in bio signals and its remedial techniques • Analyze ECG, EMG and EEG signal with characteristic feature using MATLAB
Duration	3 Weeks

Day Wise Schedule				
	Date	**Day**	**Module Contents to be covered/Interactive Session/Assignment/Quiz/Exercises/Daily practice sheets (DPP)/Tutorial/Project etc**	**Faculty**
Week 1	14/05/2021	Fri	Hands on Training on OCTAVE which includes Basic operation, Navigating the GUI, Matrices and vectors	Dr. Punjan Dohare
	15/05/2021	Sat	Plotting, Linear systems, Polynomial curve fitting, Matrix transformations	Dr. Punjan Dohare
	16/05/2021	Sun	Calculus which includes Limits, sequences, and series, Numerical integration, Complex variables, Symbolic operations, Eigenvalues and eigenvectors, Singular value decomposition, Three dimensional graphs, Differential equations	Dr. Punjan Dohare
	17/05/2021	Mon	Script files: Creating and editing a script,	Dr. Punjan Dohare

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			Running and debugging scripts, Remembering previous script,	
	18/05/2021	Tue	Control statements: if...else selection, switch selection, for loops and while loops	Dr. Punjan Dohare
	19/05/2021	Wed	Functions: Sine in degrees, Creating and using functions and Unit step, Complex numbers: Plotting complex numbers and Finding roots of polynomials	Dr. Punjan Dohare
	20/05/2021	Thu	Introduction to Image processing, Image analysis and image enhancement, Image segmentation using MATLAB platform.	Dr. Punjan Dohare
Week 2	21/05/2021	Fri	Preliminaries, Biomedical signal origin & dynamics (ECG)	Dr. Arun Kumar Wadhwani
	22/05/2020	Sat	Biomedical signal origin & dynamics (EEG, EMG etc.)	Dr. Arun Kumar Wadhwani
	23/05/2021	Sun	Decomposition of EMG Signal-Statistical Method	Dr. Arun Kumar Wadhwani
	24/05/2021	Mon	Decomposition of EMG Signal-Using Wavelet Transform	Dr. Arun Kumar Wadhwani
	25/05/2021	Tue	Extraction of clinically important features from bioelectric signals: Morphological Analysis	Dr. Arun Kumar Wadhwani
	26/05/2021	Wed	IoT Applications in HealthCare	Dr. Arun Kumar Wadhwani
	27/05/2021	Thu	Quantitative Analysis of Neck muscle Fatigue-I	Dr. Hemlata Shakya
Week 3	28/05/2021	Fri	Quantitative Analysis of Neck muscle Fatigue-II	Dr. Hemlata Shakya
	29/05/2021	Sat	Applications of ANN & Fuzzy Logic in Abnormality Detection-I	Dr Sulochana Wadhwani
	30/05/2021	Sun	Applications of ANN & Fuzzy Logic in Abnormality Detection-II	Dr Sulochana Wadhwani
Module Coordinators Email Id and Mobile Number	1) Dr. Arun Kumar Wadhwani- akwadhwani@mitsgwalior.in, (9131363200) 2) Dr.Sulochana Wadhwani- sulochana_wadhwani@mitsgwalior.in, (9399766998) 3) Dr. Punjan Dohare- punjan@mitsgwalior.in, (8360251806) 4) Dr. Hemlata Shakya- hshakya.rs.bme13@mitsgwalior.in (9628140971)			

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Eligibility and Important Instructions:-

1. The Online Finishing School Program (Online training/Internship) is designed only for Pre-final & Final Year students.

2. The students may apply online.

3. The Online Finishing School Program/ Summer Internship Program is free for the participants of Pre-final & Final year students of MITS, Gwalior.

4. The participants outside the Institute may also join the Program on payment basis.

5. This online module will be conducted under the Finishing School Program which will be considered equivalent to Online Internship of Pre-final year students who could not get any Internship during this situation.

6. Duration of this program is 14th May-30th May, 2021.

7. The no. of hours of online training may be flexible.

7. Certificates will be issued to candidates who have attendance 75% or more and also

score more than 60% in the test.