

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Skills Enhancement Program (SEP) - 2023

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| Name of Department | Department of Electrical Engineering |
| Module Name | Design analysis of grid-connected and off-grid system |
| Module Coordinators | 1) Dr. Shishir Dixit 2) Dr. Himmat Singh 3) Dr. Yashwant Sawle |
| Module Objective | <ul style="list-style-type: none">• The main aim of the program is to make participants familiar with present energy scenario in Indian prospective. That combined conventional and non-conventional energy sources and reactive power management for maximum utilization of existing utility system.• There are two main types of renewable energy generation resources: distributed generation, which refers to small-scale renewables on the distribution grid where electricity load is served; and centralized, utility-scale generation, which refers to larger projects that connect to the grid through transmission lines.• To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of Wind and Alternative Sources of Energy.• To enable the students to develop managerial skills to assess feasibility of alternative approaches and drive strategies regarding Wind and Alternative Sources of Energy.• Understand the difference between renewable and nonrenewable energy resources.• Identify strengths and limitations associated with the different renewable energy technologies.• The Flexible AC Transmission System (FACTS) are power electronics based devices which are capable of managing reactive power of the system (by injecting or absorbing the reactive power of system) under operational constant of a power system. These devices provide fast and flexible control and thus an alternate solution to address some of these problems of a power system including RPM. Main objectives of FACTS technology are to increase transmission capacity allowing secure loading of the transmission up to their thermal capacities, to enable better utilization of available generation and to control the outages from spreading to wider areas. However, the huge financial investment is required in installation of these devices; the optimal location and sizing of these devices are intensively investigated with some suitable optimizing techniques. |

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| Module Content | <ul style="list-style-type: none"> • Energy Scenario in India • Importance of Renewable Energy Resources • Availability of resources Renewable Energy Resources • Sizing of various Renewable Energy Resources • Economic details of hybrid system components for sizing. • Grid connected system • Off-grid system • Energy storage • Introduction to Hybrid Optimization of Multiple Energy Resources software. • 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 • Traditional optimization techniques • Differential Evolution • Hands on Training • Quiz /Assessment during and at the end of Session |
| Module Methodology | Implementation and verification using Hybrid Optimization of Multiple Energy Resources software. |
| Module Outcome/ Impact | <ul style="list-style-type: none"> • The understanding of optimization techniques to solve different types of grid and off-grid system problems using Hybrid Optimization of Multiple Energy Resources software. • Application of Advanced net metering in Power System • Understand the need of energy conversion and the various methods of energy storage. |
| Duration | 5 Weeks (30 days) |
| Module Coordinator | ,Dr.Shishir Dixit ¹ , Dr.Himmat Singh ² Dr. Yashwant Sawle ³ |
| Email ID | shishir.dixit1@gmail.com |
| Mobile No. | ahirwar.himmat@mitsgwalior.in |
| | yashwant@mitsgwalior.in 898982730, 9826501588 & 9575005868 |

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| | Date | Module Contents to be covered/Interactive Session/Assignment/Quiz/Exercises/Daily practice sheets (DPP)/Tutorial/Project etc (10:00 AM onward, 2-3 Hrs/ Day) | Faculty |
|---------------|-------------------|---|---|
| Week 1 | 17-05-2023 | Introduction/ Discussion on subject | Dr. Shishir Dixit / Dr. Yashwant Sawle |
| | 18-05-2023 | Energy Scenario in India | Dr. Yashwant Sawle |
| | 19-05-2023 | Feasibility analysis for design of hybrid system | Dr. Yashwant Sawle |
| | 22-05-2023 | Calculate the major parameters of sun movement, solar radiation, and tracking systems. | Dr. Yashwant Sawle |
| | 23-05-2023 | Calculate the major parameters of wind turbine, speed. | Dr. Yashwant Sawle |
| Week 2 | 24-05-2023 | Impact of battery in hybrid system | Dr. Yashwant Sawle |
| | 25-05-2023 | Hands of training | Dr. Yashwant Sawle |
| | 26-05-2023 | Research paper related to renewable energy using Hybrid Optimization of Multiple Energy Resources software | Dr. Yashwant Sawle |
| | 29-05-2023 | Research paper related to renewable energy using Hybrid Optimization of Multiple Energy Resources software | Dr. Yashwant Sawle |
| | 30-05-2023 | Introduction of Reactive Power Dispatch | Dr.Himmat Singh |
| Week 3 | 31-05-2023 | Introduction of Reactive Power Dispatch | Dr.Himmat Singh |
| | 1-06-2023 | Importance of Reactive power | Dr. Himmat Singh |
| | 2-06-2023 | Importance of Reactive power | Dr.Himmat Singh |
| | 05-06-2023 | Differential Evolution | Dr.Himmat Singh |
| | 08-06-2023 | Differential Evolution | Dr.Himmat Singh |
| Week 4 | 09-06-2023 | Differential Evolution | Dr.Himmat Singh |

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| | 10-06-2023 | Load flow Methods: Gauss-Siedel, Newton-Raphson, Fast-Decoupled method | Dr. Shishir Dixit |
| | 11-06-2023 | Load flow Methods: Gauss-Siedel, Newton-Raphson, Fast-Decoupled method | Dr. Shishir Dixit |
| | 12-06-2023 | Load flow Methods: Gauss-Siedel, Newton-Raphson, Fast-Decoupled method | Dr. Shishir Dixit |
| | 15-06-2023 | Introduction, and Need of the of FACTS Devices | Dr. Shishir Dixit |
| Week 5 | 16-06-2023 | Introduction, and Need of the of FACTS Devices | Dr. Shishir Dixit |
| | 17-06-2023 | Classification of FACTS Devices | Dr. Shishir Dixit |
| | 18-06-2023 | Optimal Placement of FACTS Devices | Dr. Shishir Dixit |
| | 19-06-2023 | Traditional optimization techniques | Dr. Shishir Dixit |
| | 20-06-2023 | Concluding Remarks by all Faculties | All faculty |
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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 and also preliminary knowledge of MATLAB software.
3. The students may apply on line.
4. The Skill enhancement program/ Online Summer Internship Program is free for the participants of pre-final & final year students of MITS.
5. The participants outside the Institute may also join the Program on payment basis.
6. This online module will be conducted under the Skill enhancement program which will be considered equivalent to Online Internship of Pre-final year students who could not get any Internship during this situation.
7. 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.
8. Certificates will be issued to candidates who have attendance 75% or more and also score more than 60% in the test.