



Model Institute of Engineering
& Technology (Autonomous)
Course Handout

Kot Bhalwal, Jammu

COURSE HANDOUT

SMART GRID (EE-604)

EE-6TH SEMESTER

ACADEMIC YEAR (2023-24)

Mr. Parveen Kumar

Assistant Professor

Electrical Engineering Department



IET
FUTURE BEGINS HERE....

Department of Electrical Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1



Please Do Not Print Unless Necessary



Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
EE-604	Smart Grid	Core	3	3	0	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Discuss the features and recent revolution in the smart power grid system.
CO2	Illustrate the concept of smart meters and advanced metering infrastructure.
CO3	Appraise the concept of communication technologies in smart grid systems.
CO4	Describe microgrid structures and energy management.
CO5	Analyze the performance of microgrid system.

Unit-I

Introduction to Smart Grid: Evolution of electric grid, concept of smart grid, definitions, functions of smart grid, opportunities and barriers of smart grid, difference between conventional and smart grid, present development and standards for smart grid system, Remote terminal unit (RTU), intelligent electronic devices (IED), phase measurement unit (PMU), smart substations, substation and feeder automation, application for monitoring, protection, and control.

(8 Hours)

Unit-II

Smart Meters and Advance Metering Infrastructure: Introduction to smart meters, advanced metering infrastructure (AMI), real time pricing, automatic meter reading (AMR), outage management system (OMS) smart sensors, smart appliances, home and building automation, geographic information system (GIS).

(10 Hours)

Unit-III

Communication Technology for Smart Grid: Introduction of Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN), Bluetooth, Zig-Bee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network and Broadband over Power line (BPL), basics of cloud computing

(10 Hours)

Unit-IV

Microgrids: Introduction to smart Microgrid, types, structure and configuration of Microgrids: AC and DC Microgrids, power electronic interfaces for Microgrids, energy management and protection control strategies of a Microgrid.

(8 Hours)

Unit-V

Control and Operation of Microgrid: Modes of operation and control of Microgrid: Grid connected and islanded mode, active and reactive power control, protection issues, power quality issues in Microgrids, regulatory standards, Microgrid economics.

(10 Hours)



Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Microgrids Architecture and control	Nikos Hatziargyriou	Wiley - IEEE	1st (2014)
2	Computer Relaying for Power Systems	Arun G Phadke, James S Thorp	Wiley	2nd (2012)
3.	Renewable Energy Systems: Advanced Conversion Technologies and Applications (Industrial Electronics)	Fang Lin Luo, Hong Ye	CRC Press	1st (2013)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Smart Grids	Nouredine Hadjsaid, Jean-Claude Sabonnadière	Wiley-ISTE	1st(2012)

COURSE PLAN

Unit-I Introduction

S.No	Topics	Recommended Books
1	Evolution of electric grid	Book 1, Ch.1
2	Concept of smart grid, definitions,	Book 1, Ch.1
3	Functions of smart grid, opportunities, and barriers of smart grid,	Book 1, Ch.1
4	Difference between conventional and smart grid,	Book 2, Ch.2
5	Present development and standards for smart grid system,	Book 2, Ch.2
6	Remote terminal unit (RTU), intelligent electronic devices (IED),	Book 2, Ch.2
7	Phase measurement unit (PMU), smart substations, substation, and feeder automation	Book 2, Ch.2
8	Application for monitoring, protection, and control.	Book 2, Ch.2
Unit-II Smart Meters and Advance Metering Infrastructure		
9	Smart Meters and Advance Metering Infrastructure	Book 2, Ch.3
10	Introduction to smart meters	Book 2, Ch.3
11	Advanced metering infrastructure (AMI)	Book 2, Ch.3
12	Real time pricing	Book 2, Ch.3
13	Automatic meter reading (AMR)	Book 2, Ch.3
14	Outage management system (OMS) smart sensors	Book 2, Ch.3
15	Smart appliances	Book 2, Ch.3
16	Home automation	Book 2, Ch.3
17	Building automation	Book 2, Ch.3
18	Geographic information system (GIS)	Book 2, Ch.3
Unit-III Communication Technology for Smart Grid		
19	Introduction of Advanced Metering Infrastructure (AMI)	Book 2, Ch.4



20	Home Area Network (HAN)	Book 2, Ch.4
21	Neighborhood Area Network (NAN)	Book 2, Ch.4
22	Wide Area Network (WAN)	Book 2, Ch.4
23	Bluetooth	Book 2, Ch.4
24	Zig-Bee	Book 2, Ch.4
25	GPS, Wi-Fi	Book 2, Ch.4
26	Wi-Max based communication	Book 2, Ch.4
27	Wireless Mesh Network and Broadband over Power line (BPL)	Book 2, Ch.4
28	Basics of cloud computing	Book 2, Ch.4
Unit-IV Microgrids		
29	Introduction to smart Microgrid	Book 2, Ch.5
30	Microgrid types	Book 2, Ch.5
31	Structure of Microgrids	Book 2, Ch.5
32	Configuration of Microgrids	Book 2, Ch.5
33	AC and DC Microgrids	Book 2, Ch.5
34	Power electronic interfaces for Microgrids	Book 2, Ch.5
35	Energy management	Book 2, Ch.5
36	Protection control strategies of a Microgrid.	Book 2, Ch.5
Unit-V Control and Operation of Microgrid		
37	Control and Operation of Microgrid	Book 1, Ch.6
38	Modes of operation	Book 1, Ch.6
39	Control of Microgrid	Book 1, Ch.6
40	Grid connected mode	Book 1, Ch.6
41	Grid islanded mode	Book 1, Ch.6
42	Active and reactive power control	Book 1, Ch.6
43	Protection issues	Book 1, Ch.6
44	Power quality issues in Microgrids	Book 1, Ch.6
45	Regulatory standards	Book 1, Ch.6
46	Microgrid economics	Book 1, Ch.6

ADDITIONAL WEB RESOURCES

1.	MOOC: Power Electronics Specialization https://www.coursera.org/learn/electric-power-systems
2.	NPTEL: Video lectures on Fundamental of Power Electronics https://onlinecourses.nptel.ac.in/noc23_ee60/preview

GRADING AND ASSESSMENT

- **Sessional Test:** 20 marks
- **Assignment:** 20 marks
- **Attendance:** 10 marks
- **Final Examination:** 100 marks

COURSE POLICIES





- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**
Monday (12:05 PM - 12:55 PM)
Friday (12:05 PM - 12:55 PM)
- **Contact Information**
Parveen.ee@mietjammu.in