NIRMA UNIVERSITY
Institute of Technology
B. Tech. in Electrical Engineering
Semester – VI

L	T	P	C
3	0	0	3

Course Code	**2EEDE05**
Course Title	**Distributed Generation and Microgrid**

Course Outcomes (COs):

At the end of the course, students will be able to-

1. illustrate the concept of distributed generation and microgrid
2. analyze the impact of grid integration and control aspects of distributed generation
3. analyze the operation and control aspects of microgrid

Syllabus: **Teaching Hours: 45**

Unit-1: Distributed Generations (DGs) **12**

Introduction, reasons for growth, advantages and disadvantages of DG, operations and features of different DG technologies, comparison among the DG Technologies, selection of sources and sizing, technical and economic impact of DGs

UNIT-2: Impact of DG Integration with Grid **13**

Requirements for grid interconnection, regulatory framework, standards for interconnecting DGs to electric power systems, grid interconnection issues, constraints on operational parameters, response to grid abnormal operating conditions, LVRT and synthetic inertia emulation, islanding, stability, power quality issues and reliability

Unit-3: Microgrid Basics **08**

Overview and concept of microgrid, typical structure and configuration of a microgrid, microgrid implementation in Indian and International scenario, AC and DC microgrids, energy management in microgrid system, power electronics interfaces in DC and AC microgrids, simulation of microgrid.

Unit-4: Operation and Control of Microgrid **12**

Grid connected and islanded mode operation, techniques for voltage, frequency, active and reactive power control of microgrid system, anti-islanding schemes, stability in microgrid, microgrid protection

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

A visit to smart grid / GIFT city, distributed generation system or relevant videos may be an advantage.

Suggested Readings:

1. H. Lee Willis, Walter G. Scott, Distributed Power Generation –Planning and Evaluation, Marcel Decker Press.
2. Math H. Bollen, Fainan Hassan, Integration of Distributed Generation in the Power System, Wiley Publication.
3. G. B. Gharehpetian, S. M. Agah, Distributed Generation Systems: Design, Operation and Grid Integration, Butterworth-Heinemann Publisher.
4. Hassan Farhangi, Geza Joos, Microgrid Planning and Design: A Concise Guide, Wiley-IEEE Press
5. K. R. Padiyar, Anil M. Kulkarni, Dynamics and Control of Electric Transmission and Microgrids, Wiley-IEEE Press
6. S. Chowdhury, S. P. Chowdhury, P. Crossley, Microgrids and Active Distribution Networks, IET Power Electronics Series.
7. Nikos Hatziargyriou, Microgrids: Architectures and Control, Wiley-IEEE Press
8. Recent Papers of reputed journals and relevant standards

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. academic year 2020-21 and onwards