

Course Number and Name												
BEE051 & Distributed Generation and Micro Grid												
Credits and Contact Hours												
3 & 45												
Course Coordinator's Name												
Mrs.Anithasampath Kumar												
Text Books and References												
References:												
1. Amirnaser Yezdani, and Reza Iravani, "Voltage Source Converters in Power Systems: Modeling, Control and Applications", IEEE John Wiley Publications, 2009.												
2. Dorin Neacsu, "Power Switching Converters: Medium and High Power", CRC Press, Taylor & Francis, 2006.												
3. Chetan Singh Solanki, "Solar Photo Voltaics", PHI learning Pvt. Ltd., New Delhi, 2009												
4. J.F. Manwell, J.G "Wind Energy Explained, Theory Design and Applications," McGowan Wiley publication, 2 nd Edition, 2009.												
5. D. D. Hall and R. P. Grover, "Biomass Regenerable Energy", John Wiley, New York, 1987.												
6. John Twidell and Tony Weir, "Renewable Energy Resources", Taylor and Francis Publications, Second Edition, 2006.												
Course Description												
<ul style="list-style-type: none"> • To illustrate the concept of distributed generation • To analyze the impact of grid integration. • To study concept of Microgrid and its configuration 												
Prerequisites						Co-requisites						
Basic Mechanical Engineering						Nil						
required, elective, or selected elective (as per Table 5-1)												
Required												
Course Outcomes (COs)												
CO1: Review the conventional power generation												
CO2: Analyze the concept of distributed generation and installation												
CO3: Design the grid integration system with conventional and non-conventional energy sources												
CO4: Design the dc and ac micro grid												
CO5: Analyze power quality issues and control operation of micro grid												
Student Outcomes (SOs) from Criterion 3 covered by this Course												
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	M	M	M		M		M			M	L	M
CO2	H		H		H						M	M
CO3	M			H	M		M					

CO4	H	M		H	M					M		
CO5		M	M		M					L	M	M

List of Topics Covered

UNIT I INTRODUCTION 9

Conventional power generation: advantages and disadvantages, Energy crises, Non - conventional energy (NCE) resources: review of Solar PV, Wind Energy systems, Fuel Cells, micro-turbines, biomass, and tidal sources.

UNIT II DISTRIBUTED GENERATIONS (DG) 9

Concept of distributed generations, topologies, selection of sources, regulatory standards/framework, Standards for interconnecting Distributed resources to electric power systems: IEEE 1547. DG installation classes, security issues in DG implementations. Energy storage elements: Batteries, ultra-capacitors, flywheels. Captive power plants

UNIT III IMPACT OF GRID INTEGRATION 9

Requirements for grid interconnection, limits on operational parameters,,: voltage, frequency, THD, response to grid abnormal operating conditions, islanding issues. Impact of grid integration with NCE sources on existing power system: reliability, stability and power quality issues.

UNIT IV BASICS OF A MICROGRID 9

Concept and definition of microgrid, microgrid drivers and benefits, review of sources of microgrids, typical structure and configuration of a microgrid, AC and DC microgrids, Power Electronics interfaces in DC and AC microgrids,

UNIT V CONTROL AND OPERATION OF MICROGRID 9

Modes of operation and control of microgrid: grid connected and islanded mode, Active and reactive power control, protection issues, anti-islanding schemes: passive, active and communication based techniques, microgrid communication infrastructure, Power quality issues in microgrids, regulatory standards, Microgrid economics, Introduction to smart microgrids.