Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER M.TECH (EMAL / PESC) END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: DISTRIBUTED ENERGY RESOURCES [ELE 520]

(PROGRAM ELECTIVE – I)

REVISED CREDIT SYSTEM

Time: 3 Hours 10 MAY 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

1A. What are hot spots? What is the cause of hot spots in a PV module? ***(03)***

1B. What are Distributed Generation (DG) and Distributed Energy Resources (DER)? What are the benefits of the distributed generation system? Explain. ***(05)***

1C. Explain the role of National Load Dispatch Center (NLDC) in Indian power sector. ***(02)***

2A. Explain the following terms in wind energy conversion system:
(i) Tip speed ratio (ii) Pitch (iii) Nacell (iv) Yaw mechanism v) Power coefficient ***(05)***

2B. Estimate the number of PV modules to be connected together in order to design a solar PV system for power generation with following requirements:
Power = 10 kW, Voltage at peak power = 200 V
The PV modules available for this plant are having following parameters:
V_m = 35 V, I_m = 8.5 A. ***(03)***

2C. A house has a LCD TV, one fan, two tube lights and five CFL. Calculate the total power and energy if all the appliances are used for 6 hours.
Assume power for the appliances as follows:
1 fan = 100 W; 1 tube light = 50 W; CFL = 18 W; and LCD TV = 80 W ***(02)***

3A. Explain the Supervisory-control strategies in Grid-connected hybrid power generation system with different modes of operation. ***(05)***

3B. With the help of neat circuit diagram explain the PMSG based wind energy conversion system in both grid connected mode and isolated mode of operation. Mention different types of wind turbines? ***(05)***

4A. What are the issues and challenges of grid integration with low power generation? ***(03)***

4B. Discuss the importance and necessity for Park's transformation for the analysis of DG and explain the transformation matrix. ***(05)***

4C. What are the requirements of AC grid integration? ***(02)***

5A. What are the different types of interface topologies used in micro turbine? With the help of neat circuit diagram explain the back to back converter interface topology used in grid connected and isolated mode of operation. ***(05)***

5B. Discuss recommended voltage distortion limits in DG system according to IEEE 519 -1992 standards. ***(02)***

5C. A village power system in India consists of 10kW wind and battery bank. Inverter initial cost is $9000/kW, energy production is 100kWh/day, fixed charge rate is 0.03%, annual operation and maintenance is $0.01/kWh. Calculate the cost of Energy. ***(03)***

6A. A remote hospital where no grid electricity is available has a load of 8 kWh/ day. The power should be available to the load 24Hour a day. For this hospital, the use of solar PV module or a diesel generator is being planned. Find out and compare the unit cost of electricity generated from a solar PV system and a diesel generator. If the load is to be operated for 20 Years. (Assumptions are made according to the IEEE Standard) ***(04)***

6B. What is micro grid? Discuss its Benefits and Technical Challenges. ***(04)***

6C. What are the benefits and requirement of successful islanding operation? ***(02)***