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Total Number of Pages : 01

M.TECH

M.TECH 1ST SEMESTER EXAMINATIONS(BACK), NOV/DEC 2019

Branch: PE, Subject Code:MPEPC1010

SMART ELECTRICAL ENERGY SYSTEM

Time: 3 Hours

Max Marks : 70

The figures in the right hand margin indicate marks.

PART-A**(10 X 2=20 MARKS)****1. Answer the following questions.**

- Define the term solar altitude angle
- What is the approximate quantum of solar energy (in kWh/m²) received by India?
- What is the Capacity Factor (CF) of wind Turbine?
- Is utility scale wind energy effective in reducing greenhouse gas emissions?
- A semiconductor is doped with a 10¹⁵ P atoms/cm³. What will be the electron concentration in the material?
- What is Distributed Generation? State the principle of DG power plant.
- What is the Application of capacitors to distribution systems
- Define Base Load, Peak Load and Peak Shaving
- What are the objectives of Smart Grid
- Highlight the issues and functions of smart grid

PART-B**(5 X 10=50 MARKS)****Answer any five questions from the following.**

- Q2. a. Compute the monthly average hourly solar flux received on a flat plate collector facing south having a slope of 12.5°. The collector is placed at a place 15° North on 20th day of October. Consider the following data: $H_g = 2405 \text{ kJ/m}^2/\text{h}$, $H_d = 1075 \text{ kJ/m}^2/\text{h}$, Ground reflectivity, $\rho = 0.25$, $\omega = 7.5^\circ$ (5+5)
- b. What are the various solar converters? And list out their applications
- Q3. a. Estimate the monthly average daily global radiation on a horizontal surface at Vadodara (22°00'N, 73°10'E) during the month of March if the average sunshine hours per day is 10. $A = 0.28$ and $b = 0.48$ for Vadodara. (5+5)
- b. Explain about Solar processes and spectral composition of solar radiation
- Q4. a. What are the various Solar Collection Devices? Analyse in brief (5+5)
- b. Write short notes on different types of solar energy collectors with neat diagrams
- Q5. a. State and explain various DG technologies (5+5)
- b. Discuss in brief about Distribution automation and control
- Q6. a. Explain how Smart Meters can play an important role to make a system Smart. (5+5)
- b. Write a note on present development in Smart Grid considering any one case study
- Q7. a. Draw and explain the block diagram of Static VAR generator employing an inverter (5+5)
- b. Explain the fixed speed system of wind system with Squirrel Cage Induction generator
- Q8. a. Explain the Reactive Power compensation in wind energy generating systems (5+5)
- b. Explain about the nearly constant speed constant frequency system of WTG unit

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