Reg. No. : | | | | | | | | | | |

Question Paper Code: 49251

M.E. DEGREE EXAMINATION, DECEMBER 2014.

First Semester

Power Electronics and Drives

14PPE510 – SOLAR AND ENERGY STORAGE SYSTEM

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (5 x 1 = 5 Marks)

1. The total radiation over a day is at best about _____

   (a) 8 kWh/m^2 (b) 7 kWh/m^2 (c) 9 kWh/m^2 (d) 6 kWh/m^2

2. Adding cells in series to a photovoltaic module will:

   (a) Decrease the voltage (c) Increase the voltage

   (c) Decrease the current (d) Increase the current

3. Improving the efficiency of a PV cell can be done by:

   (a) adjusting the light facing angle all day (b) placing colored acetates on the cell

   (c) heating the cell (d) changing its direction to north

4. Which of the following will reduce the capacity of a lead acid battery?

   (a) Operating at 80°F (b) Rapid discharge rate

   (c) Extremely slow discharge rate (d) Very shallow charge-discharge cycles

5. Between solar panel and battery, conditioning and regulating circuits are needed to,

   (a) increase the efficiency of panel

   (b) to maintain correct level of charging in battery

   (c) to increase the voltage rating of battery

   (d) to double the life time of battery

PART - B (5 x 3 = 15 Marks)

6. Define quanta energy?

7. What is sizing?

8. How does a grid-connected solar PV system work?

9. List out few pumped hydroelectric power station in Asia.

10. How the solar cells are applied in telecommunication systems?

PART - C (5 x 16 = 80 Marks)

11. (a) (i) What is meant by solar cell? How it is distinguished from a photo cell? Enumerate the advantages and disadvantages of the solar cell system. (10)

(ii) Explain the important aspects in design of solar cell. (6)

Or

(b) (i) What are the characteristics of solar spectrum? Which part of the spectrum is known as visible spectrum? (8)

(ii) Explain how "hot spot" can occur in a partially shaded cell connected to a large photovoltaic array. (8)

12. (a) (i) Discuss in detail about the stand alone PV systems design. (10)

(ii) Explain importance of the self-regulation in battery charging? (6)

Or

(b) (i) Together with solar PV panel, battery and inverter are most common parts of a PV system. Why? (8)

(ii) Compare different approaches in stand-alone PV system. (8)

13. (a) What are the design issues for central power stations? Explain in detail. (16)

Or

(b) (i) Write notes on onsite storage . (8)

(ii) Write in detail about the utility application for photovoltaic. (8)

14. (a) (i) What is the principle of solar thermal energy collection? How is it different from solar photovoltaic? (8)

(ii) What are the losses from solar thermal energy systems that limit their efficiency? How these losses are generally minimized? (8)

Or

(b) Explain in detail about the pumped hydroelectric energy storage, with neat sketch. (16)

15. (a) (i) How to use the solar system in water pumping system with relevant diagram? (6)

(ii) Discuss the use of solar power system in direct drive applications? (10)

Or

(b) Write Short notes on

(i) Battery – Chargers (5)

(ii) Solar Vehicles (5)

(iii) Space Applications (6)

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