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**C Reg. No. :**

**Question Paper Code: 55P51**

M.E. DEGREE EXAMINATION, NOV 2017

Elective

Power Electronics and Drives

15PPE510 - SOLAR AND ENERGY STORAGE SYSTEM

(Regulation 2015)

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 | | | | | CO1- R |
|  | (a) 8 kWh/m2 | | (b) 7 kWh/m2 | (c) 9 kWh/m2 | | (d) 8 kWh/m2 |
| 2. | Which one is protect the battery from short circuit in the solar array? | | | | | CO2- R |
|  | (a) Photo diode | (b) Diode voltage droppers | | | (c) Blocking diode | (d) Super capacitors |
| 3. | The National Renewable Energy Laboratory is located in | | | | | CO3- R |
|  | (a) Germany | | (b) Japan | (c) Australia | | (d) America |
| 4. | Which of the following will reduce the capacity of a lead acid battery | | | | | CO4- R |
|  | (a) Operating at 800F | | | (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 | | | | | CO5- R |
|  | (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 | | | | | |

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|  | PART – B (5 x 3= 15Marks) | | | |
| 6. | Define Air mass. CO1- U | | | |
| 7. | Define solar cell, module and array. CO2- U | | | |
| 8. | Write short notes on onsite storage.CO3 -U | | | |
| 9. | List out the application of lead acid battery*.* CO4- U | | | |
| 10. | Write short notes on battery chargers. CO5- U | | | |
|  | PART – C (5 x 16= 80Marks) | | | |
|  |  |  |  |  |
| 11. | (a) | Explain important aspect in design of solar cell | CO1-U | (16) |
|  |  | Or |  |  |
|  | (b) | What are the characteristics of solar spectrum? Which part of the spectrum is known as visible spectrum. | CO1-U | (16) |
|  |  |  |  |  |
| 12. | (a) | Design the different approaches of the stand-alone PV system design. | CO2- Ana | (16) |
|  |  | Or |  |  |
|  | (b) | Explain the basic principle of solar cell, array and modules with neat sketches. | CO2- App | (16) |
|  |  |  |  |  |
| 13. | (a) | Write short notes on onsite storage. | CO3- Ana | (16) |
|  |  | Or |  |  |
|  | (b) | Explain photovoltaic systems in buildings in grid connected PV systems. | CO3- Ana | (16) |
|  |  |  |  |  |
| 14. | (a) | Explain the impact of intermittent generation in energy storage system. | CO4- App | (16) |
|  |  | Or |  |  |
|  | (b) | Explain any one of the rechargeable battery technology | CO4- App | (16) |
|  |  |  |  |  |
| 15. | (a) | Give specific details as to why solar cells are well suited to solar car. | CO5- U | (16) |
|  |  | Or |  |  |
|  | (b) | Discuss the use of solar cells in space applications. How and why are space solar cell designs and materials different from those used in terrestrial applications . | CO5- Ana | (16) |