Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EE3052** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PV SYSTEM DESIGN AND INSTALLATION** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | List the current and emerging opportunities in the field of PV technology. | CO1 | 5 |
| b. | Draw the schematic of DC- PV system with storage batteries. State its operation. | CO1 | 5 |
| c. | Design a 48V System with Sixteen 12V, 5A PV Panels. A battery bank has to be constructed with each battery of rating 6V, 360Ah. Calculate the number of batteries required. Show the complete wiring diagram including charge controller. | CO2 | 10 |
| (OR) | | | | |
| 2. | a. | Mention different strategies to calculate panel tilt. | CO1 | 5 |
| b. | What do you mean by “Solar Window”? Mention the usefulness of “Sun Chart.” | CO1 | 5 |
| c. | Load estimation is an important aspect. For a PV design engineer, energy conservation is more important. Justify. | CO1 | 10 |
| 3. | a. | The data sheet of a typical PV panel is given below. (i) Find the FF for all the panels BLD240-60P….. BLD210-60P at STC. Comment about the result.  (ii) The open circuit voltage of BLD240-60P is 36.72 volts at STC. Find the voltage at 50O C. Mention the data used by you for the calculation.  (iii) Explain the reason for shift in I-V curve due to variation in solar radiation. | CO1 | 5 |
|  | b. | If 24 numbers of BLD210-60P PV panels are connected in series-parallel configuration (6 strings, 4/string), draw the I-V characteristics of the combination at STC. | CO1 | 5 |
|  | c. | Discuss about different PV cell technologies. Bring out their relative merits and demerits | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Compare Nickel-Cadmium and Lithium ion batteries. | CO1 | 5 |
|  | b. | List the important specifications of Batteries. Mention their significance. | CO1 | 5 |
|  | c. | A typical mechanical workshop has a total connected load of 5kW. Out of which 60% loads are critical. Size the battery bank. Each battery rating is 12V, 350Ah. Use proper battery sizing table and draw the connection diagram. | CO2 | 10 |
| 5. | a. | List the roll of IREDA, MoP and MoEF in developing Renewable Energy in India. | CO2 | 5 |
|  | b. | A client wishes to simultaneously power three 12 volt DC lights (30 watts) and a 12 volt DC television (14 watts) using a 12 volt PV array. Three modules are wired in parallel and used in the system. Each module has a peak current of 2.95 amps and a short circuit current of 3.28 amps. How will you size the controller? | CO2 | 5 |
|  | c. | Discuss the main and auxiliary functions of a PV controllers. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | List all the features of a typical inverter. | CO2 | 5 |
|  | b. | A customer wants to feed AC loads at 230 volts, 50Hz with his 12 volt battery system. Following are the loads.  Electric tool 300 watts  Water pump ¼ hp (2 numbers)  Desktop Computer 250 watts  Electric Lighting 100 watts (Total)  One water pump and 60% of lighting have to run simultaneously. How will you size the inverter for this application? | CO3 | 5 |
|  | c. | Compare different types of inverters (based on their function) used for PV. Mention their applicability. | CO2 | 10 |
| 7. | a. | Tabulate the strengths and weaknesses of the Renewable Energy sector in India. | CO2 | 10 |
|  | b. | Draw the functional schematic of Solar Energy Interconnection System. | CO2 | 10 |
| (OR) | | | | |
| 8. | a. | Draw a sample wiring diagram for residential PV system. | CO2 | 10 |
|  | b. | Discuss the main factors to be considered in the design of a utility connected PV system. | CO2 | 10 |
|  | | **Compulsory:** |  |  |
| 9. | a. | List the factors to be considered for PV array and Battery installations. | CO2 | 5 |
|  | b. | Write the possible causes and remedial actions for the symptoms ‘improper disconnection of loads’ and ‘photocontrol malfunctioning.’ | CO3 | 15 |

ALL THE BEST