Energy Management System (CBCS Pattern) M.Tech. First Semester Old (CBS Pattern) + CBCS

PEMS12 - Alternate Energy Systems-I

P. Pages : 2 **GUG/W/18/10948**

Time : Three Hours * 3 0 7 8 * Max. Marks : 70

Notes : 1. All questions carry equal marks.
2. Answer **any five** questions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Use of non programmable calculator is permitted.

1. a) Estimate the monthly average daily global radiation on the horizontal surface at Nagpur (21.06 N, 79.D3 E) during the month of March if the average sunshine hours per day is 9.2. Assume for a = 0.27 and b = 0.50. **8**

b) Explain the following terms. **6**

i) Altitude angle ii) Incident angle
iii) Declination angle iv) Zenith angle

2. a) What are the advantages and disadvantages of concentrating collectors, over a flat – plate collectors. **6**

b) What is the difference between pyrheliometer and a pyranometer? Describe the principle of Angstrom type pyrheliometer. **8**

3. a) Explain in detail I-V and power curves of solar PV module. **7**

b) What is IQE analysis? How an IQE analysis can be used to probe the different parts of solar cell? **7**

4. Design a PV water pumping system. Which is required to draw 25,000 liters of water everyday from a depth of 10 meters. **14**

Given

Water density: 1000 kg/m^3
Total Vertical lift : 5 M – elevation
5M- standing water level
2M – drawdown

Solar PV module used : 75 Wp
Operating factor : 0.75
Pump efficiency : 30%
Mismatch factor : 0.85
Solar radiation data : 6 hours / day.

5. a) How does a DC to DC converter help in maximum power transfer. **7**

b) What is the role of the charge controller circuit in a PV system? What are the different reference voltage levels that a charge controller used for its operation. **7**

6. a) Derive the expression for free energy and potential of fuel. **7**

b) What is fuel cell? Describe the principle of working of a fuel cell with reference to H_2-O_2 cell. **7**

7. a) What do you mean by a green house Enumerate the main type of green houses. **7**

b) Describe the principle of working of solar furnace. What are its main application. **7**

8. Write short note on **any two.**

i) Solar pond. **7**

ii) Parabolic solar cooker. **7**

iii) Photovoltaic economics and future prospects. **7**

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