M. Tech (with Credits)-Regular-Semester 2012-Electrical Power System Sem. III

Renewable Energy system

P. Pages : 2 **GUG/W/16/4000**

Time : Three Hours * 3 6 4 4 * Max. Marks : 70

Notes : 1. All questions carry equal marks.
2. Answer **any five** questions.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Non programmable calculator allowed.

1. a) Explain in brief Indian Energy Scenario ? **7**

b) Write a note on: **7**

i) Clean Development Mechanism (CDM).

ii) Prototype Carbon Funds (PCF).

2. a) Calculate the hour angle at sunrise and sunset on June 21 and December 21 for a surface inclined at an angle of 10^{o} and facing due South $(\gamma = 0^{o})$. The surface is located in Bombay. $(19^{o}\,07'\,\text{N},\ 72^{o}\,51'\,\text{E})$. **6**

b) Explain in brief I, II and III generation of Solar Cells? **4**

c) What are the factors influencing the rating of Solar Panel? **4**

3. a) Derive the expression for power developed due to wind. **6**

b) Wind at 1 standard atmospheric pressure and 15ºC has velocity of 15 m/s calculate : **8**
i) the total power density in the wind stream.
ii) the maximum obtainable power density.
iii) a reasonably obtainable power density.
iv) the total power.
v) the torque and axial thrust.

4. a) How are Gasifiers classified? What is Pyrolysis? **7**

b) The following data are given for a family biogas digester suitable for the output of five cows : the retention time is 20 days, temperature 30ºC, dry matter consumed per day = 2kg, biogas yield is $0.24\,\text{m}^3$ per kg. The efficiency of burner is 60%, methane proportion is 0.8. Heat of combustion of methane = $28\,\text{MJ}/\text{m}^3$. **7**
Calculate :

i) the volume of biogas digester and

ii) the power available from the digester.

5. a) Explain in detail electrical storage system? **7**

b) Explain in brief with neat block diagram about solar – wind – hydro schemes. **7**

6. a) Explain in detail National renewable energy policy for various energy sources. **7**

b) Define the following terms : **7**

i) Altitude angle

ii) Zenith angle

iii) Latitude angle

iv) Solar azimuth angle.

7. a) Describe the different schemes for wind electric generation. Also describe the generator control schemes. **7**

b) Explain in detail mini and micro hydel plants scheme. **7**

8. a) Explain in brief Fuel cell energy storage systems. **7**

b) Write a short note on **any two.** **7**

i) Solar batteries type.

ii) Biomass fired boilers.

iii) Types of wind Turbine.

iv) Factors influencing the rating of solar panel.

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