Code No: **R42025** **R10** **Set No. 1**

IV B.Tech II Semester Supplementary Examinations, July - 2014
NON-CONVENTIONAL SOURCES OF ENERGY
(Electrical and Electronics Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
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1. a) Define solar radiation and solar irradiance. How does the irradiance depend on the wavelength of the radiation?
   b) Write down the empirical equation for estimating the monthly average of daily global radiation on a tilted surface.

2. a) Discuss briefly solar absorption cooling system using a simple block diagram.
   b) Explain the working of a forced-circulation solar water heater.

3. a) Discuss the salient features of Horizontal axis wind turbines and Vertical axis wind turbines.
   b) Discuss about wind energy potential in India and its growth scenario.

4. Discuss different types of rechargeable batteries used for storage of solar energy and limitations of each type.

5. a) With a neat diagram, discuss the biomass gasification method.
   b) What are the environmental benefits of using biomass?

6. a) What is plate tectonic theory and how is it related to geothermal energy?
   b) Explain the efforts being done in India for utilizing geothermal energy as an alternative source of energy

7. a) With neat schematic explain the working of a wave energy generator .
   b) Discuss the basic concepts of tidal power.

8. a) Distinguish between battery and fuel cell.
   b) Discuss and differentiate between "electrical efficiency" and "thermal efficiency" of the fuel cell.

Code No: **R42025** **R10** **Set No. 2**

IV B.Tech II Semester Supplementary Examinations, July - 2014
NON-CONVENTIONAL SOURCES OF ENERGY
(Electrical and Electronics Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
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1. a) What is Extra Terrestrial solar radiation? How does the irradiance depend on the wavelength of the radiation?
   b) Discuss the various types of solar radiation measurement instruments.

2. a) Discuss the uses of solar energy for heating purposes.
   b) Discuss about the main components of concentrating solar power systems.

3. a) Explain the parameters "tip-speed ratio" and "coefficient of performance" which characterize a wind mill rotor.
   b) What are the phenomena responsible for the creation of atmospheric winds?

4. a) Explain the necessity of using maximum power point tracking with the help of PV I-V curves.
   b) Suppose that a nearly depleted 12-V lead-acid battery has an open-circuit voltage of 11.7 V and an internal resistance of 0.03 Ω.
      (i) What voltage would a PV module operate at if it is delivering 6 A to the battery?
      (ii) If 20 A is drawn from a fully charged battery with open-circuit voltage 12.7 V, what voltage would the PV module operate at?

5. a) What is biomass? What are the benefits of using biomass for energy generation?
   b) Discuss the reaction chemistry in the combustion and reduction zones of a gasifier.

6. Describe with necessary diagrams, the principle of working of a geothermal power plant.

7. a) With neat schematic explain the working of a mini-hydel power plant.
   b) How does ocean thermal energy conversion work?

8. a) Explain the advantages of fuel cell power plants.
   b) Discuss briefly the operation of solid oxide fuel cell (SOFC).

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IV B.Tech II Semester Supplementary Examinations, July - 2014

NON-CONVENTIONAL SOURCES OF ENERGY

(Electrical and Electronics Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1. a) Define beam radiation and diffuse radiation and differentiate between their meanings.
   b) Find the angle subtended by beam radiation with the normal to a flat-plate collector at 9 a.m. for the day on November 3, 2003. The collector is in Delhi (28^0 35' N, 77^0 12' E), inclined at an angle of 36^0 with the horizontal and is facing due south.

2. What are the different types of Concentrating Solar Power (CSP) systems and main components of CSP?

3. a) What are the main components of a wind mill turbine system?.
   b) Write a short note elaborating the environmental impact of wind energy.

4. a) Discuss any maximum power tracking scheme for a wind turbine.
   b) Explain the basic types of electrochemical batteries and mention different types of rechargeable batteries.

5. What are various types of digesters in practice for anaerobic digestion of solid organic wastes? Explain the working of any one type.

6. a) Describe the structure of earth's interior with reference to geothermal energy.
   b) Does developing geothermal resources widely have any environmental effects? Explain.

7. a) Discuss the salient features of different types of ocean thermal energy conversion systems for power generation.
   b) What are the important components of a tidal power plant?

8. Write short notes on
   a) MHD generator
   b) Fuel cell operation

Code No: **R42025** **R10** **Set No. 4**

IV B.Tech II Semester Supplementary Examinations, July - 2014

NON-CONVENTIONAL SOURCES OF ENERGY

(Electrical and Electronics Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1. a) Differentiate between extraterrestrial and terrestrial solar radiation.
   b) Find the hour angle at the sunrise and the sunset on March 22 for a surface inclined at an angle 20^0 facing south at New Delhi (28^0 35' N, 77^0 12' E).

2. a) Explain the difference between active and passive solar heating systems.
   b) Explain the working principle of a Photovoltaic cell.

3. a) What is the present installed capacity and the future of wind power generation in India?
   b) What are the advantages and disadvantages of vertical axis wind turbines?

4. A 100-Ah, 12-V battery with a rest voltage of 12.5 V (at its current SOC) is charged at a C/5 rate, during which time the applied voltage is 13.2 V. Using a simple Thevenin equivalent:
   i) Estimate the internal resistance of the battery.
   ii) What fraction of the input power is lost in the internal resistance of the battery?
   iii) If the charging is done at a C/20 rate, what fraction of the input power would be lost due to the internal resistance?

5. a) Discuss the functioning of a single stage standard rate anaerobic digester.
   b) What is biomass? What are the benefits of using biomass for energy generation?.

6. a) Explain the importance of earthquakes and volcanoes in the formation of geothermal resources?
   b) Describe the status of India in geothermal energy sector.

7. Describe the closed cycle OTEC system and mention its advantages and limitations.

8. Write short notes on
   a) Carnot cycle
   b) Polarization in a fuel cell.