Code No: N0222 **R07** **Set No. 1**

IV B.Tech. I Semester Regular Examinations, November, 2012

NON–CONVENTIONAL SOURCES OF ENERGY

(Common to Electrical & Electronics Engineering and Mechanical Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) Define solar constant. What are the reasons for variation in solar radiation reaching the earth and that received outside the earth atmosphere
   b) What is the expression for the angle of incidence for an inclined surface? Find the angle of incidence when (i)Tilt angle zero (ii)Tilt angle 90^0 (iii) Surface azimuth angle zero (iv) Tilt angle 90^0 and surface azimuth angle zero.

2. a) How are solar collectors classified? What are the important features of a solar collector
   b) Describe briefly the principle of working of a cylindrical parabolic concentrator with a neat sketch.

3. a) What are the main advantages and disadvantages of sensible heat storage with water as storage media? Compare them with those of solid media storage.
   b) With the help of schematic diagram, explain the working of solar pond electric power plant.

4. a) What is the present status of development of biomass energy resources in India?
   b) Explain Betz model of expanding airstream tube to determine extraction of wind energy by windmill.

5. a) What are the different forms of biomass available as bio-fuels?
   b) Write the basic chemical reaction, process and energetic involved in generation of biogas from biomass.

6. a) Write a note on 'utilization of geothermal sources in India'
   b) Explain double flash steam system in liquid dominated low temperature geothermal plant

7. a) What are the main types of OTEC power plants? Describe the working of anyone type in brief.
   b) Find the expressions for potential energy, kinetic energy and total energy per unit width of wave front

8. Explain the following
   a) Principle of DEC b) Carnot cycle

Code No: N0222 **R07** **Set No. 2**

IV B.Tech. I Semester Regular Examinations, November, 2012

NON–CONVENTIONAL SOURCES OF ENERGY

(Electrical & Electronics Engineering and Mechanical Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) Explain the working of Pyrometer with the help of neat sketch
   b) Estimate the average daily global radiation on a horizontal surface at Baroda ($22^0 N, 73^0 10' E$) during the month of March if the average sunshine hour per day is 9.5. Assume a=0.28, b=0.48. Also Assume $H_0 = \overline{H_0}$.

2. a) Explain the principle of conversion of solar energy to heat. Explain a flat plate solar collector?
   b) Describe the performance testing procedure of solar collectors

3. a) What are the main problems associated with the use of salt hydrate as latent heat storage?
   b) With the help of schematic diagram, explain the working of solar pond electric power plant

4. a) Show that a wind turbine cannot extract more than 59.3% wind energy
   b)Discuss the prospects and status of wind energy in India.

5. a) What are the biomass resources for the production of biomass energy?
   b) Name various models of biogas plants and describe any one of them.

6. a) Discuss the origin and types of geothermal energy. Briefly discuss hot spring and steam ejector
   b) Describe a hot dry rock geothermal sources power plant

7. a) Describe the construction and working of any one type of wave energy conversion machine.
   b) What are the possible environmental effects as a result of the operation of an OTEC

8. Explain the working of the following
   a) Principle of MHD generators
   b) Fuel cells

Code No: N0222 **R07** **Set No. 3**

IV B.Tech. I Semester Regular Examinations, November, 2012

NON–CONVENTIONAL SOURCES OF ENERGY

(Electrical & Electronics Engineering and Mechanical Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) What is meant by renewable energy sources? Explain in brief these energy sources with special reference to India
   b) Calculate the hour angle at sunrise and sunset on 21 June and 21 December for a surface inclined at an angle of 10^0 and facing due south (γ=0). The surface is located in Mumbai ($19^0 67' N, 72^0 51' E$).

2. a) Differentiate flat plate and concentrating collectors
   b)With a neat sketch explain working of solar water heating systems

3. a) For solar passive space cooling, the best approach is to reduce unnecessary heat loads entering the space inside the building. Comment
   b) Explain solar vapor absorption system for cooling.

4. a) Compare horizontal and vertical axis windmills.
   b) Explain the variation of output of a wind turbine with tip speed ratio of the rotor

5. a) Briefly discuss the factors affecting the performance of biogas digester?
   b) Write the advantages and disadvantages of floating drum type and fixed drum type biogas plants.

6. a) Describe various energy extraction technologies used with hydrothermal resources
   b) Describe a hot dry rock geothermal resource power plant.

7. a) Explain the various methods of tidal power generation. What are the limitations of each method?
   b) Show that wave power is directly proportional to the square of amplitude and inversely proportion to the period of wave.

8. Briefly write about the following
   a) Seebeck, peltier and joul Thomson effects
   b) Hall effect and magnetic flux

Code No: N0222 **R07** **Set No. 4**

IV B.Tech. I Semester Regular Examinations, November, 2012

NON–CONVENTIONAL SOURCES OF ENERGY

(Electrical & Electronics Engineering and Mechanical Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) Define solar constant. What are the reasons for variation in solar radiation reaching the earth and that received outside the earth atmosphere
   b) Calculate the number of daylight hours in Srinagar for 1 January and 1 July. Take latitude of Srinagar as $34^0 05'$ N.

2. a) Classify concentrating collectors and state their advantages over flat plate collector
   b) Explain the working of the solar thermal water pump with the help of a neat sketch

3. a) Explain with a neat sketch how a solar cell works
   b) How does the p-n junction act as a diode, thereby facilitating flow of current when it is forward biased?

4. a) What do you understand by torque coefficient? How it is related to power coefficient.
   b) Describe the working of wind energy conversion system with main components.

5. a) What is the present status of development of biomass energy resources in India
   b) Calculate the volume of cow dung based biogas plant to meet cooking requirement of five persons (230 per day) and lighting of three 100CP mantle lamps consuming 120 per hour for 3 hours. Also, calculate the required number of cows to run the plant in case cow dung produced is 1 kg/day and collection efficiency is 70%, percentage of solid is 16% and production of gas from solid is 340 per kg.

6. a) Describe various energy extraction technologies used with hydrothermal resources
   b) Discuss vapour dominated geothermal plants with a diagram

7. a) What is the source of tidal energy? What is the minimum tidal range required for the working of a tidal plant? How much is the potential in tides?
   b) Explain the working of a double basin tidal system

8. Discuss the following
   a) Renewable energy status in India
   b) Fuel cell types