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

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
NON–CONVENTIONAL SOURCES OF ENERGY
(Electrical and Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Estimate the monthly average daily global radiation using Klein's recommendation, on a horizontal surface at Baroda ($22^0$00 N, $73^0$10' E) during the month of March if the average sunshine hours per day are 9.5. Constants a, b given as 0.28 and 0.48 respectively. [10]
b) Briefly explain Terrestrial Solar Radiation with relevant diagrams. [5]

2 a) List different methods of harnessing solar energy. Compare the advantages and disadvantages of concentrating collector over flat plate collector. [10]
b) Briefly explain modes of tracking cylindrical parabolic concentrator. [5]

3 a) Explain with neat sketch, wind energy conversion systems and classify wind mills. [8]
b) Wind at one atmosphere pressure and 10^0C temperature has a velocity of 10 m/s. Calculate the total power density in the wind stream and the maximum obtainable power density. Given that R = 0.287 kJ/kgK. Assume any missing data. [7]

4 a) Explain the method of power tracking system in PV system. Explain its advantages. [8]
b) What are the different battery energy storage systems? Explain in detail. [7]

5 a) Explain in detail about anaerobic digestion and the different phases and the processes involved in it. [10]
b) Explain the gas yield process in the bio gas plant operation. [5]

6 a) What are the different types of geothermal resources? How does harnessing of geothermal energy work? Explain. [8]
b) Briefly explain methods of harnessing geothermal energy in geothermal power plants. [7]

7 a) Briefly explain critical criteria in the design of ocean thermal energy conversion plants. [8]
b) What are the civil works design considerations for mini-hydel power plants? [7]

8 a) What is the need for direct energy conversions? Explain its limitations. [8]
b) Briefly describe the operation fuel cell. How do you select fuels in the cell based on different operating conditions? [7]

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

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
NON–CONVENTIONAL SOURCES OF ENERGY
(Electrical and Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What is Klein's recommendation? Calculate the variation of day length over a year in Trivendrum ($8^0$29' N, $76^0$57' E) and plot the same. [10]
b) Briefly explain Solar Radiation on tilted surface with neat sketches. [5]

2 a) Deduce the expression for useful energy gain and collection efficiency for flat-plate collectors. [8]
b) Discuss physics of solar photo voltaic and hence photovoltaic energy conversion process. [7]

3 a) What is a power coefficient tip speed ratio and solidity of WECS? Explain the relation between these parameters. [10]
b) Explain with neat sketch, wind energy conversion system. [5]

4 a) Explain the method of maximum power tracking system in wind power system. Explain its advantages. [8]
b) What are the different battery energy storage systems? Explain in detail. [7]

5 What are the reactions phases taking place in a digester? Mention the various factors affecting the generation of bio-gas. [15]

6 a) What principles guide in the location of geothermal power station? Explain. [8]
b) What are the different types of wells in geothermal energy? How they are used? [7]

7 a) With reference to neat layout diagrams, explain the operation of a closed cycle OTEC plant. [8]
b) Explain wave energy conversion technique in detail with neat layout diagrams. [7]

8 a) Explain working principle of direct energy conversions and its limitations. [8]
b) What is a fuel cell? Discuss different types of fuel cells what are the advantages of fuel cell energy. [7]

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Code No: **R42025** **R10** **Set No. 3**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
NON–CONVENTIONAL SOURCES OF ENERGY
(Electrical and Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Estimate the average daily global radiation on a horizontal surface in Srinagar (34^0 06' N) if the average sunshine hours per day are 9.5, a = 0.35, b = 0.4 and March 16^{th} is the typical day for that month. [10]
b) Briefly explain extraterrestrial Solar Radiation with relevant diagrams. [5]

2 a) Briefly discuss any two ways of solar energy storage methods. [8]
b) Derive the relation for transmission coefficient for series of glass covers in flat plate collectors. [7]

3 a) Derive an expression for maximum output fraction from horizontal axis wind power. [10]
b) Briefly describe *cut-in speed* and *cut-out speed* in wind energy conversion system. [5]

4 a) What are the different methods of maximum power tracking in PV systems? Explain them in brief. [10]
b) What is meant by battery energy storage system? How it is used? [5]

5 What are the reactions phases taking place in a digester? Mention the various factors affecting the generation of bio-gas. [15]

6 a) How is geothermal energy generated inside the earth crust? In India where is geothermal energy available? [8]
b) Briefly explain methods of harnessing geothermal energy in geothermal power plants. [7]

7 a) What are the different thermodynamic cycles in OTEC? Describe in brief. [5]
b) Explain the methods for the utilization of tidal energy in single basin arrangement. [10]

8 a) Explain Carnot cycle. Discuss direct energy conversion methods. [8]
b) Discuss selection of fuels in the fuels cells and their operating conditions. [7]

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

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
NON–CONVENTIONAL SOURCES OF ENERGY
(Electrical and Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Determine the altitude and azimuth angle at 3pm(IST) on June 15th for Mumbai ($18^0$54' N, $72^0$49' E). [8]
b) For the above location, determine the angle of incidence over a south facing surface with tilt angle of 15^0 with horizontal. Also calculate hour of the sunrise and length of the day. [7]

2 a) What are different applications of solar energy? Briefly mention the advantages and disadvantages of each one. [10]
b) Briefly explain effect of various parameters on collector performance. [5]

3 a) List and briefly discuss the factors to be considered in selecting the site of land based wind mill. [8]
b) Wind at one atmosphere pressure and 10^0C temperature has a velocity of 10 m/s. Calculate the total power density in the wind stream and the maximum obtainable power density. Given that R = 0.287 kJ/kgK. Assume any missing data. [7]

4 a) What are the different methods of maximum power tracking methods in PV systems? Explain them in brief. [10]
b) What is meant by battery energy storage system? How it is used? [5]

5 a) What are the advantages and disadvantages of bio-mass energy? Explain the process of anaerobic digestion. [10]
b) Discuss combustion characteristics of bio-gas in brief. [5]

6 a) What is the prospect of geothermal energy? How does harnessing of geothermal energy work? Explain. [8]
b) What are the different types of wells in geothermal energy? How they are used? [7]

7 a) Briefly describe site selection criteria in OTEC. [5]
b) Explain the principle, advantages and limitations of tidal power generation. Write a note on prospect of tidal power generation in India. [10]

8 a) Discuss direct energy conversion process. Explain different methods in it. [8]
b) What are the advantages of fuel cell energy? Discuss on alkaline fuel cell and hydrogen fuel cell. [7]

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