

Code No: RT41021

R13

Set No. 1

IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017

RENEWABLE ENERGY SOURCES AND SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours**Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Explain how renewable energy is spreading wings in India. [3]
- b) What is thermal energy storage system of Solar energy? [4]
- c) Explain the effect of shunt resistance in equivalent circuit of a PV cell [4]
- d) Explain the terms Lift force and Drag force w.r.t air flow over the blades of wind turbine. [4]
- e) List the advantages of Tidal Power plant. [3]
- f) What are the various losses occurring in the fuel cells? [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the terms Declination angle and Hour angle w.r.t Solar radiation Geometry. [8]
b) Calculate the angle of incidence of beam radiation at 10.30 AM on Feb 10 at latitude 42° . The wall is tilted at 45° and points 15° west of south. [8]
3. a) Explain in detail about the Flat plate collectors (Glaze type) with a neat sketch. [8]
b) Explain the working of solar water heater with a neat sketch as an application of Solar thermal system. [8]
4. a) Explain the performance characteristics of a Solar cell and enumerate the factors they depend up on. [8]
b) Explain how Hill climbing technique of maximum Power Point technique is used in PV system. [8]
5. a) Distinguish between Local winds and Planetary winds. [8]
b) Explain the principle of aerodynamic lift and also explain the various forces acting on aerofoil shape blade of wind turbine. [8]
6. a) Explain the working of micro hydropower plant with a neat layout diagram. [8]
b) Explain the different Economic and Environmental considerations of Tidal Power plant. [8]
7. a) Distinguish between Fixed and Float drum Biodigesters. [8]
b) Distinguish between Fuel cell and a Battery. [8]

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R13**Set No. 2****IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017**
RENEWABLE ENERGY SOURCES AND SYSTEMS**(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A (22 Marks)

1. a) List the advantages of Solar energy over conventional energy sources. [4]
b) Explain the main aim of Solar collectors. [3]
c) List the different types of Solar cell materials used for fabrication of PV cell. [3]
d) Explain the limitations and possible environmental impacts of wind energy. [4]
e) What are the various factors considered in designing a micro hydel scheme? [4]
f) List the advantages and disadvantages of Fuel cell. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the concept of total radiation on Tilted Surface. [8]
b) Calculate the i) Zenith angle and ii) Solar azimuth angle for a place with latitude 43° at 9.30 AM solar time on Feb 15. [8]
3. a) Explain the different factors that need to be considered for accessing the performance of Solar collector. [8]
b) List the advantages of concentrating collector over flat collector. [8]
4. a) Explain the different conditions on which the PV system performance depends. [8]
b) Explain how the concept of Perturb and observe method of Maximum power point tracking in a PV system is used. [8]
5. a) What is Wind Energy? How does it originate and on what factors does the earth wind depends? [8]
b) Sketch and explain the different operational characteristics of Wind turbine. [8]
6. a) What are Small hydro power plants and how do you classify them? [8]
b) Explain how tides are formed and how it can be converted in to Tidal Energy. [8]
7. a) List and explain the main constituents of Biomass materials. [8]
b) What is meant by geothermal energy? What are the deciding factors to use in Power generation? [8]

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R13**Set No. 3****IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017****RENEWABLE ENERGY SOURCES AND SYSTEMS****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A (22 Marks)

1. a) What do you understand by irradiance and irradiation? [4]
b) Explain about Vacuum tube solar collectors. [4]
c) Explain the concept of Photo electric effect? [3]
d) List the applications of Wind energy. [3]
e) What are the factors affecting the Hydropower? [4]
f) What are the different sources of Geothermal energy. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the following terms w.r.t Solar radiation:
(i) Extraterrestrial Solar radiation (ii) Terrestrial Solar Radiation
(iii) Direct or beam radiation (iv) Diffuse radiation [8]
b) Distinguish between Renewable sources and Non-renewable sources. [8]
3. a) Explain the following factors w.r.t performance of Solar collector
(i) Fin efficacy factor (ii) Collector efficiency factor
(iii) Collector heat removal factor (iv) Collector efficiency [8]
b) Explain in detail about the concentrating collectors and give their classification. [8]
4. a) Explain the performance of PV cell with a neat equivalent circuit diagram. [8]
b) List and explain the different losses that lead to the less efficiency of a Solar cell. [8]
5. a) Derive the Wind power equation starting from the Kinetic energy equation. [8]
b) List and briefly explain the various parts of horizontal axis wind turbine. [8]
6. a) Explain the various constructional parts of the Tidal Power plant. [8]
b) Explain the principle and operation of Oscillating water column device wave energy system. [8]
7. a) Explain the various characteristics of Fuel cell and also show the effect of temperature on the cell performance. [8]
b) Explain how geothermal resources are classified on the basis of enthalpy. [8]

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R13**Set No. 4****IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017**
RENEWABLE ENERGY SOURCES AND SYSTEMS**(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A (22 Marks)

1. a) What are the reasons for variation in Solar radiation reaching the earth? [4]
- b) How do you explain Solar thermal energy? [3]
- c) Distinguish between PV cell, PV module and PV array. [4]
- d) List the advantages and disadvantages of Wind energy. [4]
- e) Which hydropower projects are regarded as small hydro plant? [3]
- f) List the different Biomass resources. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the following terms w.r.t Solar radiation geometry:
i) Zenith Angle ii) Solar Azimuth angle
iii) Surface azimuth angle iv) Sun Angle [8]
- b) Explain the influence of latitude and longitude on earth surface by Solar radiation. [8]
3. a) List and explain the factors that affect the performance of Flat plate collectors. [8]
- b) Explain the concept of Solar pond with a neat schematic. [8]
4. a) Explain why conversion efficiency of PV cell is low. [8]
- b) Explain the following terms w.r.t PV system:
(i) Open circuit voltage (ii) Short circuit current
(iii) Fill factor (iv) Efficiency [8]
5. a) Explain in detail about the configuration of Horizontal and vertical axis wind turbine [8]
- b) A wind turbine with 10 m diameter span has cut in speed of 5 m/s, at which it develops 3 KW. Find the; (i) Efficiency of turbine and (ii) Axial force on turbine. [8]
6. a) Explain the working of Tidal Power Plant with a neat schematic. [8]
- b) Give the advantages and limitations of Wave energy. [8]
7. a) Explain the working of a Fuel cell and list the different types of Fuel cells with brief explanation of each type. [8]
- b) List the advantages of Geothermal energy over conventional energy sources and also explain its impact on Environment. [8]