Code No: R203102F **R20** SET - 1

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23

RENEWABLE ENERGY SOURCES

(Common to CE,ME,ECE,CSE,IT,AGE,CSE(AI&DS),CSE(AI&ML), CSE(CS),CSE(IOT),AI&DS)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. Discuss the construction and working of Liquid flat plate collector with a neat sketch. Explain the various parameters that affect the performance of collector. [14M]

(OR)

2. a) Write the advantages and disadvantages of concentrating collectors over flat-plate types of solar collectors. [7M]
   b) Explain the term fill factor and its importance as a performance parameter for a solar cell. [7M]

UNIT-II

3. a) List and explain the different types of turbines considered in wind energy system [7M]
   b) Derive the Wind power equation starting from the Kinetic energy equation [7M]

(OR)

4. a) Explain principles of wind energy conversion & describe factors affecting wind speed? [7M]
   b) List and briefly explain the various parts of horizontal axis wind turbine. [7M]

UNIT-III

5. a) What are the advantages and limitations of wave energy conversion? [7M]
   b) What are the different biomass energy resources? What is the energy yield from each of them? [7M]

(OR)

6. a) Explain the analysis of the energy content and its extraction for a hot dry rock type Geothermal resource [7M]
   b) Distinguish between Fixed and Float drum Biodigesters. [7M]

UNIT-IV

7. a) State the basic principle of tidal energy production and write major components of tidal power plant. [7M]
   b) Derive the expression for energy and power in single basin tidal system [7M]

(OR)

8. a) The basin area of a tidal power plant is 20 X $10^6 m^2$. The tidal range is 8m, calculate the energy generated in kWH. [7M]
   b) Explain about the prospects of OTEC in India. [7M]

UNIT-V

9. a) Distinguish between Fuel cell and a Battery. [7M]
   b) Describe working principle of fuel cell with neat sketch and draw the performance characteristics of hydrogen-oxygen fuel cell? [7M]

(OR)

10. a) Mention the application of fuel cells and explain anyone application [7M]
    b) Write the principle of operation of MHD power generation [7M]

Code No: R203102F **R20** SET - 2

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23

RENEWABLE ENERGY SOURCES

(Common to CE,ME,ECE,CSE,IT,AGE,CSE(AI&DS),CSE(AI&ML), CSE(CS),CSE(IOT),AI&DS)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Define solar constant. What is its standard value? [7M]
   b) Write a short note on sizing of PV system and its storage. [7M]

(OR)

2. a) What are the main advantages of flat-plate solar collector? [7M]
   b) With suitable schematic, describe the construction and working of solar pond based electric-power plant with cooling tower [7M]

UNIT-II

3. a) Explain different parameters which are required in the extraction of maximum power under varying wind speed conditions? [7M]
   b) What is Wind Energy? How does it originate and on what factors does the earth wind depends? [7M]

(OR)

4. a) Describe salient features of horizontal axis and vertical axis wind turbines? [7M]
   b) Sketch and explain the different operational characteristics of Wind turbine. [7M]

UNIT-III

5. a) Explain the operation of bio-gasifier. Write its applications. [7M]
   b) What are the different sources of Geothermal energy [7M]

(OR)

6. a) Discuss the energy analysis of a hot Aquifer type Geothermal resource [7M]
   b) What is the environment impacts of geothermal energy? Explain. [7M]

UNIT-IV

7. a) Write the expressions for kinetic energy and power output for a wave. Explain each term. [7M]
   b) List out various wave-energy conversion devices. [7M]

(OR)

8. a) Explain about double basin arrangement in tidal power generation. [7M]
   b) Explain the working of closed Cycle OTEC plant with a neat diagram. [7M]

UNIT-V

9. a) Describe the principle of working of a fuel cell with reference to H2 – O2 cell. [7M]
   b) Explain methods of hydrogen production with illustrations. [7M]

(OR)

10. a) Explain the various characteristics of Fuel cell and also show the effect of temperature on the cell performance. [7M]
    b) Explain the applications of MHD generation. [7M]

Code No: R203102F **R20** SET - 3

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23

RENEWABLE ENERGY SOURCES

(Common to CE,ME,ECE,CSE,IT,AGE,CSE(AI&DS),CSE(AI&ML), CSE(CS),CSE(IOT),AI&DS)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. Briefly discuss the following: i) solar irradiance ii) solar constant iii) extraterrestrial radiations iv) terrestrial radiations [14M]

(OR)

2. a) What is the status of non-conventional energy sources in India and what is their future prospectus? [7M]
   b) Describe the main features of various types of renewable energy resources. [7M]

UNIT-II

3. a) Show that ideal maximum power coefficient is 0.59 for a horizontal axis windmill? [7M]
   b) Explain the operation wind energy system with a neat sketch. [7M]

(OR)

4. a) Explain different types and characteristics of windmill rotors with relevant diagrams? [7M]
   b) Discuss the merits and demerits associated with wind energy systems. [7M]

UNIT-III

5. a) Write a short note on bio-gas plant. [5M]
   b) List and explain the main constituents of Biomass materials. [9M]

(OR)

6. a) What is meant by geothermal energy? What are the deciding factors to use in Power generation? [7M]
   b) Explain how geothermal resources are classified on the basis of enthalpy. [7M]

UNIT-IV

7. Explain with sketches the various methods of tidal power generation. What are the limitations of each method? [14M]

(OR)

8. a) Explain about single basin arrangement in tidal power generation. [7M]
   b) List the advantages of wave Power plant. [7M]

UNIT-V

9. a) Derive an expression for emf, free energy, potential, power output and efficiency of a fuel cell. [7M]
   b) What are the various losses occurring in the fuel cells? [7M]

(OR)

10. a) Classify fuel cells and differentiate between Fuel Cell and Battery [7M]
    b) Explain the various applications and storage techniques used for Hydrogen Energy. [7M]

Code No: R203102F **R20** SET - 4

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23

RENEWABLE ENERGY SOURCES

(Common to CE,ME,ECE,CSE,IT,AGE,CSE(AI&DS),CSE(AI&ML), CSE(CS),CSE(IOT),AI&DS)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. Draw and explain the P-V and I-V characteristics of the PV System for different Input quantities of irradiance and temperature. [14M]

(OR)

2. List and explain about any two solar energy storage systems with necessary illustrations. [14M]

UNIT-II

3. a) Explain how the wind energy systems (WECS) are classified? Discuss in brief? [7M]
   b) A wind turbine with 12 m diameter span has cut in speed of 5.2 m/s, at which it develops 3.5 KW. Find the; (i) Efficiency of turbine and (ii) Axial force on turbine. [7M]

(OR)

4. a) Explain different schematics of wind power generation using induction generator as an option [7M]
   b) Explain in detail about the configuration of Horizontal and vertical axis wind turbine [7M]

UNIT-III

5. a) What are biomass conversion technologies? Draw a schematic diagram to explain various conversion technologies and products. [7M]
   b) What are the main applications of geothermal energy? [7M]

(OR)

6. a) List out various types of Geothermal resources. [7M]
   b) Explain the concept of wet steam geothermal system. [7M]

UNIT-IV

7. a) Describe the concepts of converting wave energy into mechanical or electrical energy. [7M]
   b) What is the source of tidal energy? What is the minimum tidal range required for the working of tidal plant. How much is the potential in tides. [7M]

(OR)

8. a) Discuss the different types of wave energy conversion devices. [7M]
   b) Explain the working of Open Cycle OTEC plant with a neat diagram. [7M]

UNIT-V

9. a) Write short notes on regenerative fuel cell and list out its advantages. [7M]
   b) Explain working principle of fuel cell and describe energy storage system using fuel cells? [7M]

(OR)

10. a) List various types of MHD power generation and explain any one type with working and a neat sketch. [7M]
    b) Explain the characteristics of hydrogen-oxygen fuel cell. [7M]