**IMPORTANT QUESTIONS**

**UNIT-I**

1. (a) What is the need & development of Renewable energy sources.

(b) Explain the different types of Renewable energy sources.

2. (a) Explain the Global and Indian Energy scenario of Renewable Energy sources.

(b) Explain the Energy for sustainable developments in renewable Energy sources in detail.

3. (a) Explain in detail of Global climate change, CO2 reduction methods.

(b) Explain the concept of Hybrid systems in detail.

**UNIT-II**

1. (a) Explain the principle of photovoltaic effect with neat sketches.

(b) Describe different methods of sun tracking.

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.

(b) Draw a neat sketch of solar flat plate collector and explain its working principle.

3. (a) Describe the main features of various types of renewable energy resources.

(b) Describe the various types of Solar air heaters with neat schemetic diagrams in brief.

4. (a) What is solar power? Discuss the environmental impact of solar power in India.

(b) How the solar radiation data is collected and what way it is helpful in solar energy conversion?

5. a) With a neat sketch, explain the working of solar pond electric power plant.

(b) Enumerate the different types of concentrating type collectors.

6. a) Discuss the factors attenuating the solar radiation on the earth’s atmosphere.

(b) Determine the Local solar time and declination at a location latitude 230 15’ N, longitude 770 30’ E at 12.30 PM IST on June 19. time correction = -(1’ 01”).

7. a) Explain the principle of photo-voltaic effect with neat sketches.

(b) Describe the Perturb & Observe method of tracking maximum power transfer from PV array.

8. a) Draw a neat sketch of solar flat plate collector and explain its working principle.

(b) Discuss the advantages and disadvantages of flat plate collector.

9. a) Explain the different factors that need to be considered for accessing the performance of Solar collector.

(b) List the advantages of concentrating collector over flat collector.

10. Distinguish between Renewable sources and Non-renewable sources.

11. 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.

(b) Explain in detail about the concentrating collectors and give their classification.

12.. 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.

(b) Explain the influence of latitude and longitude on earth surface by Solar radiation.

13. a) What is the status of non-conventional energy sources in India and what is their future prospectus?

(b) Define the following: i) surface Azimuth angle ii) solar Azimuth angle iii) hour angle iv) angle of latitude v) declination.

**UNIT-III**

1. (a) Discuss different types of horizontal-axis turbines.

(b) Explain how the wind energy systems (WECS) are classified? Discuss in brief?

2. (a) Explain principles and operation of wind energy conversion and describe factors affecting wind speed?

(b) Derive an expression for power extracted from wind. Write short notes on Betz

Criterion.

3.(a) Write a technical note on selection of generator for WECS.

(b) Explain different schematics of wind power generation using induction generator as an option?

4. Derive the expression for maximum wind power extracted by a wind turbine.

5. a) Explain the operation wind energy system with a neat sketch.

(b) Discuss the merits and demerits associated with wind energy systems.

6. a) Explain the principle of operation of wave power generation with a neat sketch.

(b) Derive the kinetic energy equation associated with wave power.

7. a) What is Wind Energy? How does it originate and on what factors does the earth wind depends?

b) Sketch and explain the different operational characteristics of Wind turbine.

8. a) Derive the Wind power equation starting from the Kinetic energy equation.

(b) List and briefly explain the various parts of horizontal axis wind turbine.

9. a) Explain in detail about the configuration of Horizontal and vertical axis wind turbine.

(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.

10. a) Discuss in detail the operation and control of a wind turbine. How the variations of wind velocity and its directions are taken care?

(b) A horizontal axis wind turbine is installed at a location having free wind velocity of 15 m/s. the 80m diameter rotor has three blades attached to the hub. Find the rotational speed of the turbine for optimal energy extraction.

11. a) Explain how the wind energy systems (WECS) are classified? Discuss in brief?

(b) Explain different schematics of wind power generation using induction generator as an option?

12. a) Explain principles of wind energy conversion and describe factors affecting wind speed?

(b) Describe salient features of horizontal axis and vertical axis wind turbines?

13. .a) Explain the advantages and limitations of wind energy conversion systems.

b) Derive the expression for power developed due to wind.

**UNIT-IV**

1. a) List and explain the main constituents of Biomass materials.

(b) What is meant by geothermal energy? What are the deciding factors to use in Power generation?

**2.** a) Derive an expression for emf, free energy, potential, power output and efficiency of a fuel cell. b) Write a short note on bio-gas plant.

3. a) What are biomass conversion technologies? Draw a schematic diagram to explain various conversion technologies and products.

(b) List out various types of Geothermal resources.

4. a) What are the different factors which affect the size of the bio gas plants?

(b) Describe various advantages and disadvantages of geothermal energy forms?

5. a) Compare and contrast the biomass and biogass.

b) What is a community biogas plant? Explain the problems encountered in it.

**UNIT-V**

1. What is the source of tidal energy? What is the minimum tidal range required for the working of tidal plat. How much is the potential in tides.

**2.** a) Differentiate between the following methods of biogas generation i. Pyrolysis ii. Combustion iii. Gasification iv. Anaerobic Digestion.

(b) Describe all the types of geo-thermal resources with their applications.

3. a) Explain the process of power generation from a geothermal power plant.

(b) Discuss about various applications of geothermal energy systems, and its usage.

4. (a) Explain the different Economic and Environmental considerations of Tidal Power plant.

(b) Explain with sketches the various methods of tidal power generation. What are the limitations of each method?

5. a) Explain the various constructional parts of the Tidal Power plant.

(b) Explain the principle and operation of Oscillating water column device wave energy system.

6. a) Explain the working of Tidal Power Plant with a neat schematic.

(b) Give the advantages and limitations of Wave energy.

7. a) State the basic principle of tidal energy production and write major components of tidal power plant.

(b) What are the advantages and limitations of wave energy conversion?

8. a) Derive the expression for energy and power in single basin tidal system.

(b) List out various wave-energy conversion devices.

(c) Define small, mini and micro hydro power.

9. (a) Explain various advantages and disadvantages of tidal energy generation system?

(b) Describe principle of geo-thermal energy? What are the limitations of harnessing geo-thermal energy?

10. a) What is a tidal power plant and what factors are considered in order to install it?

(b) Describe the wave power basic theory and obtain equation for its kinetic energy?

11. (a) Explain open cycle and closed cycle of OTEC techniques.

(b) What are the advantages, disadvantages and benefits of OTEC?

12. a) Describe the open cycle OTEC power plant and give the status of OTEC plants in India.

(b) Show that wave power is directly proportional to the square of amplitude and inversely proportional to the period of wave.

13. a) Draw the line diagram and explain the working of hybrid OTEC cycle.

b) Explain the working of single basin tidal power plant.