UNIT I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR RADIATION

FOUR / TWO MARKS

1. What is the approximate amount of total power generation in India? Mention the total installed capacity of renewable energy sources based on power generation. (4)
2. Comment on the present energy scenario of RE in India. (2)
3. Illustrate the concept of clean development mechanism. (4)
4. What is the need for studying alternating source of energy?
5. What is clean and green energy? Why it is necessary. (4)
6. Discuss the energy consumption pattern and growth rate in India. (4)
7. Explain energy for sustainable development. (4)
8. What are the causes of greenhouse gases? List out the methods to reduce the greenhouse effect. (4)
9. Indicate the effects of global warming. (2)
10. What do you understand by energy chain? (2)
11. What is solar radiation data? (2)
12. How to estimate of average solar radiation? (2)
13. What is, solar time, solar constant and what is its value? (2)
14. What is the limitation of solar energy utilisation techniques? (2)
15. What is beam, diffuse and global radiation? (2)

12 MARKS

1. (i). Discuss about the various energy sources with examples respect to its principle, characteristics, advantages and disadvantage, availability, economics and efficiency. (**Hint:** Ref. PPT) 2. Explain how non-conventional energy resources potential to supplement the conventional energy sources. (6 marks)

3. Discuss about the terrestrial and extraterrestrial solar radiation with neat sketch. (6 Marks) 4. How to measure the solar radiation. Explain the construction and working of Pyranometer, Pyrheliometer, and Sunshine Recorder with neat sketch.

UNIT II: SOLAR THERMAL CONVERSION AND SOLAR PV SYSTEMS

FOUR / TWO MARKS

1. What is solar collector and collector efficiency? (2)
2. Name three collector requiring one axis sun tracking. (2)
3. State the usages of various types of concentrating collector. (2)
4. List out the advantages of concentrating collector over flat plat collector.
5. Specify the applications of various solar collectors. (4)
6. Define concentration ratio of solar collector. (2)
7. Need of Orientation in Concentrating Collectors
8. Define the terms: Aperture (W), area concentration ratio (C), intercept factor (Y); and the acceptance angle (2θa) in concentrating collectors. (4)
9. What is the principle of solar photovoltaic? (2)
10. The maximum efficiency of solar cell are very low – Justify the statement. (2) 11. Why the efficiency of solar thermal power generation is lesser than other systems? (2)
12. State the applications of solar PV systems. (2)
13. What is solar heating and cooling? (2)
14. List few applications of low temperature water heaters in domestic and industrial use. (2) 15. What is the principle of solar distillation? (2)

12 MARKS

1. Explain the construction, working principle of various types concentrating and non-concentrating solar collectors with neat sketch. (Hint: Flat-plate collectors, Evacuated Collectors, Parabolic Trough Collector, Mirror Strip Collector, Fresnel Lens Collector and Flat-plate Collector with Adjustable Mirrors) (12)

2. With the help of neat sketch explain the construction and working of central receiver collector and cylindrical parabolic concentrator. Where they are used? What are its advantages? (12) 3. (i). Explain the Photovoltaic Effect and principle of Silicon photovoltaic cell. (6) (ii). Draw the equivalent circuit and explain V-I characteristics of Silicon PV Cells. (6) 4. Explain the working of solar water heater and solar pumping system with neat sketch. (12) 5. (i). Explain the working of solar thermal energy conversion with merits, demerits and applications. (ii). Explain the principle of Building integrated PV system and Grid connected solar system. (6) 6. (i). Explain the cchoice of materials for various parts of collectors. (6)

(ii). Discuss the various performance parameters of solar collectors. (6)

UNIT III: WIND, TIDAL AND WAVE ENERGY

FOUR / TWO MARKS

1. How wind is created on the earth surface? [PPT] (2)
2. Compare horizontal axis and vertical axis wind turbines. [P.136] (2)
3. What is meant by yaw control in wind energy systems? What is the use of it? [P.128] (2)
4. List the advantages and disadvantages wind energy. [P.120] (4)
5. What do you understand by the term of solidity ratio of the wind turbine? (2) 6.

Write a note on environmental issues due to wind energy harvesting. [P.121] (2) 7.

How tides and waves are created in nature? [PPT / 204] (2)

8. What are the advantages, disadvantages of Tidal Power? [P. 217] (2)
9. What are the main hurdles in the development of tidal energy? (2)
10. Define the tidal range with respect to tidal power plant. [P. 205] (2)
11. What is wave energy? How power available in waves is calculated? [P. 218&224] (2)
12. List the Wave Power Devices. [P. 226] (2)
13. Classify wind, tidal and wave power plants. [PPT] (4)
14. Name any two important wind, tidal and wave power plants in India. (2)
15. Compare tidal and wave power plants. (2)

12 MARKS

1. (i). Describe with a neat sketch the working of a wind energy conversion system (WECS) with its main components [P. 125]. (6)

   (ii). What are the factors to be considered, while selecting a site for wind turbine? [P. 127]. (6) 2. Derive an expression for energy available in wind. Using Betz model of a wind turbine, derive the expression for power extracted from wind, what is the maximum power that can be extracted and under what condition? [P. 130]

3. Explain the construction and working of propeller, multiblade, savonius, Darrieus, horizontal and vertical axis wind machines with neat sketch. [P. 132]
4. Explain the components of tidal power systems and working of single and double basin tidal power plant with neat sketch. [P. 212]
5. (i). Describe the principle and working of wave energy conversion system (Float wave-power machine) with neat sketch. [P.226] (6)

(ii). List the advantages, disadvantages and factor affecting of wave energy. [P. 219] (6)

UNIT IV: BIO – ENERGY

FOUR / TWO MARKS

1. What is bio-mass? [154] (2)
2. What are the different forms of biomass available as biofuels? [155] (2)
3. Explain the biomass energy resources. [155] (4)
4. Identify the limitations of utilizing biomass. [156] (2)
5. Enumerate the environmental benefits of biomass resources. [156] (2)
6. How Bio-gas is obtained? What is the composition of Bio-gas? [159] (4) 7.
What are the application and disadvantages of using biogas as a fuel? [160] (4) 8.
Point out the factors affecting biogas generation. [161] (2)
9. Classify biogas plants. [163] (2)
10. What do you understand by aerobic and anaerobic digestion in Bio-gas generation? [158]
(2) 11. List the advantages of anaerobic digestion. [161] (2)
12. Identify the raw materials used in biogas plants. [162] (2)
13. Compare fixed and movable drum type biogas plants. [171] (4)
14. Why Biogas Plants are not much Successful in India? Justify the reasons. [173]
(4) 15. What are the properties of biogas? [173] (4)
16. What is gasifier? List the advantages and classification. [174-175] (4)

12 MARKS

1. Explain the steps involved in conversion of biomass into energy or biofuel. [157] (12)
2. (i) Explain the anaerobic digestion system with necessary equations. [160] (6) (ii)
Explain the factor affecting the biogas generation. [162] (6)
3. (i). With neat sketch, explain the components of a biogas power plant.[163] (6) (ii). Explain the working of continuous type biogas power plant with neat sketch. [164] (6) 4. Explain the working of Floating Drum and Fixed Dome type biogas plants with the help of neat sketch. [165-166] (6+6)
5. (i). Explain the photo synthesis process. [156] (6)
(ii). Explain the site selection process of biogas plants. [172] (6)

UNIT V: GEOTHERMAL AND OCEANIC ENERGY

FOUR / TWO MARKS

1. What is geothermal energy? [P.189/PPT] (2)
2. Classify the geothermal sources? [P.194/PPT] (2)
3. What is thermal gradient? Explain briefly. [P.193] (4)
4. Write a short note on Energy inside the Earth. [P.190/PPT] (4)
5. What is Geothermal Wells? [PPT] (2)
6. What is the principle of conversion of geothermal energy into electric power? [PPT] (2)
7. State its environmental aspects dry steam open system. [P.195] (4)
8. List the advantages, disadvantage and applications of geothermal energy. [P.199-200] (4) 9.

What is OTEC technology? Which Thermodynamic Cycle is used in OTEC? [P.233&234] (2) 10.

Define efficiency of OTEC. [P.233] (2)

11. Mention why closed cycle OTEC is preferred. [P.234] (2)
12. List the advantages, disadvantage and applications of OTEC system. [P.238] (4)

12 MARKS

1. (i). Explain with neat sketch of various methods of energy harvesting techniques in geothermal source. List out their merits and demerits. [P. 194-197]
2. With neat block diagram, explain the working of open cycle, closed cycle and hybrid OTEC system. [P. 234-237]
3. (i) Write a short note on ‘Geothermal energy and OTEC in India and abroad’. [P.200 & 239] (ii). Identify the environmental impact of extraction geothermal and wave energy. [P.200&239]

**********ALL THE VERY BEST**********

**********SERVE OUR EARTH AND NATION**********