

B.E., DEGREE EXAMINATIONS: MAY/ JUNE 2013

Eighth Semester

MECHATRONICS ENGINEERING

MCT155: Renewable Energy Sources

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 × 1 = 10 Marks)

1. _____ Oxides of NO₂ concentration can damage respiratory tissues.
 - a. 100 -140 ppm
 - b. 50-100 ppm
 - c. 150-220 ppm
 - d. 50-75 ppm
2. Currently, the fastest growing source of electricity generation using new renewable sources is
 - a. Solar
 - b. Wind
 - c. Hydro
 - d. Coal
3. Which of the following methods can be called passive solar energy collection?
 - a. using heat absorbing construction materials
 - b. OTEC
 - c. photovoltaic cells
 - d. flat plate solar collectors
4. A major disadvantage of solar power is _____.
 - a. its cost effectiveness compared to other types of power
 - b. its efficiency level compared to other types of power
 - c. the variation in sunshine around the world
 - d. that solar systems decentralize control over electrical energy
5. Windmill towers are generally more productive if they are _____.
 - a. higher, to minimize turbulence and maximize wind speed
 - b. lower, to minimize turbulence and maximize wind speed
 - c. higher, to minimize the number of birds that interfere with blade turning
 - d. lower, to increase heat convection from the ground
6. A major disadvantage of wind generator to produce electricity is _____.
 - a. the emissions it produces once in place
 - b. its energy efficiency compared to conventional power sources
 - c. that people can use a single mill or develop a large-scale wind farm
 - d. the initial startup cost

7. The current practice of geothermal power generation may not provide a practical renewable energy source because _____.
 - a. in many cases, the heated groundwater is used much faster than it is recharged
 - b. in many cases, the magma is used faster than it is recharged
 - c. power plants have high maintenance costs
 - d. geologically heated groundwater is unsuitable for the plants and must be purified first.
8. Which of the following is not a bio-mass source?
 - a. Gobar gas
 - b. Coal
 - c. Wood
 - d. Nuclear energy
9. One difficulty of using hydrogen as a power source is that it _____.
 - a. is not properly understood
 - b. is less efficient than fossil fuels
 - c. requires a fuel that is a nonrenewable resource
 - d. requires an energy investment to begin the process
10. One advantage of using hydrogen fuel cells is _____.
 - a. the potential for production of greenhouse gases
 - b. the ease of transporting and storage
 - c. the energy efficiency
 - d. that they are nonpolluting

PART B (10 × 2 = 20 Marks)

11. What are the primary and secondary energy sources?
12. Differentiate energy conservation and energy efficiency.
13. What are the applications of solar air heaters?
14. List the advantages of flat plate collectors.
15. Write the expression for available wind power.
16. How do you classify the circulation of winds on the earth's surface?
17. What are the main components of a geo-thermal power plant?
18. What are the different technologies available for ocean thermal energy conversion?
19. What are the advantages of Magneto Hydro Dynamic systems?
20. What are the properties of hydrogen that make it a potential energy carrier in future?

PART C (5 × 14 = 70 Marks)

21. a) (i) What are the conventional and non-conventional energy sources? Describe briefly. (10)

(ii) Explain the environmental aspects of energy sources. (4)

(OR)

b) Discuss briefly renewable energy sources. Explain their availability, economics and efficiency with reference to India context.

22. a) Give a schematic diagram for a solar powered pump deriving its energy from a photo voltaic array. Provide a back up storage battery in your circuit.

(OR)

b) Explain a typical focusing type solar collector with sun tracking mechanism. List the advantages and disadvantages.

23. a) Sketch two types of tidal power generation plants and explain the working theory.

(OR)

b) (i) Explain the principle of electric power generation from wind mill. (8)

(ii) What are the advantages of vertical axis machines over horizontal type? (6)

24. a) State the basic principle of operation of bio-gas plant and explain the operation of a commercial type of bio-gas plant with relevant sketches. State three applications of this plant.

(OR)

b) (i) Write brief note on “Energy from agricultural wastes”. (6)

(ii) Sketch and describe any one type of Bio-mass gas generation plant (8)

25. a) Explain the various methods of production of hydrogen for use as energy carrier.

(OR)

b) With neat sketches, discuss about the operation of open cycle and closed cycle MHD systems.
