Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 40501

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Electrical and Electronics Engineering

EE 8703 — RENEWABLE ENERGY SYSTEMS

(Regulation 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What are the limitations of renewable energy sources?

2.   What do you understand by energy resources?

3.   Define tip speed ratio.

4.   What is the condition for maximum output power from a wind turbine?

5.   Differentiate between beam and diffuse radiation.

6.   What is the principle of solar photovoltaic?

7.   What are the different forms of biomass available as biofuels?

8.   What are the various factors considered in designing a micro hydel scheme?

9.   Why hydrogen is considered as a secondary energy source?

10. What are primary and secondary fuel cells?

PART B — (5 × 13 = 65 marks)

11. (a)   What are the conventional and non-conventional energy sources? Describe the fossil fuels as the conventional energy sources.

Or

(b)   Give brief review of various sources of renewable energy. Describe the energy scenario of India.

12. (a) How energy from wind can be extracted? Explain the process by using suitable diagram.

Or

(b) Describe the working of a wind power system and its components with a neat schematic diagram.

13. (a) With the help of schematic diagram, explain the working of solar pond.

Or

(b) With the help of block diagrams, explain the operations of stand-alone and grid interactive solar PV systems.

14. (a) With the help of neat sketch, explain the working of floating drum type biogas plant.

Or

(b) What is geothermal energy? Explain the working principle of a geothermal power plant with the help of a neat sketch.

15. (a) Discuss the theory and working principle of ocean thermal energy conversion systems.

Or

(b) What is tidal energy? Explain the working of a tidal power plant with a neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the working of Pyranometer and Pyrheliometer with the help of neat sketch.

Or

(b) Discuss the various methods of production of hydrogen for use as an energy carrier. What are the various methods of hydrogen storage?

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Reg. No. :

Question Paper Code : X10408

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Seventh Semester
Electrical and Electronic Engineering
EE 8703 – RENEWABLE ENERGY SYSTEMS
(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Define energy efficiency.

2. List the non-conventional energy sources.

3. State the different types of wind mills.

4. Mention the factors which determine the power in wind.

5. Give the types of solar pond.

6. Why the efficiency of solar thermal power generation is lesser than other systems ?

7. What is Biomas cogeneration ?

8. What are the factors that affect the generation of biogas ?

9. Mention various types of fuel cells with their electrochemical reactions.

10. List the peculiarities of ocean thermal energy conversion system.

PART – B   (5×13=65 Marks)

11. a) Describe the various renewable energy resource available in India and its potential to supplement the conventional energy sources.

(OR)

b) i) Discuss the present status of world energy scenario.   (6)

   ii) Criticize the energy planning issues aiming to bridge the gap between the energy demand and supply situation in India.   (7)

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12. a) i) Clearly explain the principle of WECS with neat block diagram. **(6)**
    ii) Discuss the various considerations taken into account for site selection of a wind energy system. **(7)**

(OR)

b) i) Explain the peak power tracking scheme in WECS. **(6)**
   ii) Explain the working of grid tied WECS with neat diagram. **(7)**

13. a) i) With a schematic diagram explain the structure of medium temperature solar power plant. **(6)**
    ii) Explain the working of solar water pumping system. **(7)**

(OR)

b) Explain the algorithm for maximum power point tracking. Also discuss the necessary conditions while synchronizing the PV system with grid supply.

14. a) i) Explain briefly the components of a biogas plant. **(6)**
    ii) Explain with neat diagram the working of a cogeneration plant. **(7)**

(OR)

b) i) Explain with neat diagram the working of a geothermal power plant. **(6)**
   ii) With neat layout explain the working of hydroelectric power plant. **(7)**

15. a) Explain the principle of operation of open cycle OTEC system.

(OR)

b) Explain the working of tidal power plant with neat layout and specify the site requirements.

PART – C   **(1×15=15 Marks)**

16. a) Wind at 1 standard atmospheric pressure and 15°C temperature has a velocity of 10 m/sec. The turbine has diameter of 120 m and its operating speed in 40 rpm at maximum efficiency, Calculate :

   i) The total power density in the wind stream
   ii) The maximum obtainable power density assuming $\eta = 40\%$
   iii) The total power produced in kW
   iv) The torque and axial thrust.

(OR)

b) The hydrogen-oxygen fuel cell operates at 25°C. Calculate the voltage output of the cell, the efficiency and the electric work output per mole of H_2 consumed and per mole of H_2O produced. Also compute the heat transferred to the surroundings.

   Given $\Delta H^0 298°K = - 285838$ kJ/kg mole

   $\Delta G^0 298°K = - 237191$ kJ/kg mole

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