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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 Biomass 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 H₂ consumed and per mole of H₂O produced. Also compute the heat transferred to the surroundings.
- Given $\Delta H^{0298^{\circ}\text{K}} = -285838 \text{ kJ/kg mole}$
 $\Delta G^{0298^{\circ}\text{K}} = -237191 \text{ kJ/kg mole}$
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