Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21088

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fifth Semester

Aeronautical Engineering

ORO551 - RENEWABLE ENERGY SOURCES

(Common to Aerospace Engineering/ Agriculture Engineering/ Automobile Engineering/Biomedical Engineering/ Civil Engineering/ Electronics and Communication Engineering/ Electronics and Telecommunication Engineering/ Environmental Engineering/ Industrial Engineering/ Industrial Engineering and Management/Manufacturing Engineering/ Marine Engineering/ Material Science and Engineering/ Mechanical Engineering/ Medical Electronics/ Petrochemical Engineering/ Production Engineering/ Bio Technology/ Chemical Engineering/ Chemical and Electrochemical Engineering/ Fashion Technology/ Food Technology/ Handloom and Textile Technology/ Petrochemical Technology/ Petroleum Engineering/ Pharmaceutical Technology/ Textile Chemistry/ Textile Technology)

(Regulations 2017)

Time : Three hours — Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is Greenhouse effect?
2. Define declination angle and write the equation for declination angle.
3. What are the performance indices of a solar collector?
4. Define heliostats.
5. What are the zones in solar pond?
6. List the different modes of solar cooling.
7. What causes the wind to blow?
8. Enlist any four types of generators used in wind energy conversion systems.
9. What is anaerobic degradation?
10. Define Seeback effect.

PART B — (5 × 13 = 65 marks)

11. (a) (i) How do you calculate solar radiation on tilted surfaces? (6)

(ii) Determine the average value of solar radiation on horizontal surface for June22 at the latitude of 10^0 N. If the constants a and b are given as 0.3 and 0.51 respectively and $\frac{\bar{n}}{N}$=0.55. (7)

Or

(b) Explain in detail the different types of solar radiation measuring instruments with neat sketch. (13)

12. (a) (i) What are the main components of a flat plate solar collector? Explain their functions in detail. (8)

(ii) Describe Transmittance- Absorptance product of a flat-plate collector. (5)

Or

(b) (i) Draw the schematic and give functional description of Fresnel Lens Collector. (8)

(ii) What are the advantages and disadvantages of concentrating collectors over flat plate type collectors? (5)

13. (a) Discuss briefly about the methods of solar thermal energy storage. (13)

Or

(b) With the help of a neat sketch, describe the construction, working and advantages of solar distillation system. (13)

14. (a) (i) What are the problems in operating large wind power generators? (5)

(ii) Derive an expression for maximum power coefficient for a horizontal axis wind turbine. (8)

Or

(b) (i) Explain briefly about the process of biogas-digestion. (7)

(ii) What are the factors influencing the biogas production. (6)

15. (a) (i) Briefly explain the different types of geothermal fields. (7)

(ii) What are the advantages and disadvantages of Geothermal Energy over other Energy forms? (6)

Or

(b) Explain the operation of tidal power plants with neat diagram. Write the advantages and limitations of tidal power generation. (13)

PART C — (1 × 15 = 15 marks)

16. (a) What are the main types of OTEC power plants? Describe their working in brief. (15)

Or

(b) How biomass conversion takes place? Explain the various types of bio gas plants. (15)

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