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K – 3305

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, February 2021.**

**First Degree Programme under CBCSS**

**Physics**

**Open Course**

**PY 1551.5 – ENERGY PHYSICS**

**(2018 Admission Regular)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Very short answer type questions (Answer all 10 questions of 1 mark each)

1. What are primary and secondary energy sources?
2. Define solar constant
3. Explain the principle of conversion of solar into heat.
4. What are the methods for solar energy storage?
5. What is the greenhouse effect?
6. What is the basic principle of wind energy conversion?
7. How biomass conversion takes place?
8. What is the full form of OTEC?
9. What are the components of tidal power plants?
10. What are mechanical energy storage systems?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Short answer type questions (Answer any eight questions of 2 marks each)

11. Write a short note on different energy sources.
12. What are the limitations of renewable energy sources?
13. What is meant by a sunshine recorder?
14. Write a short note on flat plate collectors
15. What are the advantages of concentrating collectors over flat plate collectors?
16. How to classify solar energy storages?
17. Write a short note on the heat extraction method from a solar pond.
18. What is meant by space heating or solar heating of building
19. What is the principle of solar photovoltaic power generation?
20. What are the disadvantages of wind energy conversion systems?
21. Write a short note on blade design for wind energy conversion.
22. Describe horizontal axis type aero generators.
23. What is meant by fermentation in a biogas plant?
24. Write a short note on the open cycle OTEC system.
25. Write a short note on different energy storage systems.
26. How to store thermal energy.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. Each question carries **4** marks

27. Determine the Local Solar time and declination at a location latitude  $23^{\circ}15'N$ , longitude  $77^{\circ}30' E$  at 12.30 IST on June 19. Equation of time correction is given from standard table or chart =  $(1'01'')$ .
28. Determine the average value of solar radiation on a horizontal surface for June 22, at the - latitude of  $100N$ , if constants  $a$  and  $b$  are given as equal to 0.30 and 0.51 respectively, and the ratio  $n/N=0.55$ .
29. To derive an equation for transmissivity  $\tau_p$  for a solar collector.
30. How to calculate conversion efficiency of solar photovoltaic cell.
31. Derive an expression for calculate forces on blades and thrust on turbines of wind mills.
32. Wind at 1 standard atmospheric pressure and  $15^{\circ}C$  has a velocity of 15 m/s calculate: (i) the total power density in the wind stream, (ii) the maximum obtainable power density.
33. The following data are given for a family biogas digester suitable for the output of five cows: the retention time is 20 days, temperature  $30^{\circ}C$ , dry matter consumed per day = 2 kg, biogas yield is  $0.24 m^3$  per kg. The efficiency of burner is 60%, methane proportion is 0.8. Heat of combustion of methane  $-28 MJ/m^3$ : calculate (i) the volume of biogas digester and (ii) the power available from the digester.
34. Write a short note on gas pipeline for energy distribution.
35. Draw the spectral distribution of solar energy radiation intensity.
36. How to estimate average solar radiation.
37. What are the factors affecting the collector efficiency of flat plate collectors?
38. Define torque coefficient,  $C_T$  in wind turbine.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks.

39. What are the prospects of non-conventional energy sources in India? Explain
40. What is the difference between a Pyrheliometer and Pyranometer? Describe the principle of Angstrom type pyrheliometer.
41. Explain the different types of concentrating type collectors. Describe a collector used in power plants for generation of electricity.
42. How are WEC systems classified? Discuss in brief.
43. How are gasifiers classified? What are the potential applications of the gasifier?
44. What are the advantages and limitations of small scale hydroelectric power generation?

**(2 × 15 = 30 Marks)**

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