D **511B1** **Total pages: 2**

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SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R,S), MAY 2024

Electrical and Electronics Engineering

(2020 SCHEME)

Course Code : 20EET322

Course Name : Renewable Energy Systems

Max. Marks : 100 **Duration:3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Compare renewable and non renewable energy sources.
2. Describe the Indian energy scenario.
3. Explain the concept of MPPT in a solar PV system.
4. How does sun tracking helps in energy collection by a flat plate solar collector?
5. State and explain Betz criterion.
6. Draw the general block diagram of a Wind Energy Conversion System (WECS) and briefly explain the working.
7. A single basin type tidal power plant has a basin area of 2 km^2. The tide has an average range of 13 m. Power is generated during ebb cycle only. The turbine stops operating when the head on it falls below 3 m. Calculate the average power generated by the plant in single emptying process of the basin if the turbine generator efficiency is 0.7. Density of sea water may be assumed as, $\rho = 1025\ kg/m^3$
8. Illustrate the hybrid cycle operation of OTEC system.
9. Explain the technology of energy from satellite.
10. Explain the factors affecting biogas generation.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Explain conventional sources of energy with examples.Compare the advantages and disadvantages of different conventional sources of energy. 14

OR

12. a) Describe the significance of Green house effect. 4
    b) Explain Global warming and describe its causes and adverse effects. 10

MODULE II

13. (a) What is a cell mismatch in a solar PV module ? What are the problems caused due to cell mismatch and how to avoid it ? 7
    (b) What is shadowing ? What are the problems caused due to shadowing and how to overcome it ? 7

OR

14. (a) Explain the geometry of sun earth relationship with neat sketch. 7
(b) Explain the sun earth radiation spectrum using spectral plots and explain the term solar constant. 7

MODULE III

15. With a neat layout explain the working of a small hydro scheme. Explain all major components in detail. 14

OR

16. Derive an expression for the power available in wind and the maximum theoretical power that can be extracted by the wind turbine. Find the maximum possible value of power coefficient (Cp_max) analytically ? 14

MODULE IV

17. Explain the various advantages and challenges associated with tidal power generation. Suggest some possible solutions to overcome these challenges. 14

OR

18. Explain the principle of OTEC system.Describe the Claude cycle and Anderson cycle of OTEC system. 14

MODULE V

19. Describe biomass energy. Explain the advantages and disadvantages of biomass energy.Explain the biomass conversion technologies. 14

OR

20. Explain the need of energy storage. Describe the main energy storage systems. 14

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