D **280B2** **Total pages: 2**

Register No: …… Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

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

Chemical Engineering

(2020 SCHEME)

Course Code : 20CHT322

Course Name : Energy Engineering

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

PART A

(Answer all questions. Each question carries 3 marks)

1. Comment on the statement 'All alternative energy sources are not renewable sources'.
2. Explain the main components of a nuclear fission reactor.
3. Differentiate open-cycle and closed-cycle ocean thermal energy conversion systems.
4. Write a short note on solar thermal power generation systems.
5. Describe the various stages involved in anaerobic digestion process.
6. Differentiate between upwind and downwind horizontal axis wind turbine.
7. List out the applications of polymer electrolyte membrane fuel cells.
8. Explain the principle of magneto hydrodynamic systems.
9. Explain the concept of pinch technology.
10. Describe how electrical energy can be conserved in chemical process plants.

PART B

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

MODULE I

11. (a) Differentiate and explain the following energy sources with suitable examples: 8
    i. Primary energy sources and secondary energy sources.
    ii. Conventional energy sources and non-conventional energy sources.
    iii. Commercial energy sources and non-commercial energy sources.
    iv. Renewable energy sources and non-renewable energy sources.
    (b) Explain any six world energy resources. 6

OR

12. (a) Explain the various facilities available to harness hydropower. 10
    (b) Describe the merits and demerits of hydel power plants. 4

MODULE II

13. (a) Explain in detail about solar cooling by absorption refrigeration. 7
    (b) Explain the working of a solar pond with a neat schematic diagram. 7

OR

14. (a) Explain the working of evacuated tube collectors and their different configurations with neat sketches. 8
(b) Compare the performance of flat plate collector and evacuated tube collector. 6

MODULE III

15. (a) Differentiate between combustion, pyrolysis, and gasification of biomass. 6
(b) Explain the process of pyrolysis of biomass with a neat sketch. 8

OR

16. (a) What are the advantages and economic benefits of wind energy? 8
(b) Compare the cost efficiency of power generation using wind energy, hydel energy and thermal energy. 6

MODULE IV

17. (a) Explain different types of hydrothermal systems for harnessing geothermal energy. 8
(b) List the advantages of geothermal energy. 6

OR

18. (a) Mention the cell reactions in a microbial fuel cell. 4
(b) Describe the merits, demerits, and applications of microbial fuel cells. 10

MODULE V

19. (a) Explain in detail about the various energy conservation measures in chemical process plants. 8
(b) Explain how energy saving can be done for a distillation column. 6

OR

20. (a) What is meant by steam economy? Explain its importance in chemical plants. 8
(b) Describe any three energy conservation opportunities (ECOs) in the petroleum industry. 6

****