A

Reg. No. :

Question Paper Code: R9202

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Professional Elective

Chemical Engineering

R21CHV202 – RENEWABLE ENERGY RESOURCES

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which of the following is a type of coal with the highest carbon content?   CO1-U

    (a) Peat   (b) Lignite   (c) Bituminous   (d) Anthracite

2. Shale oil is primarily extracted from: CO1-U

    (a) Deep-sea deposits   (b) Tar sands

    (c) Oil shale's   (d) Natural gas reserves

3. Which process is used to release energy in nuclear power plants?

    (a) fusion   (b) fission   (c) combustion   (d) evaporation

4. What is the main fuel used in most nuclear fission reactors?   CO1-U

    (a) Uranium-235   (b) Plutonium-238

    (c) Thorium-232   (d) Deuterium

5. Which method is commonly used for isolating industrially important   CO1-U
   microorganisms?
    (a) Exact yield of product   (b) Presence of desirable traits

    (c) Chemical structure of product   (d) Genetic sequence

6. Which method is commonly used for isolating industrially important   CO1-U
   microorganisms?
    (a) Gram staining   (b) Streak plate method

    (c) Western blot   (d) ELISA

7. Which energy source uses heat from inside the Earth to generate power?   CO1-U

    (a) Solar energy   (b) Geothermal energy

    (c) Ocean thermal energy   (d) Biomass energy

8. The main source of geothermal energy is: CO1-U

    (a) Sunlight   (b) Earth's internal heat   (c) Tidal waves   (d) Fossil fuels

9. Energy forecasting helps in: CO1-U

    (a) Predicting future energy needs   (b) Increasing fuel cost

    (c) Reducing efficiency   (d) Increasing pollution

10. Which is the main objective of energy planning?   CO1-U

    (a) Increase energy wastage   (b) Ensure reliable supply

    (c) Reduce energy efficiency   (d) Increase emissions

<div align="center">PART – B (5 x 2= 10 Marks)</div>

11. Define the term 'bituminous coal' and list its major uses.   CO1- U

12. Outline the main differences between a fission reactor and a fusion reactor.   CO1- U

13. Outline the main components required in a renewable energy-based power   CO1- U
    plant.

14. Build a simple block diagram of an ocean thermal energy conversion (OTEC)   CO1- U
    system.

15. Analyze the relationship between energy demand forecasting and industrial   CO5-Ann
    production planning.

<div align="center">PART – C (5 x 16= 80 Marks)</div>

16. (a) Classify the different types of coal based on their carbon content   CO1-U   (16)
         and energy value.

<div align="center">Or</div>

    (b) Explain how coal classification helps in choosing the right coal for   CO1-U   (16)
         different industries.

17. (a) Compare and contrast at least two types of nuclear reactors,   CO2-U   (16)
         showing their working principles and main uses.

<div align="center">Or</div>

    (b) Outline the main biomass energy resources and explain their   CO2-U   (16)
         importance in sustainable energy production.

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18. (a) Explain how energy is generated in a hydroelectric power system, and illustrate it with a simple diagram. CO2-U (16)

Or

(b) Classify the three main types of renewable energy sources used for power generation: hydro, wind, and solar. CO2-U (16)

19. (a) Classify the different types of geothermal power plants and discuss their working principles. CO2-U (16)

Or

(b) Analyze the working principles, advantages, and limitations of dry steam, flash steam, and binary cycle geothermal plants. CO2-U (16)

20. (a) Classify different methods of energy forecasting and explain their relevance in industrial planning. CO1-U (16)

Or

(b) Explain the working principle of a heat pipe and its role in energy conservation. CO1-U (16)

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