



M.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Second Semester

ENVIRONMENTAL ENGINEERING

P18EEE0001: Cleaner Production and Environmental Auditing

COURSE OUTCOMES

- CO1:** Understand the strategies and technologies for a cleaner industrial production and their legislation.
- CO2:** Apply an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency, and reduce risks to humans and the environment.
- CO3:** Plan and apply the concept of Cleaner Production.
- CO4:** Incorporate the knowledge on Life Cycle Assessment and Environmental Auditing.
- CO5:** Apply concepts of Cleaner Production technologies and Environmental Audit in Industrial projects.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions: -

PART A (10 x 1 = 10 Marks)

1. Assertion (A): Recycling and Reusing are considered to be the best waste management method CO1 [K₁]
Reason (R): Best waste management methods leads to Circular Economy
 a) Both A and R are correct, and R is the good explanation for A b) Both A and R are correct, and R is not the good explanation for A
 c) A is correct and R is wrong d) R is correct and A is wrong
2. _____ is a methodology for assessment impact of a product, process or service. CO4 [K₁]
 a) Environmental Impact Assessment b) Good House Keeping
 c) Life Cycle Assessment d) Cleaner Production
3. Aiming to diminish harmful substances that occur as by-products of a production process is called as CO2 [K₁]
 a) Cleaner Production b) Sustainable Development
 c) End-of-Pipe Treatment d) Waste Minimization

Match the list I and II

CO1 [K₁]

4.

List I	List II
A. SDG Goal 02	i. Clean Energy
B. SDG Goal 13	ii. Reducing Inequalities
C. SDG Goal 10	iii. Climate Action
D. SDG Goal 07	iv. Zero Hunger

- | | A | B | C | D | | |
|-----|---|-----|--|-----|-----|-------------------|
| a) | iv | iii | i | ii | | |
| b) | i | ii | iii | iv | | |
| c) | iv | ii | i | iii | | |
| d) | iv | iii | ii | i | | |
| 5. | Assertion (A): In Industries Pollution prevention (P2) Means Source Reduction
Reason (R): Pollution prevention practices can include changes in design, raw materials, production processes, and delivery of a product | | | | CO2 | [K ₂] |
| a) | Both A and R are correct, and R is the good explanation for A | | b) Both A and R are correct, and R is not the good explanation for A | | | |
| c) | A is correct and R is wrong | | d) R is correct and A is wrong | | | |
| 6. | Under which ISO series Environmental Management System (EMS) defined | | | | CO4 | [K ₂] |
| a) | ISO 14000 | | b) ISO 14003 | | | |
| c) | ISO 14001 | | d) ISO 9001 | | | |
| 7. | Identify the correct statements from the following | | | | CO3 | [K ₂] |
| | 1. Lean manufacturing is a methodology that focuses on minimizing waste | | | | | |
| | 2. Industrial ecology (IE) is the study of industrial systems that operate more like natural ecosystems | | | | | |
| | 3. ISO 14040 guidelines are adopted as a benchmark for environmental labels by the Global Ecolabelling Network (GEN) | | | | | |
| | 4. Regular Performance of Environmental Audits in industry helps to achieve the policy of Going Green | | | | | |
| a) | 1, 2, and 4 | | b) 1,2 and 3 | | | |
| c) | 2 and 3 | | d) 1 only | | | |
| 8. | Assertion (A): In industries, waste audit means survey of a facility's regular waste stream.
Reason (R): Waste audit will provide valuable information that will benefit the industry in many ways. | | | | CO5 | [K ₂] |
| a) | Both A and R are correct, and R is the good explanation for A | | b) Both A and R are correct, and R is not the good explanation for A | | | |
| c) | A is correct and R is wrong | | d) R is correct and A is wrong | | | |
| 9. | What is the shape of CP hierarchy? | | | | CO5 | [K ₂] |
| a) | Circular | | b) Square | | | |
| c) | Triangular | | d) Trapezoidal | | | |
| 10. | Sequence the 7R's. Waste Management Steps to Sustainability | | | | CO4 | [K ₂] |
| | 1. Rethink, 2. Refuse, 3. Reduce, 4. Repurpose, 5. Reuse, 6. Recycle 7. Rot | | | | | |
| a) | 1-3-5-7-2-4-6 | | b) 2-4-6-1-3-5-7 | | | |
| c) | 1-2-3-4-5-6-7 | | d) 7-6-5-4-3-2-1 | | | |

PART B (10 x 2 = 20 Marks)

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| 11. Give the best definition of sustainable development. | CO1 | [K ₂] |
| 12. Enlist the consequences from coal based thermal power plant and suggest the suitable mitigation measures. | CO1 | [K ₃] |
| 13. What are the barriers to pollution prevention? | CO2 | [K ₂] |
| 14. Differentiate Passive and Reactive environmental strategies of pollution control in Industries. | CO2 | [K ₃] |
| 15. Give an example for Better Process Control and Input Substitution Methods of Cleaner Production Practices in Industries. | CO3 | [K ₂] |
| 16. Enlist (any four) the benefits Waste Audit in an industry. | CO3 | [K ₂] |
| 17. What are the objectives of ecolabeling? | CO4 | [K ₃] |
| 18. Name the 5 stages of Life Cycle Assessment (LCA). | CO4 | [K ₂] |
| 19. Define the term “HOT SPOT” in Life Cycle Assessment (LCA) of a product. | CO5 | [K ₃] |
| 20. State the difference between ISO 9000 and ISO 14000. | CO5 | [K ₃] |

PART C (10 x 5 = 50 Marks)

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| 21. List sustainability indicators (Any five) and explain their importance. | CO1 | [K ₃] |
| 22. Draw a neat sketch and integrate 5 P's of Sustainable Development. | CO1 | [K ₂] |
| 23. Name and Explain six components of cleaner production. | CO2 | [K ₂] |
| 24. Explain the concept of industrial ecology with an example. | CO2 | [K ₂] |
| 25. Write short notes on 5S concept in workplace Management. | CO3 | [K ₃] |
| 26. What are the economic benefits of cleaner production? Give any two examples. | CO3 | [K ₂] |
| 27. Draw a neat pyramid diagram of waste management hierarchy and indicate the most and least preferred options. | CO4 | [K ₂] |
| 28. Write shot notes on the various types of environmental audits. | CO4 | [K ₂] |
| 29. Explain the Environmental Management System (EMS) PDCA cycle with a neat diagram. | CO5 | [K ₂] |
| 30. How will you implement the Pollution Prevention Concepts in sugar industry? Explain with examples. | CO5 | [K ₂] |

Answer any TWO Questions

PART D (2 x 10 = 20 Marks)

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|--|----|-----|-------------------|
| 31. Draw neat diagram and explain the evolution of various concepts for Industrial Environmental Management through Cleaner Production. | 10 | CO2 | [K ₃] |
| 32. List the Sustainable Development Goals as per order and explain (any four) the strategic measures to achieve the same. | 10 | CO1 | [K ₃] |
| 33. Life Cycle Assessment (LCA) is a flexible tool for the assessment of potential environmental impacts of products: -Justify the statement with facts and figures. | 10 | CO5 | [K ₃] |
