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# B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

## 18BTE318T - INDUSTRIAL WASTE MANAGEMENT

*(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)*

**Note:**

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
ii. **Part - B** and **Part - C** should be answered in answer booklet.

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

**PART - A (20 × 1 = 20 Marks)** — Answer **all** Questions

| | | Marks | BL | CO |
|---|---|---|---|---|
| 1. | Which of the following sectors produce parts and components for large-scale industries to fabricate substantial items?<br>(A) Small scale industries (B) Support industries<br>(C) Ancillary industries (D) Basic industries | 1 | 1 | 1 |
| 2. | What percentage of hazardous waste is estimated to be part of the global waste generation?<br>(A) 1% (B) 2%<br>(C) 3% (D) 4% | 1 | 1 | 1 |
| 3. | Classifying industries in India, What is the primary motivation being adopted?<br>(A) To determine their contribution to GDP (B) To identify potential environmental impacts<br>(C) To allocate government subsidies (D) To establish labor unions | 1 | 1 | 1 |
| 4. | Which type of limitations does the National Pollutant Discharge Elimination System (NPDES) empower the EPA to enforce?<br>(A) Effluent limitations on wastewater discharges (B) Carbon emissions limitations for industrial plants<br>(C) Restrictions on land use for agricultural purposes (D) Noise level limitations for urban areas | 1 | 1 | 1 |
| 5. | The permissible limit for Biochemical Oxygen Demand (BOD) in India for disposal into inland surface water is?<br>(A) Less than 10 mg/L (B) Less than 20 mg/L<br>(C) Less than 30 mg/L (D) Less than 40 mg/L | 1 | 2 | 2 |
| 6. | Which statement best describes the difference between industrial wastewater and domestic sewage in terms of composition?<br>(A) Industrial wastewater has a higher proportion of suspended solids, dissolved organics, inorganic solids, BOD, alkalinity, or acidity compared to domestic sewage. (B) Industrial wastewater and domestic sewage have the same proportion of suspended solids, dissolved organics, inorganic solids, BOD, alkalinity, and acidity.<br>(C) Industrial wastewater has a lower proportion of suspended solids, dissolved organics, inorganic solids, BOD, alkalinity, and acidity compared to domestic sewage. (D) Industrial wastewater only contains suspended solids, while domestic sewage contains dissolved organics, inorganic solids, BOD, alkalinity, and acidity. | 1 | 2 | 2 |

7. The coagulant is most commonly used in sewage treatment plants to prevent algal bloom formation and remove colour from water is 1 2 2

(A) Sodium alluminate
(B) Alluminium sulphate
(C) Alluminium hydroxide
(D) Alluminium oxide

8. What is the purpose of a Solidification and Stabilization Facility (SSF) in waste management? 1 2 2

(A) To activate and mobilize contaminants prior to landfilling.
(B) To inactivate and immobilize contaminants prior to landfilling.
(C) To increase the concentration of contaminants prior to landfilling.
(D) To separate contaminants from waste prior to landfilling.

9. Which type of reactor does not require a three-phase separator or flow distributor? 1 4 3

(A) Activated Sludge Reactor
(B) UASB reactor
(C) Static granular bed reactor
(D) Fluidised bed reactor

10. Which of the following statements is incorrect about membrane technology in water treatment? 1 4 3

(A) Membrane technology uses semipermeable membranes for the separation process.
(B) A pressure gradient is applied in reverse osmosis to cause separation of the solvent and solute.
(C) Fouling of the membranes has been a common problem in membrane technology.
(D) The reverse osmosis process allows both solvent and solute to pass through the membrane.

11. Among the followings is act has posed the single largest environmental challenge for Chemical Process Industry (CPI) companies in controlling Volatile Organic Compounds (VOCs)? 1 4 3

(A) The Clean Water Act (CWA)
(B) Environmental protection act
(C) The National Pollutant Discharge Elimination System (NPDES)
(D) The Clean Air Act Amendments (CAAA) of 1990

12. Carrageenan is derived from? 1 1 3

(A) Seaweed
(B) Algae - Green
(C) Coral reefs
(D) Ocean plants - Sea Grass

13. Select the correct sequence of the remedial approach for metals contaminated soil and recycling? 1 3 4

(A) a) Laboratory examination, b) Phytomining, c) Evapotranspiration, d) Translocation, e) If under standard permissible limit, then use as metal enrichment, f) Product collection after manufacturing, g) Reuse of metals, h) Phytovolatilisation
(B) a) Translocation, b) Evapotranspiration, c) Phytovolatilisation, d) Phytomining, e) Reuse of metals, f) Product collection after manufacturing, g) Laboratory examination, h) If under standard permissible limit, then use as metal enrichment
(C) a) Phytovolatilisation, b) Evapotranspiration, c) Translocation, d) Laboratory examination, e) Phytomining, f) If under standard permissible limit, then use as metal enrichment, g) Reuse of metals, h) Product collection after manufacturing
(D) a) Evapotranspiration, b) Translocation, c) Phytovolatilisation, d) Laboratory examination, e) Reuse of metals, f) Phytomining, g) Product collection after manufacturing, h) If under standard permissible limit, then use as metal enrichment

14. Which of the following statements accurately reflects the handling and destruction of biomedical waste as per Bio-medical Waste (Manufacturing and Handling) Rules, 1996. 1 3 4

(A) Biomedical waste can be disposed of in regular landfills.

(B) Biomedical waste disposal does not require any specific rules or regulations.

(C) Biomedical waste should be destroyed

(D) Biomedical waste should be incinerated

15. The type of porous membrane is suitable for oleophilic solutions is? 1 3 4

(A) Hydrophobic porous membranes

(B) Oleophilic porous membranes

(C) Oleophobic porous membranes

(D) Hydrophilic porous membranes

16. The primary purpose of the cryo-comminution process in waste management is? 1 3 4

(A) To increase the size of aluminum particles

(B) To promote the separation of aluminum from plastics

(C) To decrease the size and promote the liberation of aluminum from plastics

(D) To fuse aluminum and plastic materials together

17. Which of the followings has led to the emergence of a specialized area known as 'environmental auditing'? 1 4 5

(A) The disconnection of environmental issues from business

(B) The growing significance of environmental issues as business concerns

(C) The decline of traditional auditing methods

(D) The rise of new technologies answer

18. Select the statements accurately reflects Travis Perkins' Environmental Policy? 1 4 5

(A) The policy does not emphasize compliance with legislation.

(B) The policy does not seek continuous improvement.

(C) The policy does not emphasize compliance with legislation & The policy does not seek continuous improvement

(D) The policy prioritizes pollution prevention as far as possible.

19. Analyze the following statements accurately describes the deficiencies of EIA practice? 1 4 6

(A) EIA reports are consistently of high quality and meet internationally accepted standards.

(B) EIA practice is free of technical shortcomings and procedural limitations.

(C) Structural issues in EIA practice arise from its integration with the project cycle and decision-making context.

(D) Deficiencies in EIA practice include technical shortcomings, procedural limitations, and structural issues policy-planning framework and systematic follow-up procedures.

20. Choose the following statements for best describes the advantage of integrating EIA into the project preparation phase? 1 4 5

(A) Environmental design considerations are introduced in the first place, reducing the need for modifications later.

(B) Environmental design considerations are introduced at a later stage, requiring modifications to the proposal.

(C) Integration of EIA does not have any significant impact on the project preparation phase.

(D) EIA should be performed only after the project has been completed.

## PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

| | | Marks | BL | CO |
|---|---|---|---|---|
| 21. | Describe on bio assays and mention about any 2 test organisms used in bioassays for toxicity tests. | 4 | 1 | 1 |
| 22. | At which stage of a water treatment plant is aeration typically employed, and what is the purpose of this process? | 4 | 2 | 2 |
| 23. | Describe a wastewater treatment system in which both aeration and sedimentation processes are carried out within the same tank. | 4 | 4 | 3 |
| 24. | Identify and explain the AOP method that uses light energy to activate a catalyst and generate reactive oxygen species? | 4 | 4 | 3 |
| 25. | List the different types of pharmaceutical waste and how are they categorized? | 4 | 3 | 4 |
| 26. | Evaluate the different types of audits covered under the scope of environmental auditing in an industrial context? | 4 | 3 | 5 |
| 27. | Given the scenario where a new development project is being proposed, and considering the importance of identifying and predicting its impact on the environment and human health as well as ensuring its sustainability in the short and long term, Which approach should be taken to assess and manage the potential environmental impact of the proposed development, and what are the key objectives of this approach? | 4 | 4 | 6 |

## PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

| | | Marks | BL | CO |
|---|---|---|---|---|
| 28. | (a) What are the causes and effects of industrial pollution, and what strategies can be employed to control and prevent its detrimental impacts on both the environment and human health? | 12 | 1 | 1 |
| | **(OR)** | | | |
| | (b) Can you describe in detail about the potential implementation waste management strategies? | | | |
| 29. | (a) Describe the stages of waste water treatment plant. | 12 | 2 | 2 |
| | **(OR)** | | | |
| | (b) Discuss the different practices commonly employed for solid waste management? | | | |
| 30. | (a) Write a detailed note on immobilized cell reactors, including the various methods employed to immobilize cells? | 12 | 4 | 3 |
| | **(OR)** | | | |
| | (b) Explain any two strategies that can be implemented to digest sludge in the absence of oxygen in wastewater treatment? | | | |
| 31. | (a) Outline the treatment regime that encompasses the combination of physical, chemical, and biological systems for waste management in a tannery. | 12 | 3 | 4 |
| | **(OR)** | | | |
| | (b) What are the primary origins of pharmaceutical and electronic waste, what strategies are utilized for their proper disposal, and what measures can be implemented to mitigate the generation of such waste streams? | | | |
| 32. | (a) Discuss the fundamental principles guiding the administration and practice of Environmental Impact Assessment (EIA)? | 12 | 4 | 5 |
| | **(OR)** | | | |
| | (b) What is the process of environmental auditing? What are the benefits of conducting an Environmental Audit (EA) for a business, and how does it contribute to the goals of Environmental Impact Assessment (EIA) in terms of risk mitigation, compliance with environmental laws? | | | |

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