| | | | | | |
|---|---|---|---|---|---|
| b. | What are all the different forms of phosphorous in waste water? How can microorganisms be deployed for removal of inorganic phosphates? Draw any two types of reactor configurations in biological phosphorous removal. | 10 | 2 | 2 | 1 |
| 28. a. | Describe the mechanisms of degradation of xenobiotics. | 10 | 2 | 3 | 1 |
| | **(OR)** | | | | |
| b. | What are all the sources of oil pollution in environment? Give your insights in microbial intervention for oil degradation. | 10 | 2 | 3 | 1 |
| 29. a. | Azo dyes are considered as recalcitrant. Justify with their structural properties and write their enzymatic degradation. | 10 | 2 | 4 | 1 |
| | **(OR)** | | | | |
| b. | Describe the biodegradation of phenolic compounds by micro fungi. | 10 | 2 | 4 | 1 |
| 30. a. | Slaughterhouse wastes are potential sources for the value-added products production. Describe the biodiesel synthesis from slaughterhouse fatty waste. | 10 | 3 | 5 | 1 |
| | **(OR)** | | | | |
| b. | Plastic waste management is a major challenge worldwide. How will you provide alternate solutions through biotechnological route map? | 10 | 3 | 5 | 1 |

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**B.Tech. DEGREE EXAMINATION, MAY 2022**

Fifth Semester

18BTE317T – ENVIRONMENTAL BIOTECHNOLOGY

*(For the candidates admitted from the academic year 2018-2019 to 2019-2020)*

**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** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

| | Marks | BL | CO | PO |
|---|---|---|---|---|

**PART – A (25 × 1 = 25 Marks)**

Answer **ALL** Questions

1. Presence of which among the following salts in water causes "blue baby syndrome"? 1 1 1 1
   (A) Sulphates (B) Carbonates
   (C) Nitrates (D) Chlorides

2. Which of the following is the organic polymer coagulant? 1 1 1 1
   (A) *Moringa olifeira* (B) Alum
   (C) Sodium dodecyl sulphate (D) Ferric chloride

3. During coagulation what is the force of attraction when the solid posses neutral charge? 1 2 1 1
   (A) Electrostatic (B) Electro kinetic
   (C) Gibbs (D) Vander Wall

4. Advanced oxidation process is used in removal of 1 2 1 1
   (A) Colloids (B) Coarse suspended particles
   (C) Metal ions (D) Refractory organics

5. Which of the following treatment process require resins? 1 2 1 1
   (A) Precipitation (B) Filtration
   (C) Ion exchange (D) Flocculation

6. Pollution Control Board's prescribed norm for COD is 1 1 2 1
   (A) 100 ppm (B) 150 ppm
   (C) 200 ppm (D) 250 ppm

7. Hydraulic retention time $= \frac{\text{Volume of tank}}{X}\left(m^3\right)$. What is X? 1 1 2 1
   (A) Flow rate ($m^3$/d) (B) MLVSS (kg/$m^3$) × aeration volume ($m^3$)
   (C) MLSS (kg/$m^3$) (D) Solid retention time (d)

8. Which of the following does NOT come under fermentative bacteria? 1 2 2 1
(A) Sulphate reducing bacteria (SRB) (B) Proteolytic bacteria (PB)
(C) Lipolytic bacteria (LB) (D) Saccharolytic bacteria (SB)

9. The typical ORP range for anaerobes to survive and degrade the substrate is 1 3 2 1
(A) +20mV to +100mV (B) +25mV to +50mV
(C) –200mV to –400mV (D) –400mV to –600mV

10. Luxury uptake of $PO_4^{2-}$ occur during 1 2 2 1
(A) Micro aerophilic condition (B) Aerobic condition
(C) Anaerobic condition (D) Anoxic condition

11. _____is involved in the conversion of $NH_4^+$ *to* $N_2$ directly. 1 3 2 1
(A) Nitrification (B) Denitrification
(C) ANAMMOX (D) Ammonification

12. The recalcitrant organics possess the following properties EXCEPT 1 2 3 1
(A) High molecular weight (B) Increased solubility in water
(C) Three fold substituted nations (D) Quaternary carbon atoms

13. Ring cleavage between the two adjacent hydroxyl group by 1, 2 dioxygenase is called as 1 2 3 1
(A) Meta cleavage (B) Beta cleavage
(C) Ortho cleavage (D) Para cleavage

14. The degradation of aliphatic and aromatic hydrocarbons are initiated by 1 2 3 1
(A) Hydrolase (B) Dehalogenase
(C) Peroxidase (D) Monooxygenase

15. The peripheral degradation of aliphatic hydrocarbons yields fatty acids and leads to intermediary metabolism through 1 3 3 1
(A) Glycolysis (B) Beta oxidation
(C) Dehalogenation (D) Peroxidation

16. What is the main intermediate recognized by microorganisms formed during PAH degradation? 1 2 4 1
(A) Arene oxide (B) Toluene
(C) Benzene (D) Catechol

17. The alkyl chain length in linear alkyl sulphonates is 1 2 4 1
(A) 5 – 7 (B) 10 – 14
(C) 8 – 10 (D) 15 – 20

18. The surfactants are 1 1 4 1
(A) Hydrophilic (B) Hydrophobic
(C) Water soluble (D) Amphipathic





19. The enzyme that act membrane bound for dye removal is 1 3 5 1
(A) Permease (B) Azoreductase
(C) Dehydrogenase (D) Hydrogenase

20. Tanning industry discharges _____ in the effluent. 1 3 5 1
(A) Ni (B) Fe
(C) Cr (D) Zn

21. Advantage of Fenton's reagent in dye removal is 1 2 5 1
(A) No sludge production (B) Good sorption capacity for various dyes
(C) Effective decolourization of both soluble insoluble dyes (D) Breakdown compounds are non-hazardous

22. Which of the following make the mercury more soluble? 1 2 6 1
(A) Nitrate (B) Sulphate
(C) Carbonate (D) Borate

23. The main disadvantage of photochemical process in dye removal is 1 2 6 1
(A) Release of aromatic amines (B) Short half life
(C) By-product formation (D) Sludge

24. Which of the following is advantage of NaOCl for dye removal? 1 2 6 1
(A) Breakdown compounds are non-hazardous (B) Initiates and accelerates azo bond breakage
(C) Effective oxidation at lab scale (D) Economically feasible

25. The process of swapping organic groups of ester with organic group of alcohol is 1 3 6 1
(A) Esterification (B) Hydroxylation
(C) Hydroesterification (D) Transesterification

**PART – B (5 × 10 = 50 Marks)** Marks BL CO PO
Answer **ALL** Questions

26. a.i. Hydrogen accumulation is a major factor influencing in the anaerobic digestion process. How does the microbial system overcome it? 5 3 1 1

ii. Which anaerobic digestion technology is configured with the aim of managing the influence of acidogens over aceto and methanogens? Explain with a neat reactor configuration. 5 3 1 1

**(OR)**

b. How will you convert a leachate system into energy recovering systems? Explain with suitable design. 10 3 1 1

27. a. Surfactants – Is it beneficial or harmful or both from environmental point of view? Justify with a suitable example for each of your postulates. 10 2 2 1

**(OR)**