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22ESP317AN

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2025
(Third Semester)

Branch- **ENVIRONMENTAL SCIENCE**

MAJOR ELECTIVE COURSE- I: ENVIRONMENTAL ENGINEERING

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Question No.	Question	K Level	CO
1	Which of the following is a primary treatment method in wastewater treatment? a) Aeration b) Screening c) Activated Sludge Process d) Trickling Filter	K1	CO1
2	The type of settling in which discrete particles settle independently without interaction is called: a) Flocculent settling b) Discrete settling c) Hindered settling d) Compression settling	K2	CO1
3	Which of the following is an example of an aerobic treatment process? a) Trickling filter b) Anaerobic digestion c) Septic tank d) Imhoff tank	K1	CO1
4	The term F/M ratio in the activated sludge process refers to: a) Food to Microorganism ratio b) Flow to Mass ratio c) Filtration to Mixing ratio d) Fluid to Material ratio	K2	CO1
5	Which of the following is a disadvantage of anaerobic treatment? a) Low sludge production b) High energy requirement c) Slow microbial growth rate d) Methane gas production	K1	CO2
6	The most commonly used anaerobic reactor for wastewater treatment is: a) Activated sludge reactor b) Trickling filter c) Upflow Anaerobic Sludge Blanket (UASB) reactor d) Rotating biological contactor	K2	CO2
7	In rapid sand filtration, the primary mechanism of particle removal is: a) Sedimentation b) Chemical precipitation c) Mechanical straining and adsorption d) Biological degradation	K1	CO2
8	What is the main reason for membrane fouling in RO systems? a) High water pressure b) Bacterial growth and scaling c) Excess oxygen levels d) High temperature	K2	CO2
9	What is the primary objective of air pollution control equipment? a) To increase air quality b) To remove or reduce air pollutants c) To release more gases into the atmosphere d) To increase industrial emissions	K1	CO3
10	The efficiency of air pollution control equipment depends on: a) Temperature and pressure conditions b) Size and type of pollutants c) Air velocity and resistance d) All of the above	K2	CO3

Cont..

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Explain the different stages involved in wastewater treatment.	K2	CO1
	(OR)		
11.b.	Explain the role of coagulants in wastewater treatment and list commonly used coagulants.		
12.a.	Apply the concept of aerobic treatment and describe how it is used in treating municipal wastewater.	K3	CO1
	(OR)		
12.b.	Identify the major operational parameters that influence the efficiency of the activated sludge process.		
13.a.	Analyze the factors affecting the efficiency of anaerobic sludge digestion.	K4	CO2
	(OR)		
13.b.	Compare and contrast UASB reactors with other anaerobic reactors in terms of design, operational efficiency, and cost-effectiveness.		
14.a.	Analyze the differences between slow sand filtration and rapid sand filtration in water treatment.	K4	CO2
	(OR)		
14.b.	Compare the effectiveness of chemical disinfection and UV disinfection.		
15.a.	Demonstrate how a cyclone separator removes particulate matter from industrial emissions.	K3	CO3
	(OR)		
15.b.	Apply your knowledge of air pollution control equipment to propose a control system for a cement industry.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Discuss the principles and key design criteria that should be considered while designing a wastewater treatment plant.	K6	CO1
17	Examine the role of microbial communities in the activated sludge process and their impact on wastewater treatment efficiency.	K4	CO1
18	Evaluate the economic and environmental feasibility of anaerobic treatment for wastewater management.	K5	CO2
19	Justify the use of filtration over other treatment methods in industrial wastewater treatment.	K5	CO2
20	Analyze the efficiency differences between wet scrubbers and electrostatic precipitators for particulate removal.	K4	CO3

Z-Z-Z END