SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur– 603203

DEPARTMENTOF MECHANICAL ENGINEERING

QUESTION BANK

VII - SEMESTER

PME306 - EQUIPMENT FOR POLLUTION CONTROL

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UNIT – I POLLUTION CONTROL REGULATIONS AND STANDARDS			
Pollutants in water and wastewater –sources and impacts- Characteristics and impacts of solid and hazardous wastes -Indian Constitution and Environmental Protection Legislations - Environmental Standards under different Environmental legislations - Water Act (1974), Air Act (1981), Environmental Protection Act (1986) and major Notifications, Municipal solid Wastes (Management and Handling) Rules -Bio Medical Wastes (Management and Handling) Rules - Hazardous Wastes (Management and Handling Rules),Environment Impact Assessment Notifications - Unit operations and unit processes in Pollution Control- - Selection criteria for Pollution Control Equipment.			
PART - A (2 Marks)			
Q.No	**Questions**	**BTL Level**	**BTL Expansion**
1	Define water pollutants.	BTL 1	Remembering
2	Define wastewater pollutants.	BTL 1	Remembering
3	List the major sources of water pollution.	BTL 1	Remembering
4	List the major sources of wastewater pollution.	BTL 1	Remembering
5	State the impacts of water pollution on human health.	BTL 1	Remembering
6	Classify water pollutants based on their characteristics.	BTL 2	Understanding
7	Define solid waste.	BTL 1	Remembering
8	Define hazardous waste.	BTL 1	Remembering
9	List the characteristics of hazardous wastes.	BTL 1	Remembering
10	Differentiate solid waste and hazardous waste.	BTL 2	Understanding
11	State the environmental protection provisions in the Indian Constitution.	BTL 1	Remembering
12	List the major environmental legislations in India.	BTL 1	Remembering
13	Identify the objectives of environmental standards.	BTL 1	Remembering
14	Compare emission standards and discharge standards.	BTL 2	Understanding

15	State the objectives of the Water (Prevention and Control of Pollution) Act, 1974.	BTL 1	Remembering
16	State the objectives of the Air (Prevention and Control of Pollution) Act, 1981.	BTL 1	Remembering
17	List the important provisions of the Environment (Protection) Act, 1986.	BTL 1	Remembering
18	Differentiate the Water Act (1974) and the Air Act (1981).	BTL 2	Understanding
19	List the objectives of the Municipal Solid Waste Management Rules.	BTL 1	Remembering
20	State the purpose of the Bio-Medical Waste Management Rules.	BTL 1	Remembering
21	List the objectives of the Hazardous Waste Management Rules.	BTL 1	Remembering
22	State the purpose of Environmental Impact Assessment (EIA) Notification.	BTL 1	Remembering
23	Define unit operation in pollution control.	BTL 1	Remembering
24	Define unit process in pollution control.	BTL 1	Remembering
25	Differentiate unit operation and unit process.	BTL 2	Understanding
PART - B (16 Marks)			
Q.No	**Question**	**BTL Level**	**BTL Expansion**
1	Explain the sources and impacts of pollutants in water and wastewater.	BTL 2	Understanding
2	Describe the characteristics and impacts of solid wastes.	BTL 2	Understanding
3	Explain the characteristics and impacts of hazardous wastes.	BTL 2	Understanding
4	Discuss the environmental protection provisions incorporated in the Indian Constitution.	BTL 2	Understanding
5	Explain the environmental standards prescribed under environmental legislations.	BTL 2	Understanding

6	Discuss the objectives and salient features of the Water (Prevention and Control of Pollution) Act, 1974.	BTL 2	Understanding
7	Discuss the objectives and important provisions of the Air (Prevention and Control of Pollution) Act, 1981.	BTL 2	Understanding
8	Describe the salient features of the Environment (Protection) Act, 1986 and its major notifications.	BTL 2	Understanding
9	Explain the Municipal Solid Waste Management Rules.	BTL 2	Understanding
10	Explain the Bio-Medical Waste Management Rules.	BTL 2	Understanding
11	Explain the Hazardous Waste Management Rules.	BTL 2	Understanding
12	Describe the Environmental Impact Assessment (EIA) Notification and its importance.	BTL 2	Understanding
13	Discuss the concepts of unit operations and unit processes used in pollution control.	BTL 2	Understanding
14	Apply suitable unit operations and unit processes for the treatment of industrial wastewater.	BTL 3	Applying
15	Apply the relevant environmental legislation for the management of hazardous waste generated by an industry.	BTL 3	Applying
16	Analyze the effectiveness of the Water Act (1974), Air Act (1981) and Environment (Protection) Act (1986) in pollution control.	BTL 4	Analyzing
17	Elaborate the selection criteria for pollution control equipment used in wastewater treatment.	BTL 4	Analyzing
18	Analyze the role of Environmental Impact Assessment (EIA) in achieving sustainable industrial development.	BTL 4	Analyzing
UNIT – II EQUIPMENT FOR WATER POLLUTION CONTROL			
Operational principles and Design criteria of Flash mixers, Flocculators, Clarifiers, Sand Filters, Adsorption Columns, Aerators, Air blowers, Distillation units, Centrifugal and Reciprocating Pumps, Chemical dosing systems, Motors, Pipes, valves and Fittings - Filed visit to a wastewater treatment plant.			
PART - A (2 Marks)			

Q.No	Question	BTL Level	BTL Expansion
1	Define flash mixer.	BTL 1	Remembering
2	State the purpose of a flash mixer in water treatment.	BTL 1	Remembering
3	Define flocculation.	BTL 1	Remembering
4	Differentiate flash mixing and flocculation.	BTL 2	Understanding
5	State the function of a clarifier in water treatment.	BTL 1	Remembering
6	Differentiate sedimentation and clarification.	BTL 2	Understanding
7	Define rapid sand filter.	BTL 1	Remembering
8	List the functions of a sand filter.	BTL 1	Remembering
9	Define adsorption.	BTL 1	Remembering
10	Classify the adsorbents used in adsorption columns.	BTL 2	Understanding
11	State the purpose of aeration in wastewater treatment.	BTL 1	Remembering
12	Differentiate aerators and air blowers.	BTL 2	Understanding
13	Define distillation.	BTL 1	Remembering
14	State one application of distillation in water treatment.	BTL 1	Remembering
15	Differentiate centrifugal pumps and reciprocating pumps.	BTL 2	Understanding
16	State the function of a chemical dosing system.	BTL 1	Remembering
17	List the components of a chemical dosing system.	BTL 1	Remembering
18	State the function of an electric motor in water treatment equipment.	BTL 1	Remembering
19	List the types of pipes used in water treatment plants.	BTL 1	Remembering

20	Classify valves based on their operation.	BTL 2	Understanding
21	State the purpose of pipe fittings in water treatment systems.	BTL 1	Remembering
22	Differentiate valves and pipe fittings.	BTL 2	Understanding
23	List the major units observed during a wastewater treatment plant visit.	BTL 1	Remembering
24	Identify the sequence of unit operations in a wastewater treatment plant.	BTL 2	Understanding
25	Summarize the importance of equipment selection in wastewater treatment plants.	BTL 2	Understanding
PART - B (16 Marks)			
Q.No	**Question**	**BTL Level**	**BTL Expansion**
1	Explain the operational principle of a flash mixer with a neat sketch.	BTL 2	Understanding
2	Discuss the construction and working of a flocculator with a neat sketch.	BTL 2	Understanding
3	Describe the construction and working of a clarifier.	BTL 2	Understanding
4	Explain the construction and operation of a rapid sand filter.	BTL 2	Understanding
5	Explain the working principle of an adsorption column used in water treatment.	BTL 2	Understanding
6	Describe the construction and working of an aerator.	BTL 2	Understanding
7	Explain the construction and working of a distillation unit.	BTL 2	Understanding
8	Compare flash mixers and flocculators with suitable sketches.	BTL 2	Understanding
9	Explain the construction and working of a centrifugal pump.	BTL 2	Understanding
10	Discuss the construction and working of a reciprocating pump.	BTL 2	Understanding
11	Explain the working of a chemical dosing system used in water treatment.	BTL 2	Understanding

12	Apply the design criteria to select a suitable pump for a given water treatment application.	BTL 3	Applying
13	Apply the selection criteria to choose an appropriate adsorption column for industrial wastewater treatment.	BTL 3	Applying
14	Analyze the performance of a clarifier under varying operating conditions.	BTL 4	Analyzing
15	Elaborate the factors influencing the selection of pollution control equipment for water treatment.	BTL 4	Analyzing
16	Analyze the operational performance of a rapid sand filter in a water treatment plant.	BTL 4	Analyzing
17	Discuss the functions of pipes, valves and fittings used in water treatment plants.	BTL 2	Understanding
18	Summarize the observations made during the field visit to a wastewater treatment plant.	BTL 2	Understanding

UNIT – III EQUIPMENT FOR AIR POLLUTION CONTROL

Operational principle and Design criteria of Cyclone separators, gravity settlers, Wet Scrubbers, Air strippers, Bag Filters, Electro static precipitators, Bio filters –Filed visit to an industry with air pollution control system.

PART - A (2 Marks)

Q.No	Question	BTL Level	BTL Expansion
1	Define cyclone separator.	BTL 1	Remembering
2	State the function of a cyclone separator.	BTL 1	Remembering
3	Define gravity settler.	BTL 1	Remembering
4	Differentiate cyclone separators and gravity settlers.	BTL 2	Understanding
5	Define wet scrubber.	BTL 1	Remembering
6	Classify wet scrubbers based on their operating principle.	BTL 2	Understanding
7	Define air stripper.	BTL 1	Remembering

8	State the purpose of an air stripper.	BTL 1	Remembering
9	Define bag filter.	BTL 1	Remembering
10	Differentiate bag filters and electrostatic precipitators.	BTL 2	Understanding
11	Define electrostatic precipitator (ESP).	BTL 1	Remembering
12	State the function of an electrostatic precipitator.	BTL 1	Remembering
13	Define biofilter.	BTL 1	Remembering
14	Classify biofilters based on filter media.	BTL 2	Understanding
15	State the design objective of cyclone separators.	BTL 1	Remembering
16	State the design objective of wet scrubbers.	BTL 1	Remembering
17	Identify the applications of bag filters.	BTL 1	Remembering
18	Compare wet scrubbers and bag filters.	BTL 2	Understanding
19	State the applications of electrostatic precipitators.	BTL 1	Remembering
20	Compare gravity settlers and cyclone separators.	BTL 2	Understanding
21	List the components of an electrostatic precipitator.	BTL 1	Remembering
22	Identify the factors influencing the selection of air pollution control equipment.	BTL 2	Understanding
23	List the major air pollution control equipment observed during an industrial visit.	BTL 1	Remembering
24	Identify the sequence of air pollution control units in an industry.	BTL 2	Understanding
25	Summarize the purpose of an industrial visit to an air pollution control system.	BTL 2	Understanding
PART - B (16 Marks)			

Q.No	Question	BTL Level	BTL Expansion
1	Explain the operational principle of a cyclone separator with a neat sketch.	BTL 2	Understanding
2	Elaborate the construction and working of a gravity settler with a neat sketch.	BTL 2	Understanding
3	Describe the operational principle of a wet scrubber with a neat sketch.	BTL 2	Understanding
4	Explain the construction and working of an air stripper.	BTL 2	Understanding
5	Discuss the operational principle of a bag filter with a neat sketch.	BTL 2	Understanding
6	Describe the construction and working of an electrostatic precipitator.	BTL 2	Understanding
7	Explain the operational principle of a biofilter with suitable applications.	BTL 2	Understanding
8	Compare cyclone separators and gravity settlers.	BTL 2	Understanding
9	Compare bag filters and electrostatic precipitators.	BTL 2	Understanding
10	Explain the design criteria of wet scrubbers.	BTL 2	Understanding
11	Discuss the design criteria of electrostatic precipitators.	BTL 2	Understanding
12	Apply the design criteria to select a suitable cyclone separator for particulate emission control.	BTL 3	Applying
13	Apply the design criteria to select an appropriate wet scrubber for gaseous pollutant removal.	BTL 3	Applying
14	Analyze the performance of a bag filter under varying operating conditions.	BTL 4	Analyzing
15	Elaborate the factors affecting the efficiency of an electrostatic precipitator.	BTL 4	Analyzing
16	Discuss the selection criteria for air pollution control equipment used in industries.	BTL 4	Analyzing
17	Discuss the observations made during the industrial visit to an air pollution control system.	BTL 2	Understanding

18	Analyze the performance of an air pollution control system employed in an industry.	BTL 4	Analyzing

UNIT – IV EQUIPMENT FOR SOLID WASTE PROCESSING

Operational principles and Design criteria of Dewatering equipment – centrifuge, Vaccum Filter, Filter Press- Size Reduction equipment – shredders, grinders – Trommel and Disc Screens – Air Classifiers - bailing and briquetting – incinerators –Pyrolysis – field visit to a solid waste processing facility

PART - A (2 Marks)

Q.No	Question	BTL Level	BTL Expansion
1	Define dewatering.	BTL 1	Remembering
2	State the purpose of dewatering equipment.	BTL 1	Remembering
3	Define centrifuge.	BTL 1	Remembering
4	Differentiate centrifuge and vacuum filter.	BTL 2	Understanding
5	Define vacuum filter.	BTL 1	Remembering
6	Differentiate vacuum filter and filter press.	BTL 2	Understanding
7	Define filter press.	BTL 1	Remembering
8	List the applications of filter press.	BTL 1	Remembering
9	Define size reduction.	BTL 1	Remembering
10	Differentiate shredders and grinders.	BTL 2	Understanding
11	Define trommel screen.	BTL 1	Remembering
12	Differentiate trommel screens and disc screens.	BTL 2	Understanding
13	Define air classifier.	BTL 1	Remembering
14	State the purpose of an air classifier.	BTL 1	Remembering

15	Define baling.	BTL 1	Remembering
16	Differentiate baling and briquetting.	BTL 2	Understanding
17	Define briquetting.	BTL 1	Remembering
18	State the applications of briquetting.	BTL 1	Remembering
19	Define incineration.	BTL 1	Remembering
20	Differentiate incineration and pyrolysis.	BTL 2	Understanding
21	Define pyrolysis.	BTL 1	Remembering
22	State the products obtained from pyrolysis.	BTL 1	Remembering
23	List the major units observed in a solid waste processing facility.	BTL 1	Remembering
24	Identify the sequence of operations in a solid waste processing facility.	BTL 2	Understanding
25	Summarize the importance of a field visit to a solid waste processing facility.	BTL 2	Understanding
PART - B (16 Marks)			
Q.No	**Question**	**BTL Level**	**BTL Expansion**
1	Explain the operational principle and design criteria of a centrifuge with a neat sketch.	BTL 2	Understanding
2	Elaborate the operational principle and design criteria of a vacuum filter with a neat sketch.	BTL 2	Understanding
3	Explain the operational principle and design criteria of a filter press with a neat sketch.	BTL 2	Understanding
4	Discuss the operational principle and applications of shredders used in solid waste processing.	BTL 2	Understanding
5	Describe the construction and working of grinders used for size reduction.	BTL 2	Understanding
6	Explain the operational principle and design criteria of trommel screens.	BTL 2	Understanding

7	Elaborate the operational principle and design criteria of disc screens.	BTL 2	Understanding
8	Compare trommel screens and disc screens used in solid waste processing.	BTL 2	Understanding
9	Explain the operational principle and applications of air classifiers.	BTL 2	Understanding
10	Discuss the working principle and applications of baling and briquetting equipment.	BTL 2	Understanding
11	Explain the operational principle and applications of incinerators.	BTL 2	Understanding
12	Discuss the operational principle and applications of pyrolysis systems.	BTL 2	Understanding
13	Apply suitable dewatering equipment for sludge generated in a municipal solid waste processing plant.	BTL 3	Applying
14	Discuss the appropriate size reduction equipment for processing different categories of solid waste.	BTL 3	Applying
15	Analyze the factors influencing the selection of dewatering equipment for solid waste processing.	BTL 4	Analyzing
16	Elaborate the selection criteria for thermal treatment methods such as incineration and pyrolysis.	BTL 4	Analyzing
17	Discuss the observations made during the field visit to a solid waste processing facility.	BTL 2	Understanding
18	Analyze the process flow and equipment employed in a solid waste processing facility.	BTL 4	Analyzing

UNIT – V POLLUTION MONITORING EQUIPMENT

Equipment's for sampling of water, solids and air- Sample preservation Equipment – incubators – Cold Storage systems- equipment for analysis of water and air samples- Ambient air and flue gas sampling and monitoring equipment.

PART - A (2 Marks)

Q.No	Question	BTL Level	BTL Expansion
1	Define water sampling.	BTL 1	Remembering

2	List the objectives of water sampling.	BTL 1	Remembering
3	Define air sampling.	BTL 1	Remembering
4	Differentiate grab sampling and composite sampling.	BTL 2	Understanding
5	Define solid sampling.	BTL 1	Remembering
6	Classify sampling equipment used for environmental monitoring.	BTL 2	Understanding
7	State the purpose of sample preservation.	BTL 1	Remembering
8	List the methods of sample preservation.	BTL 1	Remembering
9	Define incubator.	BTL 1	Remembering
10	Differentiate incubators and cold storage systems.	BTL 2	Understanding
11	Define cold storage system.	BTL 1	Remembering
12	State the function of a cold storage system in sample preservation.	BTL 1	Remembering
13	List the equipment used for water sample analysis.	BTL 1	Remembering
14	Classify water quality monitoring equipment.	BTL 2	Understanding
15	List the equipment used for air sample analysis.	BTL 1	Remembering
16	Differentiate water quality analysis and air quality analysis.	BTL 2	Understanding
17	Define ambient air monitoring.	BTL 1	Remembering
18	State the purpose of ambient air monitoring.	BTL 1	Remembering
19	Define flue gas sampling.	BTL 1	Remembering
20	Differentiate ambient air sampling and flue gas sampling.	BTL 2	Understanding
21	List the equipment used for ambient air sampling.	BTL 1	Remembering

22	State the applications of flue gas monitoring equipment.	BTL 1	Remembering
23	Identify the factors affecting sample preservation.	BTL 2	Understanding
24	Summarize the importance of pollution monitoring equipment.	BTL 2	Understanding
25	Classify pollution monitoring equipment based on application.	BTL 2	Understanding
PART - B (16 Marks)			
Q.No	**Question**	**BTL Level**	**BTL Expansion**
1	Explain the equipment used for water sampling with suitable sketches.	BTL 2	Understanding
2	Discuss the equipment used for solid sampling with suitable sketches.	BTL 2	Understanding
3	Explain the equipment used for air sampling with suitable sketches.	BTL 2	Understanding
4	Describe the methods and equipment used for sample preservation.	BTL 2	Understanding
5	Explain the construction and working of an incubator used in environmental laboratories.	BTL 2	Understanding
6	Describe the construction and operation of cold storage systems used for sample preservation.	BTL 2	Understanding
7	Explain the equipment used for water quality analysis.	BTL 2	Understanding
8	Discuss the equipment used for air quality analysis.	BTL 2	Understanding
9	Compare water sampling equipment and air sampling equipment.	BTL 2	Understanding
10	Compare incubators and cold storage systems used for sample preservation.	BTL 2	Understanding
11	Explain the construction and working of ambient air sampling equipment.	BTL 2	Understanding

12	Explain the construction and working of flue gas sampling equipment.	BTL 2	Understanding
13	Discuss the suitable sampling equipment for monitoring the quality of a river water sample.	BTL 3	Applying
14	Apply appropriate sample preservation techniques for different environmental samples.	BTL 3	Applying
15	Analyze the factors influencing the selection of water quality monitoring equipment.	BTL 4	Analyzing
16	Elaborate the factors affecting the performance of ambient air monitoring equipment.	BTL 4	Analyzing
17	Discuss the selection criteria for flue gas sampling and monitoring equipment.	BTL 4	Analyzing
18	Elaborate the importance of pollution monitoring equipment in environmental quality assessment.	BTL 4	Analyzing