Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2025

Course: BBA GES **Semester: IV**
Program: Water Sanitation and Waste Management **Time: 03 hrs.**
Course Code: OGET2008P_3 **Max. Marks: 100**

Instructions:

SECTION A
10Qx2M=20Marks (Answer All Question)

S. No.		Marks	CO
Q 1	**Open defecation is a challenge for water sanitation because it:** a) Wastes time b) Reduces food security c) Contaminates water sources d) Helps soil fertility	**2**	**CO1**
Q 2	**The Swachh Bharat Mission (SBM) launched by the Government of India mainly targets:** a) Urban beautification b) Sanitation and elimination of open defecation c) Clean rivers only d) Plantation drives	**2**	**CO1**
Q 3	**Reverse Osmosis (RO) is a water purification process that uses:** a) High heat b) Ultraviolet rays c) A semi-permeable membrane d) Sand filtration only	**2**	**CO1**
Q 4	**Alum (Aluminum sulfate) is commonly used in water treatment for:** a) Killing germs b) Enhancing taste c) Coagulation and sedimentation of suspended particles d) Increasing water pressure	**2**	**CO1**
Q 5	**The Jal Jeevan Mission by the Government of India aims to provide:** a) Tap water to every household by 2024 b) Electricity to all rural areas c) Free toilets in urban slums d) River cleaning programs	**2**	**CO1**
			CO1

Q 6	**Which of the following is NOT a function of CPCB?** **a**) Advising the central government on pollution matters b) Setting air and water quality standards c) Managing national highways d) Conducting pollution awareness programs	**2**	
Q 7	**Which of the following is an example of biodegradable waste?** a) Plastic bottles b) Aluminum cans c) Vegetable peels d) Glass jars	**2**	**CO1**
Q 8	**Which color-coded bin is usually used for disposing of non-biodegradable waste in India?** a) Green b) Blue c) Red d) Yellow	**2**	**CO1**
Q 9	**Which of the following is considered hazardous waste?** **a) Paper b) Used batteries c) Food leftovers d) Garden waste**	**2**	**CO1**
Q 10	**Which of the following waste treatment methods reduces waste volume the most?** **a**) Composting b) Recycling c) Incineration d) Landfilling	**2**	**CO1**
SECTION B **4Qx5M= 20 Marks**			
Q 1	Discuss the link between climate change and water scarcity in India.	**5**	**CO2**
Q 2	Describe the various methods of water purification used at the household and community level.	**5**	**CO2**
Q 3	What are the environmental impacts of open dumping and landfill sites?	**5**	**CO2**
Q 4	How does hazardous waste differ from municipal waste? What are its disposal challenges?	**5**	**CO2**

SECTION-C **(Attempt any three)** **3Qx10M=30 Marks**			
Q 1	What role can technology and innovation play in transforming urban waste management in India?	**10**	**CO3**
Q 2	How can schools and colleges contribute to effective waste management practices? Give examples.	**10**	**CO3**
Q 3	Discuss the concept of circular economy and its relevance to waste management.	**10**	**CO3**
Q 4	How does the production of biogas through anaerobic digestion in Waste-to-Energy plants help in waste management and renewable energy generation?	**10**	**CO3**
SECTION-D ***(Attempt any two)*** **2Qx15M= 30 Marks**			
Q 1	UPES Institute, a prestigious educational institution located in the outskirts of an urban area, has a student population of 15,000. Over the years, the college has grown significantly, resulting in an increase in waste generation. The campus produces around 1.2 tons of waste per day, including food waste from the canteens, paper, plastic, metal, and electronic waste (e-waste) from administrative offices and student activities. Despite having basic waste collection services, the college's waste management system has been criticized for its inefficiency. The waste is often mixed, making it difficult to recycle, and a large portion of the waste ends up in landfills, contributing to environmental degradation. To address this, the college administration has decided to implement a comprehensive waste management system with the goal of reducing waste sent to landfills by 50% within the next two years. The proposed plan includes the following components: Source Segregation: Waste will be segregated into three categories – wet waste (organic), dry waste (plastic, paper, metal), and e-waste. Recycling Stations: Recycling bins will be placed at key locations across the campus, including dormitories, the cafeteria, libraries, and classrooms. These bins will be clearly marked with the appropriate categories.	**15**	**CO4**

	Composting: Wet waste from the cafeteria and green spaces will be sent to a composting unit, which will then be used to fertilize the college's gardens and grounds. E-Waste Collection: A dedicated e-waste collection drive will be held every semester to collect outdated electronics from students and staff. The e-waste will be sent to authorized recycling facilities. Awareness Campaign: The college plans to launch an awareness campaign to educate students and staff about the importance of waste segregation, reduction, and recycling, and to encourage active participation. Challenges: Awareness and Participation: Many students and staff are not fully aware of the importance of waste segregation and recycling. There are also concerns about whether the system will be used correctly. Inconsistent Waste Segregation: Some areas of the campus might segregate waste effectively, while others may not, leading to contamination of recyclable materials. Operational Costs: The cost of setting up composting units, purchasing additional bins, and organizing regular awareness programs could be high. Lack of Space: The college campus is already crowded, and finding suitable locations for the new waste collection and recycling stations may be challenging. E-Waste Management: Proper disposal and recycling of e-waste requires specialized processes and facilities, which may not be available locally. **Task:** Given the information in the case study, answer the following questions: Evaluate the strengths and weaknesses of the proposed waste management system at UPES. How do you assess the potential impact on reducing waste sent to landfills?		

	What are the key challenges the college is likely to face in ensuring proper waste segregation and participation in the system? Propose solutions to overcome these challenges. How can the college effectively address the issue of e-waste disposal and recycling? What steps can be taken to ensure proper handling and recycling of electronic waste? Discuss the importance of awareness campaigns in waste management systems, especially in educational institutions. How can UPES ensure that students and staff actively participate in waste segregation and reduction efforts? Analyze the financial and operational feasibility of implementing this waste management system. What cost-effective strategies can the college adopt to ensure long-term sustainability of the system?		
Q 2	You have been hired to design a Rainwater Harvesting (RWH) system for a school building in a city with an average annual rainfall of 1,200 mm. The school building has a sloping roof with the following dimensions: Length of the roof: 25 meters Width of the roof: 18 meters Roof Type: Metal roof (Runoff Coefficient = 0.85) Your task is to calculate: The catchment area (in m^2) for the roof. The total amount of rainwater harvested annually (in liters). If the school wants to store rainwater in a storage tank with a capacity of 150,000 liters, how many days of water usage will the tank supply, assuming the school uses an average of 500 liters of water per day?	**15**	**CO4**
Q 3	The city of Mumbai, with its population of over 20 million, faces significant challenges in managing municipal solid waste (MSW). Over 9,000 tons of waste are generated daily, with a large portion consisting of organic waste such as food waste, garden waste, and other biodegradable materials. Currently, waste disposal methods such as landfilling and open dumping are still prevalent in the city, leading to significant environmental issues, including groundwater contamination, methane emissions, and land-use problems.	**15**	**CO4**

	To address this, the city has begun exploring Waste-to-Energy (WtE) technology as a potential solution. A WtE plant has been proposed for the city's Deonar landfill, one of the largest landfills in India. The proposed WtE plant aims to convert a portion of the city's waste into electricity while reducing the burden on the landfill. The project is designed to process 1,000 tons of waste per day and generate 15 MW of electricity, which will be fed into the city's grid. However, the project faces several challenges: Waste Segregation: The success of the WtE plant heavily depends on the segregation of waste at the source, which is currently not well-practiced in Mumbai. Environmental Concerns: There are concerns about air pollution from the incineration process and the emission of toxic gases, which could have adverse effects on public health. High Initial Costs: The capital investment required for setting up the plant is high, and there are doubts about the financial sustainability of the project. Public Opposition: Local communities are protesting against the plant, citing environmental concerns and the potential impact on nearby residential areas. **Task:** Given the information in the case study, answer the following questions: Evaluate the potential benefits of Waste-to-Energy technology in Mumbai's waste management system. What are the major challenges faced by the proposed WtE plant, and how can these challenges be addressed? Propose a strategy to ensure effective waste segregation in Mumbai to support the success of the WtE project. Discuss the environmental concerns associated with Waste-to-Energy plants and suggest measures to mitigate their impact on local communities and the environment. How can public-private partnerships (PPPs) play a role in ensuring the financial viability and sustainability of WtE projects in India?		