School of Engineering and Applied Science, Ahmedabad University

Name: _____ Roll no.: _____

B.Tech Chemical Engineering
CHE 207 Environmental System Engineering, End Term Examination (Winter 2024–2025)
Marks: 40, Wt.: 40%
27th April 2025, Sunday, 011.00 AM – 1:00 PM (Time duration: 2.0 hrs)

Section A

Answer any 5; Each of 5 marks

1. Draw the flow sheet of a sewage treatment plant for municipal waste. (5 marks)

2. How the hospital solid waste management works? Describe using flow sheet and figures. (5 marks)

3. How does life cycle assessment work? What are the benefits of LCA? (5 marks)

4. What are the methods for treatment of air pollutions? (Discuss industrial practices only (5 marks)

5. What is aerobic and an-aerobic digestion (5 marks)

6. What is the process of calculating the LCA of a glass bottle. What are the sustainability factors for this product. (Use diagrams and flow charts of the procedure) (5 marks)

Section B

7. The write up for the Namami Gange Programme is given.
Answer **any one** of the following in about 600–800 words. (15 marks)

(a) **Case Study Analysis:**

Read the provided summary of a Namami Gange project (e.g., sewage treatment plant upgrade in Kanpur or Haridwar). Identify key issues, stakeholders, implementation strategies, and outcomes. Provide your critical assessment of its sustainability and replicability.

(b) **Policy Critique and Recommendation:**

Critically evaluate the policy design of Namami Gange with respect to inter-ministerial coordination, state participation, and long-term environmental impact. Suggest strategic improvements to enhance the success of such national river rejuvenation programs.

Ministry of Jal Shakti

Azadi Ka Amrit Mahotsav

Namami Gange Programme

Posted On: 04 DEC 2023 6:15PM by PIB Delhi

Namami Gange Programme was launched in June 2014 for a period up to 31st March, 2021 to rejuvenate River Ganga and its tributaries. The programme was subsequently extended up to 31st March, 2026. A total sum of Rs. 16,011.65 crore were released by the Government of India to the National Mission for Clean Ganga (NMCG), from Financial Year 2014-15 till 31st October 2023. NMCG have released/disbursed Rs. 15,015.26 crore to various agencies during the said period, for implementation of projects under the Programme. The year-wise details are as under:-

Financial Year	**Releases by Government of India (Rs. in crore)**	**Disbursement/release by NMCG (Rs. in crore)**
2014-15	326.00	170.99
2015-16	1,632.00	602.29
2016-17	1,675.00	1,057.87
2017-18	1,423.12	1,579.81
2018-19	2,307.50	2,589.74
2019-20	1,553.40	2,297.11
2020-21	1,300.00	1,339.97
2021-22	1,892.70	1,881.76
2022-23	2,220.00	2,215.85
2023-24*	1,681.93	1,279.87
Total	**16,011.65**	**15,015.26**

(Till 31st October 2023)

The state-wise details of sanctioned projects, their cost allocation and completed projects is enclosed at **Annexure-I.**

Central Pollution Control Board (CPCB) has estimated sewage generation of 3558 MLD from the 110 Ganga front towns in 5 Ganga main stem states (Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal). With the interventions taken up under Namami Gange programme, at present the total treatment capacity along the towns located along main stem of river Ganga increased to 2589 MLD. In addition, approximately 910 MLD sewage is treated through East Kolkata Wetland. Apart from the above, projects for developing 1104 MLD STP capacity in the towns along river Ganga main stem have been taken up which are at different stages of implementation.

As informed by CPCB, under the Namami Gange prgramme, during December 2021-April 2022, 2706 Grossly Polluting Industries (GPIs) having potential to discharge into river Ganga & its tributaries in seven states Uttar Pradesh, Uttarakhand, Bihar, Jharkhand, West Bengal, Delhi and Haryana were inspected. It was estimated that these GPIs discharge about 411.25 million litres per day wastewater having pollution load of 27.71 tonnes per day in terms of BOD.

Actions taken by the Government for pollution abatement, including sewage and industrial pollution Management for river Ganga are as follows:

Under Namami Gange Programme, a comprehensive set of interventions such as wastewater treatment, solid waste management, river front management (ghats and crematoria development), e-flow, afforestation, biodiversity conservation and Public Participation etc. have been taken up for rejuvenation of river Ganga and its tributaries. So far, a total of 450 projects have been taken up at an estimated cost of Rs. 38,022.37 Crore, out of which 270 projects have been completed and made operational. Majority of the projects pertain to creation of sewage infrastructure as the untreated domestic/industrial wastewater is the main reason for pollution in the river. 195 sewerage infrastructure projects have been taken up with a cost of Rs. 31,344.13 crore for creation & rehabilitation of 6,173.12 Million Litres per Day (MLD) of Sewage Treatment Plant (STP) capacity and laying of around 5,253.64 km sewerage network. Among these, 109 sewerage projects have been completed resulting in creation & rehabilitation of 2664.05 MLD of STP capacity and laying of 4465.54 km sewerage network.

PRAYAG-Platform for Real-time Analysis of Yamuna, Ganga and their Tributaries, an online dashboards was setup on 20th April 2023 for continuous monitoring of river water quality, performance of Sewage Treatment Plants (STPs), Common Effluent Treatment Plant (CETPs) and etc. on the Ganga and Yamuna river.

Stringent monitoring and regulation of industries and pollution sources is undertaken to assess the compliance status of Grossly Polluting Industries (GPIs) for enforcing regulatory framework on the polluting industries. Stringent action is taken by Central Pollution Control Board (CPCB)/State Pollution Control Boards (SPCBs)/ Pollution Control Committees against the GPIs discharging into main stem of Ganga River & its tributaries which are non-complying with respect to the prescribed norms.

Annual inspection of Grossly Polluting Industries (GPIs) operating in main stem of river Ganga & its tributaries is undertaken under Namami Gange Programme since 2017. Inspection of 1109 GPIs in 2017, 961 GPIs in 2018, 1072 GPIs in 2019, 2740 GPIs in 2020, 2706 GPIs in 2021 and 3186 GPIs in 2022 were carried out by joint team of technical institutes and concerned State Pollution Control Boards (SPCBs).

Industry specific discharge standards for various type of industrial categories have been notified under Environment (Protection) Rules, 1986. The industries are required to provide adequate treatment to the effluent through effluent treatment plant (ETP) so as to meet the notified effluent discharge standards. Defaulting industries are issued appropriate directions including show-cause notices and closure directions by NMCG for those CETPs/ETPs non-conforming to the discharge standard.

Central Pollution Control Board (CPCB) has formulated charter based participatory approach to facilitate the industries for water recycling and pollution prevention in major industrial sectors like Pulp & Paper, Sugar, Distillery, Textile and Tannery in river Ganga main stem states emphasizing on technological upgradation, waste minimization practices, augmentation of effluent treatment plants (ETPs) and reuse/recycle of treated effluents which resulted in reduction in specific fresh water consumption, waste water discharge & pollution load and improvement in compliance.

On the directions of NGT in 2018, in respect of the 351 polluted river stretches, State Governments have constituted River Rejuvenation Committees, for preparation of Action Plans for restoration of the identified polluted river stretches. The same were approved by Central Pollution Control Board (CPCB) for implementation by the States. The implementation of these Action Plans are monitored regularly by Chief Secretaries at State Level and on monthly /bimonthly basis by Central Monitoring Committee under Chairmanship of Secretary, DoWR,RD&GR, Ministry of Jal Shakti. Central Pollution Control Board (CPCB) in 2022 has identified 311 Polluted River Stretches (PRS) in 279 rivers in 30 States & Union Territories based on 2019 and 2021 data.

Further, the identification and assessment of quality and quantity of major drains joining river Ganga and its tributaries, establishment/upgradation of Wastewater Treatment Plants for the towns located on Ganga main stem and its tributaries, performance evaluation of those wastewater treatment plants are undertaken.

Directions are issued by CPCB for proper management of sewage and industries pollution time to time. National Mission for Clean Ganga (NMCG) is also engaged in monitoring of Wastewater treatment plants

located on the bank of river Ganga and its tributaries and appropriate directions are issued regarding the compliance and functioning of Wastewater Treatment Plants.
This information was given by the Minister of State for Jal Shakti, **Shri** Bishweswar Tudu in a written reply in **Rajya Sabha** today.

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ANNEXURE-I

State-wise details of sanctioned projects, their cost allocation and completed projects

S.No.	Type of Project		No. of Projects Sanctioned	Total Sanctioned Cost (Rs. in Cr.)	No. of Projects Completed
1	Sewerage Projects	Uttarakhand	41	1,581.59	36
		Uttar Pradesh	69	14,097.18	37
		Bihar	37	6,160.15	13
		Jharkhand	5	1,310.30	2
		West Bengal	27	4,742.02	11
		Haryana	2	217.87	2
		Delhi	9	1951.03	7
		Himachal Pradesh	1	11.57	1
		Rajasthan	1	258.48	0
		Madhya Pradesh	2	603.94	0
		Modular STP Decentralized	1	410.00	0
		Total	**195**	**31,344.13**	**109**
2	Entry Level Activities		104	1733.88	79
3	Solid-Waste Management		12	295.26	9
4	Institutional Development (Non -Infrastructure)		29	1764.30	9
5	Project Implementation Support/Research & Study Projects/Public Relations and Public Outreach		37	260.29	12
6	Biodiversity		14	238.93	8
7	Afforestation		37	525.18	32
8	Composite Ecological Task Force & Ganga Mitra		6	200.18	5
9	Bioremediation		15	238.96	7
10	Construction of IHHL across Gram Panchayats near Ganga River		1	1421.26	0
	Grand Total		**450**	**38022.37**	**270**