Name: _____   ID: _____   28/12/2023

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI, PILANI
First Semester 2023 – 2024
BITS F474 (Rural Infrastructure Planning) Comprehensive (Closed Book)
Instructor In-Charge : Dr. Nishant Bhargava

Max. Marks : 70   **Duration : 3 hours**

1. Determine the minimum total throughput requirement at a Gram Panchayat having a population of 1,000. Assume necessary data. **[3]**

2. List the advantages and limitations of any one of the three technologies. **[3]**
   a. Composting
   b. Vermi-composting
   c. Bio-gas plant

3. There are two villages A and B. Compare the SLWM index and comment on the comparative cleanliness of the village. Use $S = 0.5\,X_2 + 0.17\,X_3 + 0.33\,X_4$ **[3]**

Criteria	Village A	Village B
% level of litter free around public places	80	70
% of households having no stagnant waste water around them	60	70
% of households having no litter around them	90	80
% of households having access to safe sanitation	60	80

4. With the help of a flow chart, describe the greywater management interventions in rural areas. Include key components like population size and technological options. **[3]**

5. Determine the dimensions of the community leach pit for 10 households. Assume necessary data. **[3]**

6. Explain the role of telecommunication and energy infrastructure on the development of rural areas. **[5]**

7. List the thrust areas and provide a brief description of any of the two sustainability development goals. Explain the impact of rural infrastructure on these two SDGs. **[5]**

8. List the key features of BharatNet Planning Tool. Explain any two in detail. **[5]**

9. List the technological options for greywater management at household and community level. With the help of flow chart, describe the criteria for selection of greywater management technology for the following scenarios: **[10]**
   a. Permanent high water table
   b. Hard strata/rocky areas
   c. Remaining scenarios

10. Explain the steps for effective solid waste management approach for rural areas at both household and community level. Provide an illustration depicting ideal solid waste management approach. **[10]**

11. Identify and describe the geographical requirements and construction process for the greywater management technology provided in the figure provided below. **[10]**
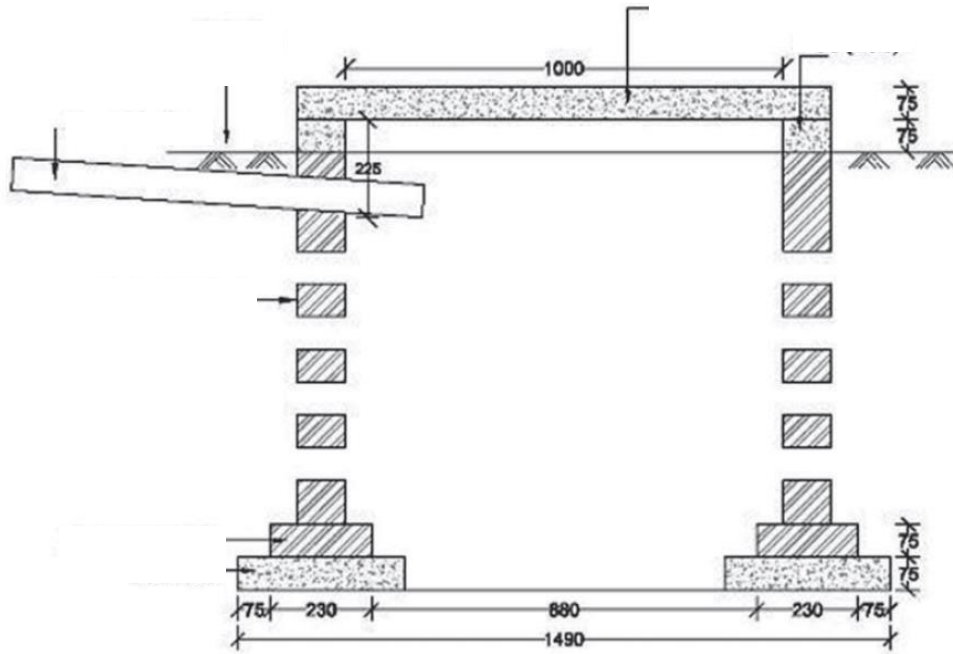
12. It is proposed to achieve an optimum C/N ratio through blending yard waste with food waste. The yard waste has been found to contain mainly leaves and grass in the ratio of 1.2 by weight. Laboratory tests provide the following data for all the three components:

	Moisture content	Carbon	C/N ratio
Grass	77%	45%	18.75
Leaves	35%	50%	66.67
Food waste	80%	42%	8.4

Determine the proportions of each component to achieve a blended C/N ratio of 30. What shall be the moisture content of the blended solid waste? **[10]**