

KATHMANDU UNIVERSITY
End Semester Examination
September 2024

Marks Scored:

Level : B.Sc.

Year : I

Exam Roll No. :

Time: 30 mins.

Course : ENVE 101

Semester : II

F. M. : 20

Registration No.:

Date : 20 SEP 2024

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle the most appropriate answer.

- In SI system, the basic unit of volumetric flow rate is?
a. m^3/s b. MLD c. L/d d. m^3/d
- During analysis of 1 litre water sample in a lab, 15 mg pollutant concentration was found. The concentration in ppb is _____.
a. 15 b. 15×10^{-3} c. 1.5×10^3 d. 1.5×10^2
- A wastewater treatment plant discharges a flow of $1.5 \text{ m}^3/\text{s}$ at a solids concentration of 20 mg/L. How much solids is the plant discharging each day in kg?
a. 260 b. 2600 c. 26 d. 2.6
- Which of the following is Mass intensive Property?
a. Density c. Mass
b. Volume d. Internal Energy
- Catchment area is _____.
a. The area of land draining into a stream or a water course.
b. Small rivers that join the main river.
c. The place where a river flows into another body of water.
d. Water lost from seepage.
- The mass balance equation for steady state non-conservative system is _____.
a. Input = Output c. Input = Output + KCV
b. Accumulation = Input + Output d. Accumulation = Input - Output
- A bypass stream does not go through which of the following...
a. Process b. feed c. both a & b d. product
- Release of methane from anaerobic wastewater treatment is example of ...
a. Gas-liquid mass transfer
b. Liquid-solid mass transfer
c. Solid-gas mass transfer
d. Liquid-gas mass transfer
- Wet weather flow is _____.
a. water from rainfall. c. sewage flows and runoff
b. wastewater from Kitchen d. treated water

10. If water is to be transported from lower elevation to higher elevation on the hill, required additional unit or chamber is _____.
- Pumping system
 - Digital meter
 - Control Valve and Sensors
 - Break Pressure Tank
11. _____ is the process of water treatment in which turbidity and colloidal matter of non settleable types are removed.
- Filtration
 - Aeration
 - Screening
 - Sedimentation
12. The sound power level results from combining the 65 dB, 60 dB, and 70 dB is _____.
- 72
 - 75
 - 70
 - 65
13. The means of access for inspection and cleaning sewer line is known as _____.
- Manhole
 - Inlet
 - Cover
 - Catch Basin
14. The phase when microbes start declining from its peak is known _____ Phase.
- Lag
 - Log
 - Stationary
 - Endogenous
15. _____ work is the process of carrying water from intake to the treatment unit is called
- Collection
 - Distribution
 - Transmission
 - Treatment
16. In a Monod Equation, the condition $S \gg K_s$ yields which of the following statements?
- $\mu = \mu_m$
 - $\mu = \frac{1}{2} \mu_m$
 - $\mu = 2\mu_m$
 - No relation exists
17. Air quality index are _____.
- Measure of how clean or polluted the air is.
 - Presence of contaminants in the atmosphere.
 - Devices that work to prevent a variety of different pollutants.
 - Acceptable threshold level of air pollution
18. Environmental Impact Assessment (EIA) is conducted for _____.
- Products
 - Policies
 - Projects
 - None
19. A town of 5,000 households each fill up one 100 liter (density of waste in bins is 100 kg/m^3) container of refuse per week. What density would a 12 m^3 packer truck have to compact the refuse to be able to collect all during two trips in a week?
- 30000 kg/m^3
 - 2083 kg/m^3
 - 100 kg/m^3
 - 500 kg/m^3
20. A Functional Unit is _____.
- defines how big a part of product life cycle will be.
 - a quantified description of the performance of the product systems.
 - description of material and energy flows.
 - critical balance of supplies.

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Make a logical assumption wherever required.

SECTION "B"

[8Q. × 5 = 40 marks]

Attempt *ALL* questions.

1. A kitchen with volume 500m^3 operating for an hour is using 10 wood burning stoves, each using 3 kg of wood. 1 kg of wood emits 1.4 mg of harmful chemical (CO). The CO is converted to CO_2 with reaction rate coefficient of 0.35 /hr. Fresh air enters in the air with the rate of $1500\text{ m}^3/\text{hr}$ and state air leaves at the same rate. For a completely mixed system, calculate the steady state concentration of harmful chemical in the air using mass balance method.
2. Determine the population of a city by 2044 by arithmetical increase methods based on the following information. If per capita demand will be 200 lpd by 2044, Estimate the water demand of the city using arithmetic and geometric projection method.

Year	1964	1974	1984	1994	2004	2014	2024	2044
Population	12000	16500	26800	41500	57500	68000	74100	?

3. Explain the physical and chemical properties of solid waste?

OR

Describe the Properties of Hazardous waste.

4. Determine the combined discharge from the following data.

Permeability = 50%

Area to be served = 6, 00,000 sq. m.

Population density = 1084 per ha.

Rate of water supply = 120 lpcd

Wastewater generation rate = 80% of rate of water supply

Time of concentration = 23 mins

Peak factor = 3

5. Calculate the annual evapotranspiration (ET in m/year) for a river basin of area 11839 km^2 having average annual runoff (R_{out}) $144.4\text{ m}^3/\text{s}$. The average annual precipitation (P) is 1.08 m. Assume no loss by infiltration. The net change in water storage over a year is zero.
6. With the support of the schematic diagram the sewer system and explain its components.

P.T.O.

7. What are the three types of Environmental assessment prevailed in projects of Nepal? Explain in brief.
8. Discuss with examples about the role of principles of Green Engineering in promoting sustainability in the design and development of environmentally friendly technologies?

OR

How do poor air quality conditions impact public health, ecosystems, and climate? Discuss on the importance of regulations, air quality standards, and technological innovations in reducing air pollution.

SECTION "C"

[15 marks]

9. Differentiate between *ANY TWO* of the following. [3+3=6]
 - a. Cyclone separators and Electrostatic Precipitator
 - b. IEE and EIA
 - c. Separate and Combined Sewer
10. Write Short Notes on *ANY TWO* of the following. [3×3=9]
 - a. Engineering Project
 - b. Monod Equation
 - c. Life Cycle Assessment.
 - d. Hydraulic Retention Time