KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Marks Scored:

Level : B.Sc.
Year : II

Course : ESEE 221
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 20 FEB 2025

SECTION "A"

[20Q. × 1 = 20 marks]

Choose and encircle the most appropriate answers from the given choices.

1. Which of the following is a primary air pollutant?
   a. Ozone
   b. Sulphur Dioxide
   c. Peroxyacetyl Nitrate (PAN)
   d. Formaldehyde

2. Which of the following measures can help reduce noise pollution
   a. Planting trees and shrubs
   b. Increasing vehicle speed
   c. Using louder machinery
   d. Reducing green spaces in urban areas

3. What is the primary factor affecting the gravitational settling of particles in air?
   a. Wind speed
   b. Particle size and density
   c. Air humidity
   d. Light intensity

4. Which one of the following wastewater contains food particles?
   a. Brown water
   b. Yellow water
   c. Black water
   d. Green water

5. Among the following, extremely expensive pollution control method
   a. Control at source
   b. Resource recovery
   c. Restoration
   d. Remediation

6. Maximum permissible storage time for determining Biological Oxygen Demand of water is:
   a. 24hours
   b. 4hour
   c. 6months
   d. l month

7. The fastest exposure route to show effects in the human body is through
   a. Ingestion
   b. Dermal
   c. Inhalation
   d. Injection

8. Ambient Environment Monitoring does not include:
   a. Air Pollution Monitoring
   b. Noise Level Monitoring
   c. Project Lifecycle Assessment
   d. Water Pollution Monitoring

9. What is the effective pH range for coagulation using Alum?
   a. 3.5 - 6.5
   b. 6.5 - 8.5
   c. 8.5 - 10.5
   d. 4.5 - 7.5

10. In isokinetic sampling, the sample flow rate is adjusted to match
    a. The velocity of the gas stream being sampled
    b. The concentration of gaseous pollutants in the air
    c. The temperature of the sampling equipment
    d. The pressure inside the sampling chamber

11. Which coagulant aid is commonly used to strengthen flocs?
    a. Bentonite clay
    b. Activated silica
    c. Sodium bicarbonate
    d. Copper sulfate

12. In a river, a pollutant released from an industrial discharge point spread downstream. The process primarily responsible for the downstream movement of the pollutant due to the bulk movement of the water is____.
    a. Advection
    b. Turbulent dispersion
    c. Gravitational settling
    d. Centrifugal settling

13. Mitigation and monitoring in the project cycle does not include
    a. Design
    b. Implementation
    c. Decommission
    d. Policy Development

14. Devices, which utilize liquid to assist in the removal of participles from carrier gas stream:
    a. Cyclone
    b. Scrubber
    c. Fabric filter
    d. Inertial separator

15. Which of the following is an example of Advection?
    a. Smokestack fume blown by the wind
    b. Spreading of a chemical in still water
    c. Soil particles settling at the bottom of a lake
    d. Cyclone dust remover

16. Carbon dioxide is produced when carbon and oxygen react with each other. What would be the amount (weight) of carbon dioxide when 1 mol of carbon reacts with 1 mol of oxygen?
    a. 44 grams
    b. 34 grams
    c. 24 grams
    d. 14 grams

17. The concentration of ozone in the atmosphere is measured in
    a. Pascal's unit
    b. Dobson unit
    c. Chapman's unit
    d. Boyle's unit

18. To classify the water as "hard water", the concentration of Ca and Mg in water should be around
    a. Up to 70 mg/L
    b. 70-140 mg/L
    c. 150-300 mg/L
    d. Above 350 mg/L

19. One of the common solid waste management systems in Nepal is
    a. Open burning
    b. Open dumping
    c. Sanitary Landfill
    d. Riverside dumping

20. Top soil loss from the slopes upstream in the watershed can be easily assessed with a _____ downstream
    a. visual turbidity monitor
    b. turbulent dispersion
    c. counting number of trees
    d. increased flow rate

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F. M. : 55

SECTION "C"
[3Q. × 7 = 21 marks]

Attempt *ANY THREE* questions.

1. What are the major environmental problems of Nepal? How can they be minimized or mitigated? Discuss on implementation of different strategies.

2. Discuss the factors affecting water demand and how they influence water supply system design.

3. Explain the different types of air pollutants and their impact on human health and the environment.

4. The analysis of water from a well showed the following results in mg/L:
$Ca^{++} = 50$, $Mg^{++} = 51$, $Na^{++} = 91.5$, $K^{+} = 24$, $HCO_3^{-} = 235$, $SO^{4--} = 218$, $Cl^{-} = 79.2$
Find the carbonate hardness, non-carbonate hardness and total hardness

5. Attempt ***ANY FIVE*** questions. [5 Q. × 5 = 25 marks]
   a. What are the advantages and disadvantages of using Alum as a coagulant in water treatment?
   b. What is the difference between primary and secondary air pollutants? Give examples.
   c. Explain advection and diffusion in the context of environmental transport phenomena.
   d. Explain the working mechanism of a slow sand filter and its efficiency in removing contaminants.
   e. Draw schematic diagram of typical rural water supply system and state the mechanism of each unit.
   f. Discuss the role of environmental monitoring in pollution control. What are the major techniques used in air and water quality monitoring?

6. Write Short Notes on. (***ANY THREE***) [3 Q. × 3 = 9 marks]
   a. Climate change
   b. Biological Oxygen Demand
   c. Ozone formation and destruction
   d. Solid waste management