KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Marks Scored:

Level : B.E.
Year : II

Course : ESEE 221
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 03 JUL 2024

SECTION "A"
[20 Q. × 1 = 20 marks]

Encircle the most appropriate answer OR give an appropriate objective answer.

1. Alum is used as _____ in water treatment system.
   [ ] Disinfectant [ ] Coagulants [ ] Filter media [ ] Sediments

2. Which one of the processes is not secondary wastewater treatment?
   [ ] Activated sludge [ ] Carbon adsorption
   [ ] Rotating biological contractors [ ] Trickling filter

3. What is eutrophication?
   [ ] The warming of oceans
   [ ] The increase in nutrients in water bodies
   [ ] The accumulation of heavy metals in soil
   [ ] The release of greenhouse gases into the atmosphere

4. Ambient Environment Monitoring does not include:
   [ ] Air Pollution Monitoring [ ] Water Pollution Monitoring
   [ ] Noise Level Monitoring [ ] Project Lifecycle Assessment

5. According to the theory of filtration, as the thickness of the cake increases:
   [ ] Resistance to flow of filtrate increases [ ] Pollution level remains constant
   [ ] Resistance to flow of filtrate decreases [ ] Filtration gets more effective

6. Turbidity is a cloud appearance of water caused by _____ particles suspended therein:
   [ ] Small [ ] Large [ ] Coloured [ ] Organic

7. Greenhouse effect refers to an increase in:
   [ ] Global temperature [ ] Carbon monoxide
   [ ] Atmospheric pressure [ ] Greenery

8. Motion with respect to the carrying fluid by random molecular collision is:
   [ ] Dispersion [ ] Diffusion
   [ ] Gravitational settling [ ] Advection

9. Which one of the following wastewater contains food particles?
   [ ] Brown water [ ] Yellow water
   [ ] Black water [ ] Green water

10. Maximum permissible storage time for determining Biological Oxygen Demand of water is:

[ ] 24 hours [ ] 4 hour [ ] 6 months [ ] 1 month

11. Preservatives, added for analyzing Iron in during water sample collection is:

[ ] NO_3 [ ] H_3PO_4 [ ] HNO_3 [ ] $CuSO_4$

12. Bacteria, that grows best at temperature below 20^0C

[ ] Mesophiles [ ] Thermophiles
[ ] Psychrophiles [ ] Steno-thermophiles

13. Which of the following is a primary pollutant?

[ ] Ozone [ ] Nitrogen dioxide
[ ] Carbon monoxide [ ] Sulfuric acid

14. Which one of the following surfaces has the highest albedo?

[ ] fresh snow [ ] green meadow
[ ] desert [ ] deep sea water

15. Devices, which utilize liquid to assist in the removal of participles from carrier gas stream:

[ ] Cyclone [ ] Scrubber
[ ] Fabric filter [ ] Inertial separator

16. Removal of hardness of water is done using:

[ ] Screening [ ] Filtration [ ] Softening [ ] Aeration

17. Which type of pollution is primarily caused by agricultural activities?

[ ] Thermal Pollution [ ] Noise Pollution
[ ] Soil Pollution [ ] Light Pollution

18. What is the main cause of acid rain?

[ ] Carbon dioxide [ ] Methane
[ ] Sulphur dioxide [ ] CFCs

19. What type of pollution is most directly associated with the increase in the use of plastics?

[ ] Air Pollution [ ] Water Pollution
[ ] Soil Pollution [ ] Noise Pollution

20. Which of the following measures can help reduce noise pollution

[ ] Planting trees and shrubs [ ] Increasing vehicle speed
[ ] Using louder machinery [ ] Reducing green spaces in urban areas

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Semester : II
F. M. : 55

SECTION "B"
[2Q. × 10 = 20 marks]

Read the given case study and attempt ALL questions.

1. The town of Rampur, with a population of about 20,000, relies on the nearby Amrit Nadi for drinking water. Recently, there has been an increase in waterborne diseases, prompting an upgrade to the town's outdated water treatment plant. The new treatment process includes four stages: coagulation, sedimentation, filtration, and disinfection.
In the coagulation stage, chemicals are added to the water to aggregate suspended particles into larger flocs. During sedimentation, these flocs settle to the bottom and are removed. The water then undergoes filtration, where it passes through sand, gravel, and charcoal to remove smaller impurities. Finally, chlorine is added during disinfection to kill harmful microorganisms, ensuring the water is safe for consumption. This comprehensive upgrade aims to improve the water quality and reduce the incidence of waterborne diseases in Rampur.

Questions: [5Q×2 = 10]

a. What is the primary purpose of the coagulation process in water treatment?
b. Explain the role of sedimentation in the water treatment process.
c. Why is filtration necessary even after coagulation and sedimentation?
d. What is the purpose of the disinfection process in water treatment?
e. Name one common disinfectant used in water treatment and describe its effectiveness.

2. The mid-sized city of Mitrapur has been experiencing high levels of air pollution, primarily from vehicle emissions and industrial activities. Residents have reported increasing respiratory issues, prompting the city council to take action. They implemented several measures, including stricter vehicle emission standards, promoting public transportation, and requiring factories to install advanced air filters.

Stricter vehicle emission standards aim to reduce pollutants like carbon monoxide, nitrogen oxides, and particulate matter by enforcing the use of cleaner technologies and fuels. Promoting public transportation reduces the number of vehicles on the road, decreasing overall emissions. Factories are now required to use air filters that capture and remove pollutants from exhaust gases before they are released into the atmosphere. These measures are designed to improve air quality and protect public health in Mitrapur.

Questions: [5Q x 2 = 10]

a. What are the main pollutants released by vehicle emissions that contribute to air pollution?
b. How do stricter vehicle emission standards help improve air quality?
c. Explain how promoting public transportation can lead to improved air quality?
d. What is the function of air filters in controlling air pollution?
e. Suggest on additional measure the city could implement to further reduce air pollution.

SECTION "C"

[7Q. × 5 = 35 marks]

Attempt *ANY SEVEN* questions:

3. What are the causes of air pollution? Give brief description about the sources of air pollution.

4. Discuss about the primary and secondary air pollutants with examples.

5. Write briefly about five types of waste water generated from different sources.

6. What are the important factors that contribute to the characteristics of the colloidal particles?

7. Write short notes on Biological Oxygen Demand (BOD).

8. What are the types of water demands for semi urban area?

9. Discuss briefly about the classification of impurities on the basis of their characteristics.

10. Differentiate between Slow Sand Filter and Rapid Sand Filter.

11. Discuss about the the common coagulants used in colloidal entrapment.