KATHMANDU UNIVERSITY
End Semester Examination
May/June, 2022

Marks Scored:

Level : B. Tech.
Year : III
Course : BIOT 307
Semester : II

Exam Roll No:
Time: 30 mins.
F. M. : 20

Registration No.:
Date :

SECTION "A"
[10Q. × 1 = 10 marks]

Encircle the most appropriate option among the given choices.

1. If a 2% solution of sewage sample is incubated for 5 days at 20°C and the dissolved oxygen depletion was found to be 8 mg/l, the BOD of the sewage is
   a. 100 mg/l b. 200 mg/l c. 300 mg/l d. 400 mg/l

2. Baculoviruses
   a. are pathogens that attack insects and other arthropods.
   b. are used as biofertilizers.
   c. have negative impacts on plants, mammals, birds and fish.
   d. are species-specific and have broad spectrum insecticidal applications.

3. Activated sludge usually employs an aeration period of
   a. 1 hour b. 4-8 hours c. 2-16 hours d. 24 hours

4. If you see a pile of grass clippings, old cornstalks, bean vines and tomato stems that are decaying to return nutrients to the soil, what is it?
   a. An ant hill b. An ethanol pile c. A pile of manure d. A compost heap

5. Which of the following organisms are known to grow on the surfaces of freshly exposed rocks?
   a. Green algae b. Cyanobacteria c. Diatoms d. Yeast

6. The minimum recommended concentration of residual Cl_2 in drinking water is
   a. 0.4-0.6 mg/l b. 0.4-0.6 µg/l c. 4-6 mg/l d. 4-6 µg/l

7. Find the **FALSE** statement for the typical secondary sewage treatment plant.
   a. It does NOT kill all the pathogens.
   b. It does NOT digest many man-made organic chemicals.
   c. It does NOT remove organic materials.
   d. It does NOT produce potable water

8. _____ uses fungi present in natural wood decay to alter the lignin in the cell walls of the wood, which therefore "softens" the wood chips.
   a. Biofungicides b. Bioremediation c. Biopulping d. Biobleaching

9. Which of the following substances has the least relative biodegradability?
   a. petroleum fuels
   b. aromatic hydrocarbons
   c. alcohols
   d. chlorinated hydrocarbons

10. The various potential benefits of microorganisms on plant performance and crop yield suggest their substantial application in agriculture, except
   a. Giberellin production
   b. Phosphate solubilization
   c. Atmospheric N_2 fixation
   d. Crown gall formation

SECTION "B"
[10Q. × 1 = 10 marks]

Fill in the blanks.

11. In _____ activated sludge, the diffusers or aeration devices are spaced closer together at the head end of the tank to match the oxygen demand.

12. The fern _____ forms a symbiotic relationship with the cyanobacterium _____ which fixes atmospheric nitrogen, giving the plant access to this essential nutrient.

13. _____ principle states that no two species can coexist long if they occupy the same niche.

14. Factors contributing eutrophication are _____.

15. When organisms within a habitat modify the habitat in such a way that permit new populations to develop, it is termed as _____.

16. BTEX refers to the chemicals _____ _____.

17. _____ involves the addition of bacterial formulations externally to the treatment plants or for bioremediation.

18. _____ is the breakdown of contaminants in the rhizosphere through microbial activity that is enhanced by the presence of plant roots.

19. Some microorganisms have their own particular _____ and receptors which can bind Fe^{3+} in such a way that the iron becomes inaccessible to other microorganisms, including pathogens.

20. Two fungus capable of breaking down lignin:
   _____
   _____.

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SECTION "C"
[3Q × 7 = 21 marks]

Attempt *ANY THREE* questions.

1. Describe the physical and biological components of the activated-sludge system.

2. List three beneficial plant-microbe interactions and describe any one in detail.

3. What are xenobiotic compounds? Explain with examples the structural constraints that affect microbial degradation of xenobiotics.

4. What are the different methods for the disposal of solid waste? Discuss the various factors that affect the composting process.

SECTION "D"
[6Q × 4 = 24 marks]

5. State and explain Andrew's logistic equation for the growth of a population.

6. Differentiate between suspended growth and fixed film biological treatment.

7. Comprehend any two mutualistic relationships between microbes and animals.

8. Describe Reed Bed Wastewater Treatment Systems.

9. What are the different mechanisms of biological control? Explain briefly.

10. Illustrate the role of various microorganisms in bioremediation with examples.

SECTION "E"
[5Q × 2 = 10 marks]

11. Write short notes on (*ANY FIVE*):
    a. Succession
    b. Diauxic growth
    c. Biosurfactants
    d. Phytostabilization
    e. Sludge digestion
    f. Chlorination of drinking water