INTERNATIONAL UNIVERSITY OF EAST AFRICA
'Learning to Succeed'

FACULTY OF SCIENCE AND TECHNOLOGY

END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: BSEM
YEAR/SEM: YEAR 3/SEMESTER 2
COURSE CODE: BSE 3206
NAME: ENVIRONMENTAL BIOTECHNOLOGY

DATE:
TIME:

INSTRUCTIONS TO CANDIDATES:

SECTION A

Attempt all questions by circling the most correct answer

Question 1:

1. Which microbe is a fecal contamination indicator in water? (4Marks)

A. Bacillus subtilis

B. Escherichia coli

C. Streptococcus pneumoniae

D. Pseudomonas aeruginosa

2. Bioindicators are particularly useful in bioremediation to……. (4Marks)

A. Replace chemical analyses entirely

B. Predict weather patterns

C. Assess the effectiveness of pollutant degradation

D. Increase soil pH

3. Indian mustard (Brassica juncea) is effective in absorbing…….(4Marks)

A. Arsenic

B. Lead

C. Mercury

D. All of the above

4. Which organelle contains digestive enzymes to break down cellular waste? (4Marks)

A. Lysosome

B. Vacuole

C. Peroxisome

D. Chloroplast

5. Which organism is commonly used as a bioindicator for air pollution? (4Marks)

A. Earthworms

B. Lichens

C. Mayflies

D. Algae

6. The process by which cells divide to form two identical daughter cells is called……(4Marks)

A. Meiosis

B. Mitosis

C. Osmosis

D. Phagocytosis

7. What is a bioindicator? (4Marks)

A. A chemical device measuring pollution levels

B. An organism providing information on environmental quality

C. A tool for monitoring temperature changes

D. A satellite imaging technique

8. Which fungal phylum includes mushrooms and toadstools? (4Marks)

A. Ascomycota

B. Basidiomycota

C. Zygomycota

D. Deuteromycota

9. A key advantage of bioindicators over chemical tests is their ability to…. (4Marks)

A. Provide instant results

B. Measure cumulative long-term effects

C. Replace laboratory equipment

D. Detect only inorganic pollutants

10. Which yeast species is commonly used in baking and brewing? (4Marks)

A. Candida albicans

B. Saccharomyces cerevisiae

C. Aspergillus niger

D. Penicillium chrysogenum

Question 2:

1. Fungi are ecologically important as…….. (4Marks)

A. Primary producers

B. Decomposers

C. Parasites only

D. Nitrogen fixers

2. Which microorganism is known for degrading heavy metals waste?(4Marks)

A. Staphylococcus sp

B. Aspergillus niger

C. Nitrosomonas europaea

D. Lactobacillus acidophilus

3. A key limitation of bioremediation is……..(4Marks)

A. High cost compared to physical methods

B. Inability to work in extreme temperatures

C. Requirement for long-term monitoring

D. Only effective for inorganic pollutants

4. The cell wall of fungi is primarily composed of.....(4Marks)

A. Cellulose

B. Chitin

C. Peptidoglycan

D. Starch

5. Which process involves plants releasing pollutants into the atmosphere as gases? (4Marks)

A. Phytodegradation

B. Phytovolatilization

C. Phytoextraction

D. Phytostimulation

6. Yeasts belong to which kingdom? (4Marks)

A. Plantae

B. Animalia

C. Fungi

D. Protista

7. Which organelle is responsible for photosynthesis? (4Marks)

A. Mitochondria

B. Chloroplast

C. Ribosome

D. Endoplasmic reticulum

8. What is in situ bioremediation? (4Marks)

A. Treating contaminated soil in a laboratory

B. Removing pollutants by excavating the site

C. Remediating contamination at the site itself

D. Using genetically modified plants

9. Which process is beneficial for iron or sulfur pollutants removal? (4Marks)

A. Bioleaching

B. Bioaugmentation

C. Biostimulation

D. Biosorption

10. A limitation of biosensors in environmental monitoring is: (4Marks)

A. High specificity for target analytes

B. Short shelf-life of biological components

C. Inability to detect low concentrations

D. Dependence on external power sources

SECTION B

Choose any 3 questions

Question 1:

1. Write short notes on the following;

a) Phytoaccumulation (5marks)

b) Phytodegradation (5marks)

c) Rhizofiltration (5marks)

d) Phytostabilization (5marks)

Question 2:

2. Microbes can remove pollutants from the environment using different mechanisms. Give an explanation of those mechanisms. (20marks)

Question 3:

3. a) Discuss the characteristics of fungi (10marks)

b) Explain the characteristics of biosensors that make them valuable tools for their applications (10marks)

Question 4:

4. Discuss the classification of bioindicators based on their application and aim. (20marks)

Question 5:

5. Using an illustration explain the sexual and asexual reproduction process in fungi (20marks)

Question 6:

6. a) Explain the different types of cells (10Marks)

b) What are the differences between haploid and diploid cells (10Marks)

Question 7:

7. Write short notes on the following terms;

a) Bioleaching (5marks)

b) Bioaugmentation (5marks)

c) Biosparging (5marks)

d) Biostimulation (5marks)

Question 8:

8. Discuss the different forms of genetic engineering (20marks)

Question 9:

9a) What characteristics should be possessed by organisms used as bioindicators? (10marks)

b) Explain the different applications of bioindicators? (10marks)

Question 10:

10. Discuss the in situ microbial bioremediation techniques. (20marks)

Question 11:

11. Explain the processes involved in mitosis cell division (20marks)

Question 12:

12. The application of the microorganism for the process of degradation is in two modes: aerobic and anaerobic. Explain how these applications occur in waste degradation. (20marks)