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SEAT No. \_\_\_\_\_

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SARDAR PATEL UNIVERSITY  
M. Sc. FOURTH SEMESTER EXAMINATION

DATE: 20-03-2019, Wednesday

PS04C MIC22/ BIT22: ENVIRONMENTAL BIOTECHNOLOGY

TIME: 10.00 TO 1.00 P.M.

MAX.MARKS: 70

Q-1

Select most appropriate answer from the given choices.

(8)

1. In activated sludge process, sludge bulking can be reduced by .....
  - a) Using aerobic selectors.
  - b) Addition of chlorine
  - c) Addition of iron salts
  - d) All of the above
2. Which of the following is a protein responsible for intracellular sequestration of heavy metal ions?
  - a) Siderophore
  - b) Metallothioneins
  - c) Melanin
  - d) All of the above
3. Under anaerobic conditions, *Acinetobacter calcoaceticus* accumulates \_\_\_\_\_ in cytoplasm during A/O process.
  - a) Organic phosphates
  - b) Polyphosphates
  - c) Poly 3- hydroxybutyrate
  - d) All of the above
4. The meta cleavage of catechol biodegradation generates \_\_\_\_\_ end products.
  - a) Acetaldehyde and pyruvate
  - b) Fumaric acid and pyruvic acid
  - c) Acetyl-CoA and succinic acid
  - d) Succinic acid and malic acid
5. A biotechnological process which removes the arsenopyrite from gold ore to produce a higher grade concentrated gold ore is called .....
6. In anaerobic digesters, conversion of volatile fatty acids into methane requires \_\_\_\_\_
  - a) Low partial pressure of hydrogen
  - b) High partial pressure of hydrogen
  - c) Low partial pressure of nitrogen
  - d) High partial pressure of nitrogen
7. Methanogens can be detected by fluorescence microscopy owing to the presence of...
  - a) F430
  - b) F420
  - c) Co-M
  - d) Pseudomurein
8. Which of the following microbial metabolites can reduce the viscosity of oil during MEOR.
  - a) Solvents
  - b) Biosurfactants
  - c) Gases
  - d) All of the above

Q-2

Answer any seven short questions.

(14)

- a) How does heavy metals affect biological processes in waste water treatment plant?
- b) What is phytovolatilization? Explain with example.
- c) Enlist the benefits of using *Azotobacter* sp. as biofertilizer
- d) Differentiate between bioscrubber and biofilters.
- e) Explain biomagnification with suitable example.
- f) Give four reasons for poor settling of sludge in activated sludge process
- g) Enlist the merits of vermicomposting over composting.
- h) Enlist the adverse effects of inorganic nitrogen rich discharges in freshwater reservoirs?
- i) What are occlusion derived baculoviruses?

(1)

(P.T.O.)

- Q-3A Explain the operational parameters used in activated sludge process and discuss their influence on performance of the process. (6)
- Q-3B Briefly describe following aerobic waste water treatment processes and list their merits. (6)
- a) Fluidized bed                      b) Rotating biological contactors
- OR
- Explain the biological mechanisms of nitrogen removal from waste water and describe any one process for efficient nitrogen removal. (6)
- Q-4A Discuss the advantages of anaerobic treatment of waste water and explain in detail UASB process. (6)
- Q-4B Answer the following (3+3)
- a) Explain the applications of rapid microbial assays for toxicity testing in waste water treatment plant
- b) Explain the basis of any two rapid microbial assays used in toxicity testing.
- OR
- Write in detail on objectives, fundamental aspects and processes for composting. (6)
- Q-5A What is bioremediation? Discuss the biostimulation approach for bioremediation of polluted sites with suitable examples. (6)
- Q-5B Write in detail on biodegradation of lignin by white rot fungi and mention the applications of lignin degrading enzymes. (6)
- OR
- Explain the role of oxygenases in hydrocarbon degradation and write in detail on biodegradation of alkanes. (6)
- Q-6A Write in detail on structure and function of insecticidal toxins of *B. thuringiensis* and write their applications. (6)
- Q-6B Describe the mechanisms involved in removal of organic and inorganic sulfur from coal. (6)
- OR
- Write in detail on microbes involved in bioleaching of sulfidic ores and mechanisms of bioleaching. (6)

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