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

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SARDAR PATEL UNIVERSITY  
M. Sc. FOURTH SEMESTER EXAMINATION

DATE: 23-03-2019, Saturday

PS02C IBT23: ENVIRONMENTAL BIOTECHNOLOGY

TIME: 2.00 TO 5.00 P.M.

MAX.MARKS: 70

- Q-1 Select most appropriate answer from the given choices. (8)
1. Partitioning of the gaseous pollutants in liquid phase depends on \_\_\_\_\_ of pollutants.  
a) Diffusion constant    b) Henry constant    c) Kow    d) Koc
  2. Which of the following organisms are obligate symbionts of plants?  
a) Rhizobia    b) *Azospirillum sp.*    c) Arbuscular mycorrhizae    d) All
  3. Which of the following enzyme of ligninolytic fungi possess copper ions as prosthetic group?  
a) Lignin peroxidase    b) Laccase    c) Versatile peroxidase    d) All of the above
  4. *Leptospirillum ferrooxidans* obtain energy from oxidation of .....  
a) Ferrous ions    b) Ferric ions    c) Sulfur    d) All
  5. BOD<sub>5</sub>/COD ratio of municipal sewage is generally \_\_\_\_\_  
a) 1.0    b) 0.6    c) 0.1    d) 6.0
  6. In suspended growth processes, which of the following act as electron donor in denitrification process?  
a) Ammonia    b) Nitrate    c) Nitrite    d) Methanol
  7. Which of the following toxicity assay is based on inhibition of  $\beta$  galactosidase biosynthesis?  
a) Microtox    b) Polytox    c) Toxi-Chromotest    d) Met PAD
  8. Mature and stable compost should be rich in \_\_\_\_\_.  
a) Easily available carbon compounds    c) Humic acid  
b) Fatty acids    d) All of the above

- Q-2 Answer **any seven** short questions. (14)
- a) Explain: TOC. How is it different than TOD?
  - b) Explain the differences in physiology of polyphosphate accumulating bacteria in aerobic and anaerobic reactors of A/O process.
  - c) Enlist the benefits of *Rhizobium sp.* as biofertilizer.
  - d) Name the important organisms required for biodesulfurization of coal.
  - e) Give two examples of 'non specific' enzymes which are involved in cometabolism of xenobiotic compounds.
  - f) Name any two PAH compounds and give reasons for poor biodegradability of PAH
  - g) Write the advantages of using microbioassays over fish bioassays for toxicity testing in waste water.
  - h) Give physiological differences between floc forming bacteria and filamentous bacteria.

①

(P.T.O.)

i) Explain the concept of water effect ratio(WER)

Q-3A Explain the biofilm formation and sloughing. Discuss the benefits of biofilm based effluent treatment processes over suspended growth processes. (6)

Q-3B Neatly narrate flow diagrams and describe attractive features of the following waste water treatment processes. (6)

a) Phostrip

b) Bardenpho

OR

Describe extended aeration processes and compare it with the working and performance of activated sludge process. (6)

Q-4A Explain in detail bioconversion of solid waste into compost and discuss the major factors affecting composting process. (6)

Q-4B Enlist various anaerobic effluent treatment processes and describe any two efficient processes. (6)

OR

Explain in detail the biochemical activities of various groups of microorganisms in biomethanation process and explain regulatory role of dihydrogen. (6)

Q-5A Explain the mechanisms involved in bioremoval of heavy metals from polluted soil or water. (6)

Q-5B Explain the approaches and techniques used for *in situ* bioremediation of subsurface polluted sites with suitable examples (6)

OR

Explain the adverse effects and biodegradation pathways for following pollutants. (6)

a) Aromatic hydrocarbons

b) PCB

Q-6A Write in detail on microbially enhanced oil recovery explaining the role of biomass and microbial metabolites. (6)

Q-6B Explain the following: (3+3)

a) Mechanism of indirect bioleaching

b) Heap leaching for extraction of copper

OR

Explain the following. (3+3)

a) Life cycle of insect pathogenic baculoviruses..

b) Mode of action of BT toxin

~~OR~~

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