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SARDAR PATEL UNIVERSITY  
M. Sc. MICROBIOLOGY FOURTH SEMESTER EXAMINATION  
DATE: 23-04-2015  
PS04CBIT02: ENVIRONMENTAL BIOTECHNOLOGY  
TIME: 10.30 TO 1.30 P.M. MAX.MARKS: 70

- Q-1 Select most appropriate answer from the given choices. (08)
- In A/O process, under anaerobic conditions polyphosphate accumulating bacteria .....
    - Take up phosphate luxuriously from waste water
    - Release phosphate in the waste water
    - Synthesize volutin granules
    - Synthesize glycogen
  - Which of the following statement is not true for methanogens?
    - Grow at +350 mV redox potential
    - Lack peptidoglycan in cell wall
    - Lipids of cell membrane have ether linkages
    - All of the above
  - Which of the following are products of orthocleavage pathway for catechol degradation.
    - Pyruvate and Acetaldehyde
    - Acetyl-CoA and Succinate
    - Fumarate and Pyruvate
    - Pyruvate and Acetyl- CoA
  - The separation of newly formed biomass from the treated effluent in suspended growth processes occurs by the process known as \_\_\_\_\_.
    - Deflocculation
    - Flocculation
    - Precipitation
    - All
  - Which of the following microbial assay is based on inhibition of  $\beta$  galactosidase activity and used for determination of heavy metal toxicity in waste waters?
    - Microtox
    - Polytox
    - MetPAD™
    - All
  - The oil eating 'superbug' strain was developed using four strains of .....
    - Pseudomonas sp.*
    - E. coli*
    - Arthrobacter sp.*
    - All
  - Recovery of copper from the leaching solution (leachate) can be done by.....
    - Solvent extraction
    - Reaction with scrap Iron
    - Electrowinning
    - All of the above

8. Which of the following enzyme of ligninolytic fungi does not require  $H_2O_2$  for catalysis?

- a) Lignin peroxidase
- b) Laccase
- c) Versatile peroxidase
- d) All

Q-2 Answer any seven short questions. (14)

- a) What is bioventing? Write its application.
- b) Explain the principle of fluidized bed process.
- c) List the benefits of using *Azotobacter* sp. as biofertilizer.
- d) Give two examples of 'non specific' enzymes which are involved in cometabolism of xenobiotic compounds.
- e) Write only two changes in operation of activated sludge process to enhance nitrification.
- f) Explain the effect of F/M on sludge settling?
- g) Enlist applications of compost.
- h) Name only two organisms involved in desulfurization of coal.
- i) Explain the effect of pH on anaerobic digestion.

Q-3 Explain the merits of fixed film processes over suspended growth processes and explain the design and working of rotating biological contactors. (06)

A

Q-3 Differentiate between working and performance of following processes.

B

- a) Low rate and high rate trickling filters (03)
- b) Oxidation ditch and activated sludge process (03)

OR

Explain the following waste water treatment processes:

- a) Phostrip (03)
- b) Sharon - anammox (03)

Q-4 Explain the microbiological succession during composting and discuss the major factors affecting composting process. (06)

A

Q-4 Describe the biochemical activities of various groups of microorganisms in biomethanation process and explain the interspecies hydrogen transfer. (06)

B

OR

Enlist reactors for anaerobic treatment of liquid waste and explain UASB process. (06)

Q-5 What is bioaugmentation? Discuss in detail its application in bioremediation. (06)

A

- a) Neatly narrate the biodegradation pathway for n alkanes. (03)
- b) Explain a mechanism for biodegradation of azodyes. (03)

B

OR

Explain the principle of biofiltration of polluted air and describe working of biofilters. (06)

Q-6 Explain the actions of insecticidal proteins of *B. thuringiensis*. (06)

A

Q-6 Discuss the role of microbes in oil recovery. (06)

B

OR

What is biobeneficiation? Explain its application in gold recovery. (06)