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# HERITAGE INSTITUTE OF TECHNOLOGY

M. Tech/ 1<sup>st</sup> year 1st Semester Examination. 2014... Session :...2014-2015...

> : ...Biotechnology..... Discipline

Paper Code : ....BIOT5132 .... Paper Name : ... Advanced Environmental Biotechnology

Time Allotted : 3 hrs

Full Marks: 70

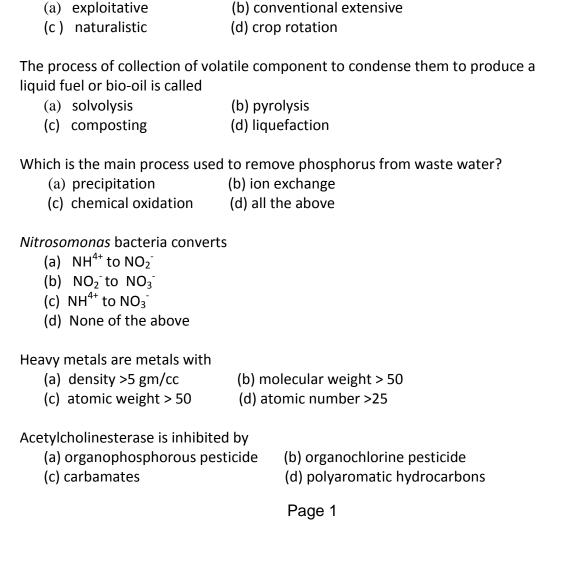
10 x 1=10

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

#### Group – A (Multiple Choice Type Questions) Choose the correct alternative for the following: 1. (i) Solid waste comprises of (b) industrial waste (a) garbage (c) pathological waste (d) all of the above (ii) Which of the following is not silviculture? (a) exploitative (b) conventional extensive (c) naturalistic (d) crop rotation (iii) The process of collection of volatile component to condense them to produce a liquid fuel or bio-oil is called (a) solvolysis (b) pyrolysis (c) composting (d) liquefaction (iv) Which is the main process used to remove phosphorus from waste water? (a) precipitation (b) ion exchange (c) chemical oxidation (d) all the above (v) Nitrosomonas bacteria converts (a) $NH^{4+}$ to $NO_2^{-1}$ (b) $NO_2$ to $NO_3$ (c) $NH^{4+}$ to $NO_3^{-1}$ (d) None of the above (vi) Heavy metals are metals with (a) density >5 gm/cc (b) molecular weight > 50 (c) atomic weight > 50 (d) atomic number >25 (vii) Acetylcholinesterase is inhibited by (a) organophosphorous pesticide (b) organochlorine pesticide (c) carbamates (d) polyaromatic hydrocarbons





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M. Tech/ 1<sup>st</sup> year 1st Semester Examination. 2014... Session :...2014-2015... Discipline :...Biotechnology..... Paper Code : ...BIOT5132 .... Paper Name : ... Advanced Environmental Biotechnology (viii) Biostimulation is the process for decontamination of a site where (a) microorganisms are added from outside (b) nutrients are added from outside (c) oxygen is added from outside (d) nothing is added from outside (ix) Biosorption of heavy metals by fungi involves (a) intracellular sequestration (b) adsorption on cell wall (c) both adsorption and intracellular sequestration (d) enzymatic detoxification (x) Which of the following statement is not true for ascorbic acid (a) it is an antioxidant (b) it is a vitamin (c) it protects against damage by free radical (d) it is an essential mineral Group - B 2. (a) Write the different forms of mercury found in nature. Put them in the increasing order of toxicity. Discuss the toxic effects of mercury in mammalian systems.

(b) Polyaromatic hydrocarbons are often found to be carcinogenic. Explain the observation.

(2+1+3) + 6 = 12

- 3. (a) i) Write the chemical name of DDT. Discuss its mode of action.
  - ii) Paralysis and difficulties in limb movement were reported in a large number of people in a city. Upon investigation, they were found to have consumed oil contaminated with an organophosphorous pesticide. Do you think consumption of pesticide-contaminated oil is related with the syndromes? Justify your answer.
- (b) Anaemia is a major syndrome of lead toxicity. Discuss how lead toxicity leads to anaemia.

((1+3)+5) + 3 = 12

### Group - C

4.(a) Plastics are recalcitrant solid waste. How plastics can be recovered and recycled?

(b) What do you mean by activated sludge process? Discuss about different criteria associated with activated with sludge process design.

(3+3) + (2+4) = 12

5 (a) What are the different conventional techniques for industrial waste management?



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 (b) Explain in detail ion-exchange process and precipitation to chemically treat waste water.
 4 + 8 = 12

### Group - D

- 6.(a) Discuss the ortho-cleavage pathway for phenol degradation.
- (b) You are asked for isolation of a soil bacterial strain which can be used for treatment of excess proteins coming out in the effluent of a tannery. Which of the sites given below will you prefer for collection of soil: a) from a village, d) from a site near the tannery itself, c) from a site near a jute mill? Explain your answer.

(c)	Why most of the bacteria do not have capacity to degrade petroleum products?	4 + 3 +5 =
		12

- 7.(a) What is Exxon Valdez disaster? Discuss the use of microbes for controlling the damage.
- (b) What was the major difference between the steps taken for damage control in Exxon Valdez disaster and Mexican Gulf disaster?
   (3+6) + 3 = 12

### Group - E

8.(a) Describe ethanol production by fermentation. Mention its usage.
(b) How is biogas produced by anaerobic digestion? What are energy crops? Give examples.

(4+2) +
(4+1+1)
= 12

9.(a) How is bio-diesel produced from vegetable oil?
(b) Define the terms: Environmental Impact Assessment, Bioprospecting, Gasohol.
6 + (2x3) =

12