2022 4/BIT C 403

(July)

BIOTECHNOLOGY & BIOINFORMATICS

(Environmental biotechnology, IPR, Biosafety and Bioentrepreneurship)

Course No: BIT C 403

Full Marks: 75

Time: 3 hours

The figures in the margin indicate full marks for the questions

*Answer **Question No. 1** and **any four** from the rest*

1. A. Choose the correct answer: 1 x 5=5

I Temperature closer to the earth is cooler than air above it and is a phenomenon referred to as

a) Temperature reversal
b) Temperature inversion
c) Temperature diversion
d) Temperature conversion

II. In mining activities, which causes environmental degradation, the overburden consisting of surface materials that do not contain the metal of interest and is stockpiled, is referred to as

a) Surface mining
b) Mine spoils
c) Mine tailings
d) Mine smelting

III. "Hormesis" refers to

a) Biological responses to chemicals or other stressors even at low exposures.
b) Biochemical response to physical stress
c) Stress due to temperature changes
d) Stress due to evolutionary changes

IV. Which of the following species of plants are considered highly effective in xenobiotics degradation?

a) Cucurbitaceae
b) Asteraceae
c) Rosaceae
d) Crassulaceae

V. Bioaccumulation of xenobiotics may cause

a) Birth defects
b) Neurological disorders
c) Asthma
d) All of the above

B. Write True or False against each statement: 1 x 5=5

I. Chlorine treatment of waste water is part of secondary treatment of water

II. A patent is a type of intellectual property that gives its owner the exclusive right to copy and distribute a creative work, usually for a limited time.

III. For construction of GEMs, one should understand the degradative pathways, enzymes and their respective genes.

IV. Most enzymes of halobacteria are active and stable at low-salt concentration and loose activity at salt concentration higher than 2M.

V. White rot fungus used for waste water treatment is *Penicillium chryosporium.*

C. Write short answer to following questions: 2.5 x 2=5

a) "Phytoremediation is an innovative and cost-effective technology for environmental cleanup". Justify

b) Why are the climate change feedbacks important?

2. "Polar stratospheric clouds speed up the degradation of ozone molecules". Write about the ozone layer and the mechanism along with the factors that lead to depletion of ozone layer. What are the proposed replacements for chlorofluorocarbons? List out the impacts of ozone hole depletion and higher dosage of UV radiation. 7+4+4=15

3. What are limiting factors? Explain the 'Law of Minimum' and 'Law of Tolerance' with reference to limiting factors and the adaptation of organisms in a microhabitat. Write on the diverse abiotic stresses and the strategic defences adopted by organisms. 3+6+6=15

4. i) What are the different types of patents? Enumerate the steps involved in filing of a patent. If you need to expedite the process, what would your approach be? 2+3+2.5=7.5

ii) How will you recover the earthworms from its composting bed? Briefly explain the construction of its bed. 3+4.5=7.5

5. 'Design of bioreactors are crucial in bioremediation of waste water'. Elaborate the statement in the light of development of various designs of biological contactors. 15

6. Prepare a model showing various steps that may be involved for the bioremediation to analyse the environmental risk assessment of GEMs during their field trials in the environment. 15

7. i) How have microorganisms evolved in a better way to degrade xenobiotics? Explain. 7

ii) "Use of microbial consortium performs better than single strain in biodegradation". Explain. 8

8. Write short notes on any three of following: 5 x 3=15

A) Biofuels

B) Biosafety

C) Bioentrepreneurship

D) Air pollution control

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