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3 (Sem-6/CBCS) BOT HE 1

2022

**BOTANY**

(Honours Elective)

Paper : BOT-HE-6016

**(Industrial and Environmental  
Microbiology)**

Full Marks : 60

Time : Three hours

**The figures in the margin indicate  
full marks for the questions.**

1. Answer the following : **(any seven)**  $1 \times 7 = 7$ 
  - (a) What is bio-aerosol ?
  - (b) Name the bacterium that causes spoilage of canned food.
  - (c) Which microorganisms are used in commercial production of citric acid ?
  - (d) What is biofilm ?
  - (e) Who discovered the fermentation process ?

Contd.

- (f) What are COD and TOC ?
- (g) Name *one* airborne human pathogen.
- (h) What do you mean by biological augmentation ?
- (i) Name *two* heavy metal air pollutants.
- (j) What is bioremediation ?

2. Answer **any four** of the following :  $2 \times 4 = 8$

- (a) What is the difference between biodegradation and biodeterioration ?
- (b) Why is air not a growth medium for the microorganisms ?
- (c) Write the use of settle plate technique.
- (d) What is flocculation ?
- (e) What is an indicator of pollution ?
- (f) Write the difference between submerged and solid state fermentation.
- (g) Why are biogeochemical cycles important for nature ?
- (h) Write the name and composition of culture medium used for isolation of *Rhizobium*.

3. Answer **any three** of the following :

$5 \times 3 = 15$

- (a) Define  $N_2$ -fixation. Write briefly the process of biological  $N_2$ -fixation.
- (b) Write the techniques used for isolations of AMF from roots and soil.
- (c) Write a note on extremophiles.
- (d) Mention the use of microbes in petroleum industry.
- (e) Describe the process of aseptic packaging of commercial processed food.
- (f) Write the career options in microbiology.
- (g) Write briefly the commercial production of penicillin.
- (h) Write a note on air microflora.

4. Answer **any three** of the following :

$10 \times 3 = 30$

- (a) What is a bioreactor ? Write about the types and typical characteristics of a bioreactor.  $1 + (3 \times 6) = 10$

(b) "The immobilized enzyme techniques make the industrial process more economical." Elaborate the above statement and the techniques involved.

2+8=10

(c) What is downstream processing? Write filtration, solvent extraction and precipitation processes of a fermented target product.

1+(3+3+3)=10

(d) Write about various steps and ex-situ approaches of bioremediation.

(e) Describe the goal of wastewater treatment and the process with special reference to microbial activity.

1+9=10

(f) Describe the common methods for bacteriological analysis of water.

(g) Write the industrial production process of ethanol and its use in various commercial products.

8+2=10

(h) Write briefly how plant-microbe interactions contribute in sustainable agriculture.