'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2023

SEC1-P1-MICROBIOLOGY

Time Allotted: 2 Hours | Full Marks: 60

The figures in the margin indicate full marks.

The question paper contains Paper-I and Paper-II. Candidates are required to answer any *one* from the *two* papers and they should mention it clearly on the Answer Book.

PAPER-I

MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

1. Answer any ***four*** questions from the following: 3×4 = 12

   (a) State the principles of HACCP. 3

   (b) State the differences between BSL-1 and BSL-2 3

   (c) Write about EMB agar and state its importance. 1+2

   (d) Name one organism that is used as a biosensing material. What is the advantage of biosensor? 1+2

   (e) How resazurin test is used to rapidly check the quality of milk? 3

   (f) What is HEPA filter? Where are these used in microbiological laboratories? 2+1

2. Answer any ***four*** questions from the following: 6×4 = 24

   (a) Why do we need biosafety cabinets in BSL-2 laboratories? How will you discard biohazardous wastes without any exposure? 3+3

   (b) What type of wastes can be discarded using incineration? Describe the mode of action of two chemical disinfectants used for disinfection of microbes. 2+4

   (c) Discuss the importance of limulus lysate test. 6

   (d) Describe the various test used for sterility testing of pharmaceutical products. 6

   (e) What type of organism can be detected using Mannitol Salt Agar? Explain any one method to detect the quality of milk rapidly. 2+4

   (f) Discuss about the principle, advantage and disadvantage of standard plate count method. 6

3. Answer any ***two*** questions from the following: 12×2 = 24

   (a) Discuss about the microscopic methods to determine microbes in food. Write a note on BIS standards are required for different foods and water. 6+6

(b) Write short notes on: 4×3 = 12
   (i) Good laboratory practices
   (ii) COB Test
   (iii) Nucleic acid probes.

(c) What is the working principle of Laminar Airflow? Why is it required to wear protective clothing in biosafety cabinets? Write a short note on endotoxins. 6+3+3

(d) Mention the importance of enrichment technique in isolation of microbes from natural habitat. What do you mean by Standard Plate Count (SPC) and why it is named so? Describe the SPC technique for the enumeration of microbes from a given sample. 4+4+4

PAPER-II

BIOFERTILIZERS AND BIOPESTICIDES

1. Answer any ***four*** of the following: 3×4 = 12

(a) How mycorrhizae help in promotion of plant growth? 3

(b) Differentiate between Nitrogen fixers *Azotobacter* and *Azospirillum*. 3

(c) What is VAM? 3

(d) What are bioinsecticides? Name two virus used as bioinsecticides. 1+2

(e) Write down the characteristics of *Rhizobium*. 3

(f) What is arbuscle? Name one species of ectomycorrhizal fungus. 2+1

2. Answer any ***four*** of the following: 6×4 = 24

(a) What are the disadvantages of using chemical fertilizers? What are the advantages of biofertilizers over them? 2+4

(b) Discuss about cultivation and field applications of viral biopesticides. 6

(c) What are the types of mycorrhizae? Write a note on mycorrhizal inoculum. 3+3

(d) Explain briefly Frankia and non-leguminous crop symbiosis. 6

(e) Write short note on algae as biofertilizer. 6

(f) Write the procedure for mass production of biofertilizer. Give example of biofertilizer used in soybean cultivation. 6

3. Answer any ***two*** of the following: 12×2 = 24

(a) Give a general account of microbes used as bioinsecticides. What are their advantages over synthetic pesticides? 8+4

(b) Mention any four symbiotic nitrogen fixers used as biofertilizers. Discuss the role of *Azolla* in rice cultivation. Elaborate isolation, characterization and mass cultivation of *Azolla* biofertilizers. 2+3+7

(c) Define phytostimulation. Write differences between organic fertiliser and biofertiliser. Discuss Nitrogen fixing gene organisation and expression with the help of suitable diagram. 2+4+6

(d) What is Bt toxin? How does it work as a bioinsecticide? Discuss the production and field application of *Bacillus thuringiensis* bioinsecticide. 2+3+7

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