Semester- III

Course MI-206

Microbiology Practicals

1. Study of ecological diversity amongst bacteria at extreme conditions: Cultivation of acidotolerant (pH-4), alkalitolerant (pH-8), halotolerant (NaCl 10%), thermotolerant (temp:50 ^{o}C) bacteria

   [Cultivation using nutrient broth (as basal medium) at different environmental variable(s), results to be observed in form of turbidity followed by Gram's staining. Use routine nutrient broth as control tube. Soil sample to be used for cultivation].

2. Study of microbial diversity in soil by using Winogradsky Column (Demonstration only)

3. Study of morphological and cultural diversity of *Escherichia coli, Enterobacter aerogenes, Staphylococcus aureus, Bacillus subtilis, Bacillus megaterium and Bacillus cereus*.

   A. Study of morphological diversity by performing Gram's staining, capsule staining and spore staining.

   B. Study of cultural / growth diversity using nutrient broth and nutrient agar media

4. Study of metabolic diversity amongst bacteria: *Escherichia coli, Enterobacter aerogenes, Proteus vulgaris, Staphylococcus aureus, and Bacillus subtilis* by performing various biochemical tests:

   A. Based on carbon metabolism

      i. Methyl Red Test
      ii. Voges-Proskauer (V-P) test
      iii. Fermentation of sugars and sugar alcohol: glucose, xylose, mannitol, lactose, maltose and sucrose
      iv. Citrate utilization test
      v. Starch utilization test
      vi. Lipid utilization test

   B. Based nitrogen metabolism

      i. Indole production test
      ii. H_2S production test
      iii. Urea utilization test
      iv. Casein hydrolysis test
      v. Gelatin hydrolysis test

   C. Presence of respiratory enzymes

      i. Catalase test
      ii. Dehydrogenase test
      iii. Oxidase test

5. Study of diverse groups of eukaryotic microorganisms
   A. Fungi: Cultural and microscopic characters of *Mucor, Rhizopus, Aspergillus, Penicillium* and yeast
   B. Algae: Study of algae present in pond water; study of permanent slides of spirogyra and diatoms
   C. Protozoa: Study of presence of protozoa in pond water; study of permanent slides of Amoeba, Euglena and Paramecium
6. Microbiological analysis of food
   A. Standard plate count of food sample
   B. Determination of MPN of coliforms
7. Microbiological analysis of milk
   A. Standard plate count of milk sample
   B. Determination of microbial load of milk by use of MBRT of raw milk, boiled milk and pasteurized milk
   C. Detection of acid-fast organisms in milk sample

Scheme for Examination

Ex		Marks
1.	Microbiological analysis of food / milk (any one) A. Standard plate count of food / milk sample B. Determination of MPN for coliforms in food sample C. Determine microbial load of milk sample by performing MBRT and check for presence of acid-fast bacteria.	15
2.	Diversity in bacteria (any one) A. Study cultural diversity and morphological diversity in given bacterial cultures (two bacterial cultures) B. Study metabolic diversity based on metabolism of nitrogen source / carbon source / presence of respiratory enzymes of the given bacterial cultures (two bacterial cultures, three tests)	15
3.	Identification of fungi A. Identify the given fungal culture based on its growth and morphological characters.	15
4	Spotting	10
5	Viva	10
6	Journal and slides	05
	Total	**70**