

SOFT CORE COURSES

BSS453 APPLIED MICROBIOLOGY

Course Outcomes:

After successful completion of the course, students will be able to :

- CO 1. Understand the applications of Microbiology in biomedical and industrial fields.
- CO 2. Comprehend the beneficial and harmful interactions of microbes with other organisms.
- CO 3. Use fermentation for production of ethanol, lactic acid and other industrial products.
- CO 4. Gain theoretical knowledge of food microbiology, prevention of air- and food-borne diseases and food poisoning.
- CO 5. Gain the basics of soil microbiology and its allied applications in agriculture.
- CO 6. Know the importance of aquatic microbiology and learn water purification and assessment of drinking water quality.

UNIT I (13 hrs)

Microbial Ecology: Microbial symbiosis, mutualism, plant-microbe interactions (e.g. mycorrhizas), animal-microbe interactions (human, ruminants and non-ruminants). Microbes in extreme environments - hydrothermal vents and coral reefs. Microorganisms as bio-indicators. **Microbial bioremediation** - role in environmental management, advantages and disadvantages. Ecological implications of genetically modified microorganisms.

Fermentation: Ethanol, lactic acid, mixed acids, 2-3 butanediol, clostridial and propionic acid fermentation with emphasis on their ecological niches, merits and demerits.

UNIT II (13 hrs)

Food Microbiology: Classification of foods and oriental foods; Basic principles of food spoilage and methods of food preservation; Milk and milk products, milk microflora and their estimation, milk-borne diseases and prevention; Food poisoning, food-borne diseases and prevention.

Air Microbiology: Microflora of air and methods of their estimation, monitoring air allergens, air-borne diseases and prevention.

UNIT III (13 hrs)

Soil Microbiology: Soil microflora and methods of their estimation, role of soil microorganisms, bioconversion and decomposition. Biological nitrogen fixation (symbiotic and non-symbiotic), microbial phosphorus solubilization and their importance in soil fertility and agriculture.

Aquatic Microbiology: Microbes in water and wastewater and methods of their estimation (e.g. MPN), drinking water microbial standards and water purification; Water-borne diseases and prevention.

References:

1. Brock T.B. and Madigan M.T. (1991) Biology of microorganisms, Prentice Hall.
2. Pelczar J. and Chan E.C.S. (1981) Element of Microbiology, Mac Graw Hill, New York
3. Schlegel H.G. (2008) General Microbiology, 7th Ed., Cambridge Univ. Press.
4. Rosenberg E. and Cohen I.R. (1983) Microbial Biology, Saunders Coll. Pub.
5. Stanier R.Y., Adelberg, E. A., Ingraham, J. L. (1976) The Microbial World, Prentice Hall, New Delhi.
6. Atlas R.M. and Bartha R. (2000) Microbial Ecology, 4th Ed., Benjamin-Cummings Sci. Press, USA
7. Cruickshank R., Livingstone C. (1973) Medical Microbiology. London
8. Doelle H.W. (1975) Bacterial Metabolism, Academic Press, London
9. Nicklin, J., Paget, T., Graeme-Cook, K., Killington, A. (2011) Instant Notes in Microbiology. Via

- Books Pvt. Ltd., NewDelhi
- 10.Norris J.R., Ribbons, D. W. (1981) Methods in Microbiology. Academic Press,London
 - 11.Adams M.R and Moss M.O.(2003), Food Microbiology, 2nd Ed.,Panima Publ. Corp., NewDelhi
 - 12.Barrett J.T. (1998)Microbiology and Immunology Concepts, Lippincott-Raven,PA, USA
 - 13.Casida Jr., L.E. (1968) Industrial Microbiology. Wiley Eastern Ltd., New Delhi
 - 14.Elger, K.D. (2009) Immunology. John Wiley and Sons,USA
 - 15.Subba Rao N.S. (1982) Advances in Agricultural Microbiology. Oxford and IBH Pub., New Delhi.
 - 16.Arora, D.R. and Arora, B. 2012. Text Book of Microbiology, CBS Publ. & Dist. Pvt. Ltd., New Delhi.
 - 17.Dubey, R.C. (1993) Text book of Biotechnology, S Chand Publ.
 - 18.Maier, R.M., Pepper, I.L. and Gerba, C.P. (2008) Environmental Microbiology, Academic Press
 - 19.Jjemba, P. K. (2004) Environmental Microbiology - Principles and Applications, Science Publ., USA

