B. Sc (CBCS) Microbiology – I Year
Semester- I – Paper- I
BS104-DSC-1A: INTRODUCTORY MICROBIOLOGY

Theory syllabus

Credits – 4

UNIT – I

1. Meaning, definition and history of Microbiology. Contributions of Antony von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanowsky, Beijerinck, Winogradsky and Alexander Fleming.
2. The origin of microbial life - Spontaneous generation (abiogenesis), Biogenesis, Germ Theory of disease, Koch's Postulates.
3. Outline classification of living organisms: Heckel, Whittaker and Carl Woese systems. Place of microorganisms in the living world. Outline classification for bacteria as per the second edition of Bergey's Manual of Systematic Bacteriology (up to section level). Scope, importance and applications of Microbiology.

UNIT – II

1. Principles of microscopy – bright field, dark field, phase-contrast, fluorescent and electron microscopy.
2. Differentiation of prokaryotes and eukaryotes.
3. Structure and function of Plasma membrane, cell wall, capsule, flagella, nucleod, plasmid, Gram positive and Gram negative bacteria

UNIT – III

1. Principles and types of stains - Simple and differential staining: theories of staining, mordant and its function, Gram staining, acid fast staining; endospore staining, negative staining, capsule staining, flagella staining.
2. Sterilization and disinfection techniques - Principles and methods of sterilization. Physical methods - autoclave, hot-air oven, pressure cooker, laminar air flow, filter sterilization.
3. Radiation methods - UV rays, gamma rays, ultrasonic methods. Chemical methods - Use of alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites. Phenol coefficient.

UNIT - IV

1. Classification and characteristics of fungi, algae, protozoa and viruses.
2. Isolation of pure culture techniques - Enrichment culturing, pour plate, streak-plate, spread plate and micromanipulator.
3. Preservation of microbial cultures – sub culturing, overlaying cultures with mineral oils, lyophilization, storage at low temperature.

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Practical syllabus

Credits – 1

1. Precautions to work in Microbiology laboratory.
2. Sterilization techniques: Autoclaving, hot-air oven and filtration.
3. Aseptic transfer of Microorganisms
4. Isolation of single colonies on solid media.
5. Light, compound microscope and its handling.
6. Microscopic observation of bacteria (Gram +ve bacilli and cocci, Gram –ve bacilli), cyanobacteria (*Nostoc, Spirulina*), algae (*Scenedesmus* sp., diatoms), and fungi (*Saccharomyces, Rhizopus, Aspergillus, Penicillium, Fusarium*).
7. Calibrations of microscopic measurements (Ocular, stage micrometers).
8. Demonstration of Motility by hanging drop method.
9. Micrometry: Determination of size of Bacteria, yeast. Fungal filaments.

References:

1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition.
3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited.
4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International.
5. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.BrownPublishers.
6. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGrawHill Book Company.
7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). GeneralMicrobiology. 5th edition. McMillan.
8. General Microbiology (1993) Authors- Powar and Daginawala.
9. Microbiology, Author- S.S. Purohit.
10. Microbiology, Author- P.D. Sharma