3-1-115

SUBJECT: MICROBIOLOGY

SEMESTER-I

Paper I: Introductory Microbiology, Microbial Techniques and Biology of Microorganisms

UNIT-I

History and Mile stones in Microbiology- Meaning, definition and history of Microbiology. Contributions of Antony von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanowsky, Beijerinck, Winogradsky and Alexander Fleming. Importance and applications of Microbiology. Virology- Basics of Virology, history, milestones, taxonomy and significance of virology.

UNIT-II

Classification of microorganisms - Hackel's three -kingdom concept - Whittaker's five - kingdom concept and three domain concept of Carl Woese and phylogenetic trees. Basis of modern microbial classification and their concepts, nomenclature and taxonomic ranks. General characters of Fungi (Yeasts, Candida) - Algae (Cyanobacteria, Chlorella), Protozoa (Entameoba,
Leishmania, Plasmodium). Isolation and identification of Microorganisms- Principles and types of stains (Simple, differential and negative stains), structural stains - spore, capsule, flagella.
Hanging-drop method.

UNIT-III

Sterilization and disinfection techniques Principles and methods of sterilization. Physical methods - autoclave, hot-air oven, pressure cooker, laminar air flow, filter sterilization. Radiation methods - UV rays, gamma rays, ultrasonic methods. Chemical methods - Use of alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites. Phenol coefficient.

UNIT-IV

Isolation of pure culture techniques - Enrichment culturing, dilution-plating, streak-plate, spread-plate and micromanipulator. Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature (ultra low temperature).

UNIT-V

Differentiation of prokaryotes and eukaryotes. General characteristics of bacteria, archaebacteria, rickettsias, mycoplasmas, cyanobacteria and actinomycetes. Outline classification for bacteria as per the second edition of Bergey's Manual of Systematic Bacteriology (up to order level). Ultra structure of a bacterial cell: Invariant components - cell wall, cell membrane, ribosomes, nucleoid. Variant components - Capsule, flagella, fimbriae, endospore and storage granules. General characteristics and classification of viruses- animal, plant and microbial. Morphology, structure and replication of TMV, HIV and lambda bacteriophage. Eukaryotes - General characteristics and classification (up to the order level) of eukaryotic microorganisms - micro protozoa, microalgae, molds and yeasts.

Signature of the
Chairman (B.O.S.)
(20.....Exams)

PRACTICAL- Introductory Microbiology, Microbial Techniques and Biology of Microorganisms

1. Precautions to work in Microbiology laboratory.
2. Preparation of culture media: Solid / Liquid.
3. Isolation of single colonies on solid media.
4. Enumeration of bacterial numbers by serial dilution and plating- spread and streak.
5. Light and compound microscope and its handling.
6. Simple and differential staining (Gram's staining).
7. Spore staining, capsule staining and negative staining.
8. Motility of bacteria by Hanging drop method.
9. Contributors of Microbiology- photographs.
10. Electron micrographic representation of viruses-TMV, HIV, Bacteriophages.
11. Physical methods - autoclave, hot-air oven, pressure cooker, laminar air flow, filter
12. sterilization.
13. 12.Microscopic observation of cyanobacteria (*Nostoc, Spirulina*), algae (*Scenedesmus* sp., diatoms) and fungi (*Saccharomyces, Rhizopus, Aspergillus, Penicillium, Fusarium*).
14. Calibrations of microscopic measurements (Ocular, stage micrometers)- bacteria, fungal spores.

Note: S.No. 5,6,7,8,13 practicals are compulsory for major experiments.

Reference Books for Theory papers:

1. Black, J.G. (2005). Microbiology: Principles and Explorations, John Wiley, USA.
2. Tortora, G.J., Funke, B.R. and Case, C.L. (2004). Microbiology: An Introduction. Pearson Education, Singapore.
3. Prescott, M.J., Harley, J.P. and Klein, D.A. (2002). Microbiology. 5th Edition, WCB Mc GrawHill, New York.
4. Dimmock, N.J., Easton, A.J. and Leppard, K.N. (2001). Introduction to Modern Virology, Blackwell Science Ltd, U.K.
5. Madigan, M.T., Martinkl, J.M. and Parker, J. (2000). Brock Biology of Microorganisms, 9th Edition, MacMillan Press, England.

Text Books for Theory papers:

1. Singh, R.P. (2007). General Microbiology. Kalyani Publishers, New Delhi..
2. Ram Reddy, S. and Reddy, S.M. (2007). Essentials of Virology. Scientific Publishers India,
Jodhpur.
3. Reddy, S.M. (2003). University Microbiology -I . Galgotia Publications Pvt Ltd., NewDelhi.
4. Dube, R.C. and Maheswari, D.K. (2000) General Microbiology. S.Chand ,New Delhi.

Signature of the Chairman (B.O.S.) (20.....Exams)

3-1-115

B.Sc. Choice Based Credit System (CBCS)
Subject: MICROBIOLOGY
Model Question Paper (Theory)
Paper: I/II/III

Time: 3 Hrs Max. Marks: 75

Part – A
Answer ANY FIVE questions
Each question carries 3 marks 5 x 3M = 15 Marks

1.
2.
3.
4.
5.
6.
7.
8.

Part – B
Answer any FIVE questions
Each question carries 15 marks 5 x 12M = 60 Marks
(Select two questions in each unit)

9 a)

OR

b)

10. a)

OR

b)

11. a)

OR

b)

12. a)

OR

b)

13. a)

OR

b)

Signature of the Chairman (B.O.S.) (20.....Exams)