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M.A. M.Sc. Microbiology Exam, Dec., 2016
First/Third Semester (Third Sem) to 08/08

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FOR COLLEGE ONLY

MB: 101 BASICS IN MICROBIOLOGY AND BACTERIOLOGY

UNIT-I

1. Introduction, history and scope of Microbiology.
2. General characteristics and composition of Prokaryotes and Eukaryotes.
3. Classification of Microorganisms: Haekel's three kingdom concept, Whittaker's five kingdom concept, three domain concept of Carl Woese, classification and salient features of bacteria according to Berger's Manual of Determinative Bacteriology.
4. Nomenclature and modern methods of Bacterial taxonomy.

UNIT-II

1. Morphology and ultra structure of bacteria: size, shape, and arrangement of bacteria, ultra structure of bacterial cell wall of eubacteria and archeobacteria. Protoplast and spheroplast formation and L-form.
2. Components external to cell wall: Structure and function of flagella, fimbriae and pilli, capsule- types, composition and function, slime layers, S-layers.
3. Prokaryotic cell membrane and cytoplasmic matrix – cell membrane structure and function of bacteria and archeobacteria, mesosomes, ribosomes, cytoplasmic inclusion bodies (polyhydroxy butyrate, polyphosphate granules, oil droplets, cyanophycin granules) and nucleoid.
4. Bacterial response to external stimulus and bacterial endospores: Chemotaxis and phototaxis structure, formation and germination of bacterial endospore.

UNIT-III

1. Bacterial nutrition: Basic nutritional requirements, growth factors, nutritional categories, physical requirements of bacterial growth.
2. Bacteriological media: types (complex, synthetic, differential, enrichment and selective media) and their uses, culture characteristics of bacteria on different media.
3. Cultivation of bacteria: aerobic and anaerobic culture, pure culture techniques, shaker and still culture, maintenance and preservation of microbial culture.
4. Bacterial growth: growth kinetics, growth curve. Batch, continuous and synchronous culture. Measurement of growth and influence of environmental factors affecting growth.

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UNIT-IV

1. General concept of Prokaryotic and Eukaryotic genome. Genome of *E.coli*.
2. Genetic recombination and transformation.
3. Transduction: generalized and specialized transduction, phage conversion.
4. Plasmid: types and their significance. Conjugation and chromosomal mobilization. *E.coli* as model prokaryotes.

UNIT-V

1. Staining methods: fixation, types of dyes, simple staining, differential staining (Gram and Acid-fast staining), staining of specific structures (capsule, flagella and spore staining)
2. Control of microorganisms: Microbial death curve, concept of bio-burden, thermal death time and decimal reduction time. Factors influencing the effectiveness of antimicrobial agents.
3. Control of microorganisms by physical agents: heat (moist and dry), filtration and radiation.
4. Chemical control of microorganisms: Halogens, phenol and other phenolic compounds, heavy metals, alcohols, ethylene oxide and aldehydes.

Reference Books

1. Microbiology; Lansing M Prescott, John P. Harley, Donald A Klein, Sixth edition, Mc Graw Hill Higher education.
2. General Microbiology; R.Y. Ingraham, J.L. Wheels, M.L. Painter. Thess Macmillan Press Ltd.
3. Brock Biology of Microorganism; M.T, Martinko, J.M. Parker, Prentice-Hall.
4. Microbiololgy; M.J. Pelczar, E.C.S Chan and N.R. Kreig, Tata MacGraw Hill.
5. Microbial Genetics, S.R. Molloy, J.E. Jr. Cronan and Frreifelder D Jones, Bartiett Publishers.
6. Breed and Buchanan. *Bergey's Manual of Systematic Bacteriology*. 2nd Edition, (Volumes. 1 – 5) (2001 – 2003).
7. General Microbiology, R. Y. Stanier, E. A. Adelberg, J. L. Ingraham, 4th edition, Mac Millan Press, London.
8. Microbiology An roduction by Tortora Funke case.

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MB: 102 VIROLOGY AND MYCOLOGY

UNIT-I

1. Brief outline on discovery and origin of viruses.
2. General properties of viruses, morphology and ultra structure of viruses, capsid and their arrangements, types of envelopes and their composition, measurement of viruses.
3. Viral genome; their types and structure, viral related agents-viroids and prions.
4. Classification and general properties of major families of viruses including detail account of their mode of replication.

UNIT-II

1. Cultivation of viruses- in embryonated eggs, experimental animals and cell lines; primary and secondary cell lines, diploid cell culture.
2. Assay of viruses: physical and chemical methods, plaque method, pock counting and end point method.
3. Serological methods: hemagglutination, hemagglutination inhibition, neutralization test, complement fixation, ELISA, RIA.
4. Purification of viruses: gradient centrifuge, electrophoresis, and chromatography.

UNIT-III

1. Plant viruses: recent advance in classification of plant viruses. Structure and pathogenicity of TMV.
2. Transmission of plant viruses with vector (insect, nematods and fungi) and without vector (contact, seed and pollens). Biochemical changes induced by virus in plant cell.
3. Animal viruses: nomenclature and classification of animal viruses.
4. General idea about Cyanophage, and Mycophage.

UNIT-IV

1. Bacteriophage: classification, morphology and ultra structure.
2. One step growth curve (latent period, eclipse period, and burst of size.)
3. Life cycle: lytic and lysogenic life cycle of bacteriophages.
4. Brief account of M13, Mu, T4, ϕ x174 and lamda phage

UNIT-V

1. Structure, reproduction and classification of fungi, general characteristics of Zygomycetes, Ascomycetes, Basidiomycetes, and Duteromycetes.
2. Cultivation of fungi, culture media for fungal growth, effects of environment on growth, isolation, identification and preservation of fungi.
3. Dimorphic fungi, yeast morphology, general characteristics and reproduction. Lichens, Micorrhiza, and Actinomycetes.
4. Ecology of fungi: concept of fungistatis, fungicidal.

Reference Books

1. Virology; Renato Dulbecco and Harold S. Ginsberg, Fourth edition, J.B. Lippincott Company, USA
2. An Introduction to viruses, S. B. Biswas and Amita Biswas. Forth edition, Vikas Publishing House PVT LTD New Delhi.
3. Textbook of Microbiology by Ananthnarayanan and Paniker's, eighth edition, Universities Press .
4. Microbiology; Lansing M Prescott, John P. Harley, Donald A Klein, Sixth edition, Mc Graw Hill Higher education.
5. Introductory Mycology, Alexopoulos, C.Jr : , Second edition, Wiley, New York.

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