B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS 2020

MBT IV: MEDICAL MICROBIOLOGY AND IMMUNOLOGY

TOTAL HOURS: 60 **CREDITS: 4**

UNIT-I: Immune System

No. of hours: 12

Concept of Innate and Adaptive immunity
Primary and secondary organs of immune system thymus, bursa fabricus, bone marrow, spleen, lymph nodes and lymphoid tissues
Cells of immune system- Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils
Complement system (in brief)

UNIT-II : Immune response

No. of hours: 12

Characteristics of antigen (Foreignness, Molecular size, Heterogeneity and solubility) haptens.
Antibodies basic structure and types.
Generation of Immune Response - Primary and Secondary Immune Response
MHC- Functions of MHC I & II molecules
Generation of Humoral Immune Response (Plasma and Memory cells), Immune complex formation and elimination - Agglutination, Precipitation, Neutralisation, Complement fixation, Phagocytosis
Generation of Cell Mediated Immune Response
Hypersensitivity- definition and types (in brief)

UNIT- III: Microbes in Health and Disease

No. of hours: 12

Normal flora of human body.
Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections.
General account on microbial diseases causal organism, pathogenesis, epidemiology, diagnosis, prevention and control of the following
Bacterial diseases Tuberculosis, Typhoid, Botulism
Fungal diseases Candidiasis.
Protozoal diseases Malaria.
Viral Diseases - Hepatitis- A and AIDS

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UNIT- IV: Principles of Diagnosis **No. of hours: 12**

General principles of diagnostic microbiology- Collection, transport of clinical samples
Identification by culturing
Identification by biochemical/physiological properties
Identification by molecular assays (PCR, DNA probes)
Identification by serological tests (ELISA, Immunofluorescence, Agglutination based tests, Complement fixation)

UNIT- V: Prevention and Treatment **No. of hours: 12**

Vaccines Active (Natural and recombinant) and passive
Monoclonal antibodies- Production and application
Antimicrobial agents- General modes of action of antibacterial (Penicillin, Streptomycin), antifungal (Amphotericin and Griseofulvin), antiviral (Amantadine, Acyclovir) agents
Interferons
Tests for antimicrobial susceptibility (Disc diffusion)
Antibiotic resistance in bacteria

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MBP IV: MEDICAL MICROBIOLOGY AND IMMUNOLOGY

TOTAL HOURS: 30 **CREDITS: 1**

1. Identification of human blood groups.
2. Separate serum from the blood sample (demonstration).
3. Immunodiffusion by Ouchterlony method.
4. Identification of any of the bacteria (*E. coli, Pseudomonas, Staphylococcus, Bacillus*) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease production and catalase tests
5. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS Isolation of bacterial flora of skin by swab method.
6. Antibacterial sensitivity by Kirby-Bauer method
7. Determination of minimal inhibitory concentration of an antibiotic
8. Study symptoms of the diseases with the help of photographs: Anthrax, Polio, Herpes, chicken pox, HPV warts, Dermatomycoses (ring worms)
9. Study of various stages of malarial parasite in RBCs using permanent mounts.

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MBT V: MICROBIAL ECOLOGY AND INDUSTRIAL MICROBIOLOGY

TOTAL HOURS: 60 **CREDITS: 4**

UNIT I: Microorganisms in environment

No. of hours: 12

Role of microorganisms in Biogeochemical cycles (Carbon, nitrogen, phosphorus)
Microbe-microbe interactions Synergism, mutualism, commensalism, antagonism, competition, parasitism, predation,
Plant- Microbe interactions Plant growth promoting Microorganisms, Plant pathogens
Extremophilic microorganisms

UNIT II : Microorganisms in Food and Water

No. of hours: 12

Microbes in waste management- solid and liquid waste (aerobic and anaerobic)
Microbes in degradation of Xenobiotics
Microbes in drinking water- detection of potability by (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique, Microbes in food intrinsic and extrinsic parameters that affect microbial growth in food

UNIT III: Industrial Microbiology

No. of hours: 12

Microorganisms of industrial importance yeasts (*Saccharomyces cerevisiae*), moulds (*Aspergillus niger*) bacteria (*E.coli*), actinomycetes (*Streptomyces griseus*).

Screening techniques.

Industrially important Primary and secondary microbial metabolites - Techniques involved in selection of industrially important metabolites from microbes.

UNIT IV: Fermentation processes

No. of hours: 12

Design of fermenter (for control of pH, temperature, dissolved oxygen, foaming and aeration)
Types of fermenter batch, continuous and fed batch.
Types of fermentation processes solid state, liquid state, batch, fed-batch, continuous.
Fermentation media (Crude and synthetic media; molasses, corn- steep liquor, sulphite waste liquor, whey, yeast extract and protein hydrolysates)
Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

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UNIT V: Microbial Productions **No. of hours: 12**

Microbial production of Industrial products: Citric acid, Ethanol, Penicillin, Glutamic acid, vitamin B12, Amylase, Yogurt

Microbial cells as food- SCP

Total hours: 30 **Credits: 1**

1. Microbial fermentation for the production and estimation of ethanol
2. Isolation of amylase producing microorganisms from soil
3. Production of amylase from bacteria and fungi
4. Assay of amylase
5. Demonstration of fermenter
6. Production of wine from grapes
7. Growth curve and kinetics of any two industrially important microorganisms.
8. Microbial fermentation for the production and estimation of citric acid

The syllabus, Pg. No. 1 to 19 of this document is approved w.e.f the current academic year 2020-21 for the students admitted from academic year 2020-21 onwards.

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