Subject Curriculum for M.B.B.S Course

- **THEORY**

1. Introduction to Microbiology. History and Classification

GENERAL BACTERIOLOGY

2. Morphology of Bacteria & Methods of study of Morphology.
3. Physiology of Bacteria, Metabolism & products thereof
4. Growth requirements of Bacteria, Growth Curve/measurement of growth
5. Sterilization & disinfection
6. Host-parasite relationship
7. Bacterial genetics with variation
8. Antimicrobial agents, mechanism of action, Mechanisms of bacterial drug resistance and Sensitivity Testing.

IMMUNOLOGY

1. Introduction to Immunology. Natural & Non-specific Immune Mechanisms
2. Antigen, Hapten, Adjuvants
3. Antibody
4. Complement System
5. Structure & Function of Immune System
6. Immune response with T & B Cell Co-operation
7. Cytokines with its role in cell mediated Immune response
8. Hypersensitivity and related disorders
9. Antigen -antibody reactions methodology of testing
10. Immune deficiency disorders and autoimmune Diseases
11. Vaccine and scope of Immunotherapy

PATHOGENIC BACTERIA AND DISEASES

1. Staphylococcus - Staphylococcus aureus – morphology, culture characteristics, biochemical reaction, resistance mechanisms, pathogenicity and virulence, enzymes, toxins, disease associated, typing methods, epidemiology, lab diagnosis, treatment, CONS, Micrococci

2. Streptococcus - Streptococcus pyogenes - morphology, culture characteristics, biochemical reaction, resistance mechanisms, antigenic structure, toxins and other virulence factors, disease, epidemiology, typing methods, epidemiology, lab diagnosis, treatment, other hemolytic streptococci, Enterococcus and Viridens group of Streptococci
3. Streptococcus pneumonia (Pneumococcus) - Streptococcus pneumoniae - morphology, culture characteristics, biochemical reaction, resistance mechanisms, antigenic structure, variation, toxins and other virulence factors, pathogenicity, epidemiology, lab diagnosis, prophylaxis and treatment
4. Neisseria - Neisseria meningitis and N. gonorrhoeae - morphology, culture characteristics, biochemical reaction, resistance mechanisms, antigenic properties and classification, pathogenicity, epidemiology, lab diagnosis, treatment, prophylaxis, NGU, Commensals Neisseriae
5. Corynebacterium - Corynebacterium diphtheria - morphology, culture characteristics, biochemical reaction, toxins, resistance, antigenic structure, pathogenicity, bacteriophage typing, lab diagnosis, epidemiology, prophylaxis, treatment, other pathogenic corynebacteria, diphtheroids
6. Bacillus - Bacillus anthracis and B. cereus - morphology, culture characteristics, biochemical reaction, resistance, pathogenicity, Anthrax, epidemiology, lab diagnosis, bioterrorism, prophylaxis, treatment, anthracoid bacilli
7. Clostridium - Clostridium perfringens and Cl. difficile - morphology, culture characteristics, biochemical reaction, resistance, classification, toxins, pathogenicity, gas gangrene causing bacteria, clinical feature, lab diagnosis, prophylaxis and treatment, Clostridium tetani and Cl. botulinum - morphology, culture characteristics, classification, pathogenicity, Tetanus, Botulism, lab diagnosis, prophylaxis and treatment
8. Non sporing anaerobes - Anaerobic cocci, gram positive bacilli, gram negative bacilli, Anaerobic infections, lab diagnosis and treatment Anaerobic cocci, gram positive bacilli, gram negative bacilli, Anaerobic infections, lab diagnosis and treatment

9. Mycobacterium tuberculosis - Classification, morphology, cultural characteristic, resistance, biochemical reaction, antigenic properties, typing methods and host range, Koch's phenomenon, tuberculin test
10. Listeria, Erysepalothrix, Legionella, etc. - Listeria its morphology, epidemiology, pathogenicity, lab diagnosis, treatment, Erysepalothrix, Legionella its morphology, epidemiology, pathogenicity, lab diagnosis, treatment
11. Actinomyces & Nocardia - Actinomyces & Nocardia its morphology, epidemiology, clinical form, pathogenicity, lab diagnosis, treatment, mycetoma foot
12. Enterobacteriaceae – E. coli and diagnosis of UTI - Introduction to Enterobacteriaceae, classification, Esch. Coli – morphology, cultural characteristic, biochemical reaction, antigenic structure, virulence factors, diarrhoegenic types, clinical feature, UTI, diarrhea, lab diagnosis, treatment and prevention, Klebsiella, Citrobacter, Enterbacter, Proteus etc. - Klebsiella, Citrobacter, Enterbacter, Proteus, Edwardsiella, Hafnia, Serratia, Morganella, Providentia and Erwinia - morphology, cultural characteristic, biochemical reaction, antigenic structure, virulence factors, lab diagnosis, treatment and prevention
13. Enterobacteriaceae – Shigella & Acute Bacillary dysentery - Shigella its morphology, cultural characteristic, biochemical reaction, resistance, antigenic structure, classification, epidemiology, pathogenicity, lab diagnosis, treatment and control
14. Enterobacteriaceae – Salmonella & Food Poisioning - Salmonella its morphology, cultural characteristic, biolchemical reaction, resistance, classification and nomenclature, antigenic structure, antigenic variation, pathogenicity, enteric fever, clinical course, complication, epidemiology, carrier stage, Salmonella its lab diagnosis, blood, clot, feces and urine culture, Widal test, diagnosis of carrier, typing method, prophylaxis, treatment, drug resistance, gastroenteritis, septicemia
15. Vibrio - Vibrio its morphology, cultural characteristic, biolchemical reaction, resistance, classification, cholera, pathogenesis, epidemiology, lab diagnosis, immunity, prophylaxis, Vibrio mimicus, halophillic vibrio, aeromonas and plesiomonas

16. Campylobacter & Helicobacter - morphology, cultural characteristic, biochemical reaction, resistance, pathogenesis, epidemiology, lab diagnosis, prophylaxis
17. Pseudomonas - morphology, cultural characteristic, biolchemical reaction, resistance, pathogenesis, epidemiology, lab diagnosis, prophylaxis, Sternotrophomonas maltophilla, Burkholderia, melioidosis
18. Mycobacterium tuberculosis
19. Atypical Mycobacteria - Introduction, classification, photo-, scoto-, nonphoto-chromogens, rapid growers, skin pathogens, epidemiology, lab diagnosis and treatment
20. Mycobacterium leprae - Introduction, cultivation, resistance, leprosy and its classification, epidemiology, immunity, lab diagnosis, lepromin test, treatment, prophylaxis
21. Haemophilus - Haemophilus its morphology, epidemiology, pathogenicity, lab diagnosis, treatment
22. Bordetella sp - Bordetella its morphology, epidemiology, pathogenicity, lab diagnosis, treatment
23. Brucella sp - Brucella its morphology, epidemiology, pathogenicity, lab diagnosis, treatment
24. Yersinia, Pasteurella, Francisella - Yersinia, Pasteurella, Francisella its morphology, epidemiology, pathogenicity, lab diagnosis, treatment
25. Spirochetes – Treponema - Treponema morphology, culture characteristics, biochemical reaction, resistance, antigenic structure, pathogenicity, Lab Diagnosis of Treponema, Non- verenreal treponematopsis, Yaws, Pinta
26. Spirochetes – Borrelia - Relapsing fever, borrelia its morphology, cultural characteristic, antigenic properties, pathogenicity, epidemiology, lab diagnosis, prophylaxis, treatment, Vincent angina, lyme disease
27. Spirochetes –Leptospira - Leptospira its morphology, cultural characteristic, resistance, antigenic properties, classification, pathogenicity, lab diagnosis, epidemiology, prophylaxis, treatment

28. Mycoplasma - Mycoplasma its morphology, cultural characteristic, resistance, antigenic properties, classification, pathogenicity, lab diagnosis, association with HIV, ureaplasma urealyticum, L form
29. Miscellaneous bacteria - Acinetobacter, HACEK group of organism, Legionella, helicobacter, campylobacter, Alcaligenes
30. Rickettsial disease - Introduction, characteristic, classification, morphology, cultivation, resistance, antigenic structure, pathogenesis, epidemic typhus, Brill Zinsser disease, endemic typhus, tick typhus, rickettsial pox, Scrub typhus, Eherlichia, q fever, Bartonella Quintana, Bartonella henselae
31. Chlamydia - Introduction, classification, morphology, growth cycle, resistance, antigenic properties, lab diagnosis, trachoma, inclusion conjunctivitis, infant pneumonia, genital infections, LGV, Psittacosis

VIROLOGY

1. Introduction to virology, general properties of viruses and Classification of viruses

2 Replication of viruses, Antiviral agents
3. Principles of viral diseases
4. Principles of diagnosis of viral infections
5. Common viral vaccines
6. Bacteriophage
7. Diseases caused by Herpes viruses, Vericella zoster virus, CMV EBV etc.
8. Hepatitis viruses, A,B,C,D,E; Hepatitis A & B properties laboratory diagnosis
9. Picorna viruses -and diseases produced with special mention to Pathogenesis of polio diagnosis and prevention.
10. Viral gastroenteritis –agents, pathogenesis, diagnosis.
11. Rhabdo viruses -General character of Rabies virus, pathogenesis of disease diagnosis prophylaxis.
12. Orthomyxo and paramyxo viral diseases (Influenza, Mumps, Measles, Rubella) including vaccines.

13 (a) Retrovirus -HIV infection & AIDS & other retrovirus;

(b) Oncoviruses -examples & properties & mechanisms of viral etiology of tumor scope of immunotherapy.

14 (a) Arboviruses and arboviral diseases prevalent in India: epidemiology & diagnosis

(b) Slow viral diseases –etiology, diagnosis

MYCOLOGY

1. Introduction, Classification, principles of laboratory diagnosis
2. Superficial mycosis
3. Subcutaneous mycosis
4. Deep mycosis
5. Opportunistic mycosis

PARASITOLOGY

1. Introduction, Classification, definition and types of hosts. Definition and types of parasites
2. Intestinal amoebiasis and complications -mode of infection, pathogenesis, laboratory diagnosis.
3. Flagellated protozoa -intestinal & genitourinary
4. Haemoflagellates -diseases, life cycle, vector for transmission, laboratory diagnosis (Trypanosomes, leishmania).
5. Malaria -types, parasite -Morph., life cycle, vector, laboratory diagnosis.
6. Toxoplasmosis and other opportunistic protozoa infections.
7. Classification of helminthes and general characters of nematodes, Three introduction to intestinal nematodes, strongyloides stercoralis, Ascaris lumbricoides, Hook worm, Trichinella spiralis, Enterobius Vermicularis trichiurae life cycle, disease, laboratory. Diagnosis, epidemiology
8. Filariasis -diseases, vector, life cycle of parasite Pathogenesis of disease, laboratory diagnosis.
9. Dracunculosis -life cycle of parasite, mode of infection, epidemiology, laboratory diagnosis.

10. General characters of cestodes, Taeniasis -hosts, mode of infection, life cycle of parasite infection, laboratory diagnosis.
11. Echinococcus granulosus-Morphology,1ife cycle of parasite, mode of infection, prevention ,laboratory diagnosis.
12. D.latum and other cestode infections
13. Trematodes -classification, diseases caused,. Life cycle of Schistosomes and general principles of laboratory

❖ **PRACTICAL**

1. Parts and use of microscope and microscopy
2. Instruments and glass wares used in Microbiology
3. Universal presence of microbes
4. Commonly used media and culture techniques (Media -simple basal media -liquid, solid, enriched media, selective media, enrichment media, Indicator Media) Transport Media, Blood culture media, sugar media, Anaerobic media Name, type, composition, sterilization and use.
5. Sterilization methods used for different purpose- basic principles, instruments/chemical agents used
6. Study of morphology of bacteria:
   a) Gram staining
   b) Albert staining
   c) Ziehl-Neelsen staining
7. Study of motility of bacteria by
   a) Hanging drop method
   b) Cragie's tube method
   c) Straight loop inoculation method
   d) Capillary tube method
   e) Dark-ground microscopy
8. Methods of antimicrobial sensitivity testing
   a) Disk diffusion
   (b) Tube dilution

9. Study of Staphylococcus aureus and staph. epidermidis, Colony morphology, Pigment production. Gram stain. Motility, Coagulase and other confirmatory tests including Catalase test.

10. Study of -Gram + cocci

    a) Haemolytic properties of Staph., Strepto., Pneumococci

    b) Gram staining, Morphology, Study of Strepto, Staphylo Neisseria, Pneumococcus, Clostridia.

11. Corynaebacterium - Albert Stain Media used

12. Mycobacterium - Z -N Stain, Study of charts, Confirmatory diagnosis of Tuberculosis & Leprosy, D/D Myco. Tuberculosis & M. leprae in smear.

13. Study of spores -Gram stain, Spore-Stain (Carbol Fuchsin)

14. Study of Stained Smear, Capsule –India ink staining (Negative - Stain) Carbol Fuchsin (Positive stain), Methods of Anarobiasis.

15. Enterobacteriace (Use of media) Colony character Biochemical reactions for Identification of the bact. & Final identification with antibiogram)

    (a) E.coli

    (b) Klebsiella sp.

    (c) Proteus sp.

    (d) Salmonella sp.

    (e) Shigella sp

16. Vibrio -Gram Stain Motility test Oxidase Biochemical Reactions.

17. Pseudomonas sp. -Gram Stain. Motility test, Oxidase

18. Serological Tests: VDRL Test RPR Agglutination -Widal, Latex Agglutination test, ELISA -any common test done.

19. Introduction to Parasitology - Types of clinical materials different types of tests done.

    Steps of exam of Stool Smear

    Steps of exam of Blood Smear

    Steps of exam of marrow Smear.

20. Blood Parasites - Malaria Parasite, L.D.Body, Microfilaria

21. Adult Parasites - Nematodes, Cestodes, Trematodes

22. Examination of Stool for ova, parasite & Cyst Saline and Iodine preparations
23. Demonstration of fungus by KOH prepn. / lacto phenol cotton blue staining.
24. Demonstration of yeast cells in Gram stains & culture

❖ **TUTORIALS**

A. Interpretation of laboratory investigation for diagnosis of Infectious disease and correlation between clinical features with etiological agents to be taken up in the form of charts on diseases of national importance e.g.

a) Tuberculosis
b) Leprosy
c) Cholera
d) Enteric fever
e) Diphtheria
f).Whooping coughs
g) Tetanus
h) Malaria
i) Kala-azar
j) Filaria
k) Dengue
t) Hepatitis B
m) AIDS
n) Hookworm anemia

CLINICAL MICROBIOLOGY

1. Upper respiratory tract. Infections with lab diagnosis
2. Lower respiratory tract infections with lab diagnosis.
3 Bacterial food poisoning with lab diagnosis
4 Terminology: gastroenteritis, diarrhoea, dysentery, pseudo membranous colitis diarrhoea and its lab diagnosis
5. Dysentery and its lab diagnosis
6. Meningitis -types, agents and its lab diagnosis

7 Terminology of Bacteraemia, Septicaemia, pyaemia and its lab diagnosis/ PUO (Blood culture)

8 Urinary tract Infection, organism and its lab diagnosis

9. Sexually transmitted diseases list and lab diagnosis

10 Hospital acquired infection and its control

11. Bacteriology of milk, water air.