DETAILEDS YLLABUS FOR THE POST OF ASSISTANT PROFESSOR MICROBIOLOGY (MEDICAL EDUCATION)

TOTAL : 100 MARKS

MODULE 1 GENERAL MICROBIOLOGY (10 marks)

1. Historical events and developments in microbiology
2. Nomenclature, classification, morphology, growth requirements, pathogenesis and laboratory diagnosis of different bacteria, viruses, parasites and fungi.
3. Normal flora microbes, including Microbiome in health and disease
4. Epidemiology of common infectious diseases, host-parasite relationship and their significance.
5. Various types of microscopes and microscopic techniques used in diagnostic microbiology.
6. Various methods of isolation, identification and preservation of microbes in laboratory.
7. Type, mechanism of action and applications of microbial toxins, other virulence factors & microbial products like Bacteriocins
8. Basic principles of bacterial genetics and applications of molecular techniques in medical microbiology.
9. Microbiological surveillance including patient screening methods, organism typing and genome sequencing methodologies.
10. Emerging infectious diseases with strategies for their identification and control.
11. Application of molecular biology techniques in the laboratory diagnosis of infectious diseases.
12. Types & mechanism of action of Antimicrobial agents, their pharmacokinetics & pharmacodynamics, along with mechanism of drug resistance.
13. Types and applications of Bacteriophages in diagnostic and therapeutic of infections

MODULE 2 IMMUNOLOGY(10 marks)

1. Describe the structure and function of the immune system, immunological mechanisms in health and response of the host immune system to infections. (Innate and acquired immunity, Cells involved in immune response, Antigens , Immunoglobulins, Mucosal immunity, Cell mediated immunity, Cytokines, MHC complex, Immune tolerance)
2. Complement system and its role in health and disease.
3. Mechanism/s in immunological disorders (hypersensitivity, autoimmune disorders and immunodeficiency states) and the laboratory methods used in their diagnosis including measurement of immunological parameters

4. Types & principles of antigen and antibody reactions and immunological techniques used in diagnostic microbiology as well as in research.
5. Iimmunological mechanisms of transplantation and tumor immunity**.**
6. Mechanism/s and significance of immune-potentiation and immune-modulation.
7. Types, techniques and advances in the development and applications of vaccines including UIP and immunotherapy and reverse vaccinology.
8. Role of animals in immunology.

MODULE 3 BACTERIOLOGY(10 marks)

1. Gram positive cocci of medical importance including *Staphylococcus, Micrococcus, Streptococcus,Enterococcus, anaerobic cocci* etc.

2. Gram negative cocci of medical importance *including Neisseria, Moraxella* etc.

3. Gram positive bacilli of medical importance including *Lactobacillus, Coryneform organisms, Bacillus and aerobic bacilli, Actinomyces, Nocardia, Actinobacillus and other actinomycetales, Erysipelothrix, Listeria, Clostridium* and other spore bearing anaerobic bacilli etc.

4. Gram negative bacilli of medical importance including *Enterobacteriaceae, Vibrios, Aeromonas, Plesiomonas, Haemophilus, Bordetella, Brucella, Gardnerella, Pseudomonas and other non-fermenters, Yersinia,,Pasteurella, Francisella, Bacteroides, Fusobacterium, Leptotrichia and other anaerobic gram negative bacilli* etc.
5. Helicobacter, Campylobacter,Legionella, Calymmatobacterium, Streptobacillus, Spirillum and miscellaneous bacteria

6. Mycobacteria

7. Spirochaetes

8. Chlamydia

9. Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.

10. *Rickettsiae, Coxiella, Bartonella*etc.

11. Any newly emerging bacteria

MODULE 4 MYCOLOGY(10 marks)

1. Yeasts and yeast like fungi of medical importance including *Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces* etc.

2. Mycelial fungi of medical importance including *Dermatophytes, Aspergillus, Zygomycetes, Pseudallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes*etc.

3. Dimorphic fungi including *Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Talaromycesmarneffei*etc.

4. Fungi causing Mycetoma, Chromoblatomycosis, OcculomycosisOtomycosis, Phaeohyphomycosisetc

5. Pythium insidiosum

6. Prototheca

7.Rinosporidium seeberi

8. Pneumocystis jirovecii

9. *Lacazialoboi (Loboaloboi)*

10. Laboratory contaminant fungi

11. Fungi causing Mycetism and mycotoxicosis

12. Any newly emerging fungi

MODULE 5 VIROLOGY(10 marks)

1. DNA viruses of medical importance including Pox viruses, Herpes viruses, Adeno viruses, Hepadna virus, Papova and Parvo viruses etc
2. RNA viruses of medical importance including Picorna viruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses, Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human immunodeficiency virus, Arbo viruses, Corona viruses, Calci viruses etc.

3. Oncogenic viruses

4. Bacteriophages

5. Slow viruses including prions

6. Unclassified viruses

7. Viriods

8. Any newly emerging virus

MODULE 6 –PARASITOLOGY(10 marks)

1. Protozoan parasites of medical importance including *Entamoeba, Free living amoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, CyclosporaIsospora, Babesia, Balantidium,* etc.

2. Helminths of medical importance including those belonging to Cestoda (*Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dipylidium, Multiceps*etc.), Trematoda (*Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides, Paragonimus,*

Clonorchis, Opisthorchis etc.) and Nematoda (*Ascarislumbrecoides, Ancylostomaduodenale, Enterobiusvermicularis, Trichuristrichiura, Filariasis*etc.)

3. Entomology: common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myasis etc.

4. Neglected tropical parasitic diseases

5. Any newly emerging parasite

MODULE 7APPLIED MICROBIOLOGY & RECENT ADVANCES(10 marks)

i.Prophylaxis- Basic Principles and applications of general, immune as well as chemo- prophylaxis of infections in various clinical situations / scenarios.
ii. **Vaccinology**: types of vaccines, principles, methods of preparation of vaccines and administration of vaccines.

iii. **Role of microbes in non-communicable diseases** - infectious agents in origin and progression of non-communicable diseases like cancer, diabetes, musculoskeletal disorder and influence of these microbes on mental health.

iv. **Antimicrobial Resistance Detection and Prevention:** classification, mechanism of action, detection and reporting drug resistance to antimicrobials (antibacterial, antiviral, antifungal, antimycobacterial and antiparasitic agents).

v. Investigation of an infectious disease outbreak in hospital and outbreak/epidemic/pandemic in community.

vi. Information technology (computers) in microbiology.

vii. Automation in Microbiology.

viii. Molecular techniques in the laboratory diagnosis of infectious diseases.

ix. Laboratory safety and management.
x.Principles and application of recent technological advances, automation, and application of Artificial Intelligence, nanotechnology, biosensors, bioinformatics, etc. in diagnosis & research in Microbiology.
xi. Emerging and reemerging diseases.

MODULE 8 CLINICAL / SYSTEMIC MICROBIOLOGY(10 marks)

i. Discuss in depth about the etiological agents, source, transmission, host-parasite interaction, clinical manifestations, laboratory diagnosis, treatment, prevention, epidemiology, national, international guidelines in the situations/ scenario given below:

ii.Infections of various organs and systems of the human body

iii.Microbiological basis of infective syndromes of various organs and systems of human body viz. CVS and blood, Respiratory Tract Infections, Urinary Tract Infections, Central Nervous System infections, Reproductive Tract Infections, Gastrointestinal Tract infections, Hepatobiliary System, Skin and Soft tissue infections, Musculoskeletal system, infections of Eye, Ear and Nose etc)
iv. Discuss in depth about the etiological agents, source, transmission, host-parasite interaction, clinical manifestations, laboratory diagnosis, treatment, prevention, epidemiology, national, international guidelines in the situations/ scenario given below:
v.Microbiological basis of infective syndromes as per the source/risk e.g. Blood borne, sexually transmitted infections congenital, vector borne, food, air & water borne, zoonotic, laboratory acquired, occupational infections etc.
vi. Opportunistic Infections in special and high risk host eg Pregnancy, neonates, geriatrics, diabetics, immunocompromised host due to any reason, patients with Implants/Devices, dialysis etc,
vii.Infections in special situations/ scenario -Tropical, Travel related, Emerging/ Remerging Infectious diseases seen commonly, agents of bioterrorism etc.
viii. Elicit relevant history, interpret laboratory results with clinic-microbiological correlation and develop diagnostic and treatment algorithms.

MODULE 9 HEALTH CARE ASSOCIATED INFECTIONS(10 marks)

i. **Health care associated Infections** - types, pathogenesis, diagnosis, prevention, control and surveillance of health care associated infections.

ii. Biomedical waste and its management.

iii.Concept& application of various biosafety and biosecurity issues in laboratory and patient care including physical, biological containment and standard precautions
iv.Various methods of sterilization and disinfection and apply them in the laboratory and in patient care.
v. Needle stick injury
vi. Antimicrobial stewardship.
vii.

MODULE 10 MISCELLANEOUS TOPICS(10 marks)

i.Quality assurance, quality control and accreditation in diagnostic microbiology.
ii. Use of information technology (LIS, WHO NET etc.) in microbiology laboratory effectively.
iii.Principles& implementation of animal and human ethics involved in diagnostics and research in Microbiology
iv.Microbiology of air, water and food in patient care both in community/ hospital setting.
v.Quantification in Microbiology
vi.Management of experimental animals
vii. Diagnostic test evaluation
viii.Statistical analysis of microbiological data and research methodology.

ix.Pandemic management

x. Bioterrorism

xi.National Health programmes for communicable diseases

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

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