Dr. M.G.R. EDUCATIONAL AND RESEARCH INSTITUTE
Deemed to be University

Maduravoyal, Chennai – 600 095, Tamilnadu, India
(An ISO 2001:2018 Certified Institution)

University with Graded Autonomy Status

SYLLABUS & CURRICULUM
for
M.D. MICROBIOLOGY

2020 onwards

Sponsored by

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M.D .MICROBIOLOGY

1. GOAL

The aim of this curriculum is to train and equip clinical microbiologist for identification, diagnosis, containment of infectious diseases, autoimmune and immunodeficiency diseases in hospital and community settings and training on planning and execution of applied and fundamental research in the field of microbiology. They will be proficient to apply the wholesome knowledge both for laboratory diagnosis and fundamental / applied research.

2. OBJECTIVES

To train a post graduate student to

1. Demonstrate competence as a clinical microbiologist
2. Interact effectively with the allied departments by rendering services in basic as well as advanced laboratory investigations
3. Demonstrate application of microbiology in a variety of clinical settings to solve diagnostic and therapeutic problems along with preventive measures.
4. Play a pivotal role in hospital infection control, including formulation of antibiotic policy and management of biomedical waste.
5. Acquire skills in conducting collaborative research in the field of Microbiology and allied sciences.
6. Conduct such clinical/experimental research as would have significant bearing on human health and patient care
7. Demonstrate effective communication skills required for the practice of clinical microbiology and while teaching undergraduate students

8. Establish good clinical microbiological services in a hospital and in the community in the fields of bacteriology, virology, parasitology, immunology and mycology.

9. Plan, execute and evaluate teaching assignments in Medical Microbiology.

10. Plan, execute, analyze and present the research work in medical microbiology.

11. Acquire various skills for collaborative research.

12. Participate is various workshops/seminars/journal clubs/ demonstration in the allied departments

13. Uphold the prestige of the discipline amongst the fraternity of doctors.

14. Be well versed in vertical programmes /WHO ,UN.

To attain the above objectives the following are the essential requirements

3. COMPONENTS OF THE POSTGRADUATE CURRICULUM

(i) KNOWLEDGE

Good knowledge of various disciplines of micro-biology includes General Bacteriology, Systematic Bacteriology, Virology, Parasitology, Immunology, Mycology and Molecular diagnosis.

Clinical Microbiologist should establish good clinical microbiological services in the hospital and community in the fields of bacteriology, virology, parasitology, immunology, serology, mycology and also get updated with new diagnostic technology.

Interact with allied departments, acquire knowledge of infections in humans, immunoprophylaxis, transplantation immunology, Health care associated infections, outbreak investigations ,Antibiotic stewardship

programme, Antibiotic audits, basics of antibiotic policy, Awareness of National policies like RNTCP, NACO guidelines, NVBDCP, IDSP & Reference Lab network etc.,

Acquire skills in planning, executing and evaluating teaching assignments in medical microbiology and conducting collaborative research both clinical and experimental in the field of microbiology and allied sciences.

Knowledge of laboratory animals and applications in diagnosis, quality assurance , quality control and management for laboratory standardization and accreditation is essential prerequisite of the curriculum.

(ii) SKILLS

- Washing and sterilization of glass wares, Plugging and packing
- Preparation and pouring of basal media, Enriched media, Selective media and Transport media
- Disinfection, sterilization techniques and checking and adjustment of PH of media
- Sterility check (Dry / Moist methods) and disinfectant testing
- Preparation of in house reagents
- Decontamination of cultures
- QC and QA of media, reagents, antibiotic discs
- Safe laboratory practices including bio safety
- Care and maintenance of laboratory equipments (Conventional /Automated)
- Collection and transport of various clinical specimens
- Performance of antibiotic sensitivity test – Kirby Bauer, Stokes method
- Determination of MIC by agar dilution, Broth dilution

- Test for drug resistance including MRSA, VRE, ESBL, AmpC, Metallobetalactamases.
- Environmental sampling including operating Room (OR)
- Identification of Bacteria of Medical importance upto species level by routine and special tests.
- Identification of Anaerobic Bacteria with various techniques of Anaerobiasis .
- Preparation and performance of different stains including Grams, Albert, Capsule, Shauffer Fulton Spore Staining Method , Fontana, Ziehl-Neelsen, Modified Ziehl-Neelsen etc.
- Care and operation of various microscopes viz. light , dark ground, phase contrast ,Inverted and fluorescence microscopes.
- Quantitative and semi-quantitative analysis of urine sample / BAL
- Inoculation of clinical specimen on media for isolation, identification of bacteria
- Test for motility, in-vitro toxicity tests
- Bacteriological tests for air, water and milk
- Maintenance and preservation of bacterial cultures.
- Serological grouping of streptococcus
- Antibiotic susceptibility test for mycobacteria
- Molecular methods of detection of drug resistance in bacteria
- Molecular diagnostic methods for bacteria / virus / fungi

IMMUNOLOGY

- Collection / separation / preservation of blood samples
- Antigen preparation for Widal / Weil-Felix, VDRL
- Serological test including rapid / conventional (LAT, IC, tube agglutination, slide flocculation
- Raising of bacterial anti sera in laboratory animals
- Enzyme linked immunosorbent assay / Immunoblotting

- Co- agglutination test
- CLIA(Chemiluminescent immunoassay)
- FIA (Flourescent Immunoassay)

VIROLOGY

- Preparation of Glass wares for tissue culture(washing, sterilization)
- Preparation of media like Hanks, MEM, VTM
- Preparation of clinical specimens for isolation of viruses
- Maintenance of continuous cell lines by subcultures
- Preservation in -70 C & Liquid Nitrogen ^{o}
- Recognition of CPE & Cytopathogenic viruses
- Serological test- ELISA, Rapid tests for Hepatitis A,B,C,D& E, HIV, Arboviruses & Westernblot for HIV

MYCOLOGY

- Collection and transport of specimens
- Direct examination of specimens by KOH, Gram's, Giemsa, Lactophenol Cotton blue stains and tissue stains.
- Calcofluor staining and examination under fluorescent microscope.
- Examination of histopathology slides for fungal infections
- Isolation and identification of common laboratory contaminants, dermatophytes and other fungi of medical importance (yeast, dematiaceous fungi)
- Special techniques like Wood's lamp examination, hair baiting, hair perforation, paraffin baiting and slide culture
- Maintenance of stock cultures
- Antifungal susceptibility testing

PARASITOLOGY

i. Examination of faeces for parasitic ova and cysts etc. by direct and concentration methods (salt floatation and formal-ether methods)

ii. Egg counting techniques for helminths
iii. Examination of blood for protozoa and helminths by wet mount and thin and thick stained smears
iv. Examination of other specimens e.g. urine, CSF, bone marrow etc. for parasites.
v. Histopathology sections-examination and identification of parasites
vi. Performance of stains-JSB, Field's Leishman, Giemsa
vii. In-vitro culture of parasites like Entamoeba, Leishmania, etc.
viii. Preparation of media- NNN, etc.
ix. Copro-culture of larva of hookworms
x. Antigen preparation-viz. Entamoeba, filarial, hydatid for serological tests like IHA and skin tests like Casoni's test
xi. Identification of common arthropods and other vectors viz., mosquito, sandfly, tick, mite, cyclops
xii. Collection of specimens
xiii. Preservation of parasites- mounting, fixing, staining, etc.
xiv. Peripheral blood smear, QBC for malaria

MOLECULAR BIOLOGY

- Extraction of DNA, protein & RNA, Routine PCR Protocols, Gel Documentation

(iii) CLINICAL APPLICATION

At the end of the course, the student should be able to

- ❖ Diagnose infectious diseases, correlating the clinical details with laboratory tests as evidence.
- ❖ Identify, aid in prevention, control and treatment of common Health care associated infections (HCAI) which includes Catheter associated urinary tract infections (CAUTI), Ventilator associated pneumonia (VAP),

Central line associated blood stream infections (CLABSI), surgical site infections (SSI).

- ❖ Alert the treating physician on existing and emerging antimicrobial resistance and follow up.
- ❖ Interpret the surveillance indicators of HCAI
- ❖ Practice and participate in antimicrobial stewardship program (ASP) with regard to selection of appropriate antimicrobials – dose, duration, dosing interval, & de-escalation, etc.

WRITING THESIS/ RESEARCH ARTICLES

All students will have to carry out a research program and bring out a dissertation (thesis).

Students are encouraged to attend CME's, publish research papers and present posters, or platform presentations at State, National and International Conferences.

ATTITUDES INCLUDING COMMUNICATION SKILLS

Students should develop the art of eliciting clinical history from patients to correlate laboratory reports. Communication skills to be acquired to inform critical parameters to clinicians without undue delay.

TRAINING IN RESEARCH METHODOLOGY MEDICAL ETHICS, BIOETHICS AND MEDICOLEGAL ASPECTS

Students should compulsorily attend the research Methodology workshop conducted by the University within first six months of the M.D course.

Students are encouraged to attend workshops /CME's on Bioethics conducted by the University and other reputed Institutions.

Medical ethics, Bioethics, moral and legal issues and Medical Audit are part and parcel of our curriculum and syllabus in Medical Microbiology like Lab

reports confidentiality, Notification and reports disclosure, Pre and post test counseling. And biomedical ethics related to quarantine and its impact, patient Vector, carrier, Specimen transport, Bio-terrorism, outbreak and their control, HCAI , BMWM, NABL including quality assurance are very much essential for the Health care setup and teaching institutions.

4. THEORY SYLLABUS

General Microbiology

- Microbiology- The Historical introduction
- Microscopy
- Biosafety and standard precautions
- Taxonomy and Nomenclature of microorganisms
- Sterilization and disinfection.
- Microbial susceptibility & resistance to chemical and physical agents
- Morphology of bacteria and other microorganisms
- Human microbiota
- Bacterial growth and metabolism.
- Bacterial toxins &, Bacteriocins & Bacteriophages
- Microbiology of hospital environment.
- Microbiology of air
- Microbiology of milk and dairy products
- Microbiology of Food
- Microbiology of water.
- General epidemiology, Transmission, and Therapy
    - Epidemiology of infectious diseases,
    - Theory of infectious diseases transmission and control,
    - emergence and resurgence of infectious diseases,
    - Healthcare associated infections,
- Host-parasite relationship

- ❖ Antibacterial therapy and drug resistance
- ❖ Bacterial genetics & Bacterial Typing
- ❖ Molecular genetics relevant for Medical Microbiology.
- ❖ Molecular techniques in diagnosis of microbial infections
- ❖ Automation in Microbiology
- ❖ Quality assurance & quality control in Microbiology.
- ❖ Accreditation of laboratories

IMMUNOLOGY

- ❖ History
- ❖ Innate Immunity and Inflammation:
- ❖ Phagocytes: Macrophages, Neutrophils
- ❖ Basophils and eosinphils
- ❖ Natural killer cells
- ❖ Apoptosis
- ❖ Complement
- ❖ Antimicrobial peptides
- ❖ Mediators of Inflammation
- ❖ Acute phase response
- ❖ Acquired Immunity
- ❖ Antibodies and B lymphocytes
- ❖ The B-cell antigen receptor
- ❖ Monoclonal antibody therapy
- ❖ Processing and presentation of antigen – Class II MHC
- ❖ CD4 lymphocytes and their role in infectious disease
- ❖ Processing of antigen – Class I MHC
- ❖ CD8 lymphocytes and their role in infectious diseases, malignancy
- ❖ TCR
- ❖ Unconventional T cell
- ❖ Lymphocyte mediated cytotoxicity

- Immunological memory
- Lymphocyte homing
- Mucosal immune response
- Superantigens
- Immunogenetics
- Transplantation immunity
- Tumour Immunology
- Vaccines and immunotherapy
- Measurement of immunological parameters
- Immunological techniques
- Immunopotentiation & immunomodulation
- ImmunoHaematology
- Infection and Immunity
- Virus & Interference with Host immune response
- Bacteria & Evasion of immune response
- Parasite evasion
- Immunopathology & Immunodeficiency
- Sepsis/ Shock
- DTH associated pathology
- Airway hypersensitivity
- Autoimmunity
- Immunocompromised host
- Acquired immunodeficiencies
- Vaccines
- New approaches to vaccine delivery
- New vaccine delivery
- Peptide vaccines
- Live vaccine carriers
- Naked DNA vaccines

- ❖ Adjuvants and subunit vaccines
- ❖ Mathematical models of vaccination

Systematic Bacteriology:

- ❖ Isolation & identification of bacteria.
- ❖ Gram positive cocci of medical importance including Staphylococcus, Micrococcus, Streptococcus species, Streptococcus pneumoniae, Enterococcus, Anaerobic cocci, etc.
- ❖ Gram negative cocci of medical importance including Neisseria, Branhamella, Moraxella, etc.
- ❖ Corynebacterium and other Coryneform organisms, Bacillus & other Aerobic bacilli, Actinomyces, Nocardia, and other Actinomycetales, Erysipelothrix, Listeria, Clostridia and other spore bearing Anaerobic bacilli, Lactobacillus, etc.
- ❖ Gram negative bacilli of medical importance including Vibrios, Aeromonas, Plesiomonas, Haemophilus, HACEK Group, Bordetella, Brucella, Gardnerella, Pseudomonas, Burkholderia, Acinetobacter & other Non-fermenters, Pasteurella, Francisella, Capnocytophaga, Bacteriodes, Fusobacterium, Leptotrichia and other anaerobic gram negative bacilli, etc.
- ❖ Helicobacter, Campylobacter & Spirillium, Gardnerella, Legionella
- ❖ Enterobacteriaceae- Escherichia, Edwardsiella, Citrobacter, Salmonella, Shigella, Klebsiella, Enterobacter, Hafnia, Serratia, Proteus, Morganella, Providencia,Yersinia & Erwinia
- ❖ Mycobacteria
  - ✓ Mycobacterium tuberculosis complex, Non-Tuberculous Mycobacteria,
  - ✓ Mycobacterium leprae
  - ✓ Microbiology, pathogenesis, transmission, clinical spectrum, laboratory diagnosis – conventional and recently developed point of

care,rapid and automated techniques, molecular diagnostic methods, national and WHO guidelines on diagnosis and treatment of Pulmonary and extrapulmonary Tuberculosis in adults and children , drug resistant TB and diagnosis of drug resistance, and treatment of drug resistant TB, prophylaxis – immunoprophylaxis and control and prevention of TB in community and hospitals , national programs on control of tuberculosis.

- Spirochaetes including Treponema, Leptospira, Borrelia etc
- Chlamydiae
- Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasma
- Rickettsiae, Coxiella, Bartonella, & Orientia etc.
- Ehrlichia, Anaplasma,etc.
- Spirillum minus, Streptobacillus moniliformis
- Antibiotic panels / Guidelines

MYCOLOGY

- Historical introduction to fungi
- General characteristics & classification of fungi. Phylogeny and systematic
- Morphology & reproduction of fungi.
- Laboratory diagnosis -Isolation and identification of fungi, Mycoserology, molecular diagnosis of fungal diseases.
- Tissue reactions to fungi and histopathological diagnosis of fungal infections
- Yeasts and yeast like fungi of medical importance including Candida, Cryptococcus, Malassezia. Trichosporon, Geotrichum, Saccharomyces, etc.

- Mycelial fungi of medical importance including Aspergillus, Zygomycetes, Pseudoallescheria, Fusarium, Piedra, other Dematiaceous hyphomycetes and other hyalohyphomycetes, etc.
- Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium manneffei, etc.
- Dermatophytes
- Fungi causing mycetoma, keratomycosis & otomycosis
- Phythium insidiosum
- Prototheca
- Pneumocystis carinii infection; Pneumocystis jerovecii.
- Rhinosporidium seeberi & Loboa loboi
- Superficial and ocular fungal infections
- Subcutaneous mycoses
- Systemic mycoses due to Dimorphic fungi
- Systemic mycoses due to Opportunistic fungi
- Common laboratory contaminant fungi.
- Mycetism & mycotoxicosis.
- Therapeutic agents and vaccines
    - Antifungal agents & inVitro antifungal susceptibility tests
    - Principles of antifungal therapy
    - Resistance to antifungal agents

VIROLOGY

- History of research in virology
- General properties of viruses.
- Classification of viruses.
- Morphology : Viral structure, Bacteriophages.
- Viral replication
- Isolation & identification of viruses.
- Cultivation of viruses.

- Epidemiology and Pathogenesis & Control of viral diseases.
- Genetics of vertebrate viruses.
- Virus host interaction
- DNA viruses of medical importance including Poxviridae, Herpesviridae, Adenoviridiae, Hepadna virus, Papova and Parvo viruses, etc.
- RNA viruses of medical importance including Enteroviruses, Picorna virus, Togaviridae, Flaviviruses, Orthomyxoviruses,Paramyxoviruses, Reoviridiae, Rhabdoviridae, Arenaviridae, Bunyaviridae, Retroviridae, Filoviruses, Coronaviridae, Calciviruses, etc.
- Human immunodeficiency virus
    - Morphology, transmission and prevention, epidemiology, pathogenesis, clinical syndromes,Opportunistic Infections, laboratory diagnostic procedures, National and WHO guidelines on diagnosis and treatment in adults and children, Post exposure prophylaxis, developments in vaccine research
- Lentiviruses, Slow viruses including Prions
- Arthropod borne & Rodent borne viruses
- Oncogenic & Teratogenic Viruses
- Hepatitis viruses
    - Morphology, transmission and prevention, epidemiology, pathogenesis, clinical syndromes, laboratory diagnostic procedures, diagnosis and treatment guidelines in adults and children and in high risk patients, and Prophylaxis for diseases caused by hepatitis viruses
- Slow viruses including prions
- Oncogenic & Teratogenic Viruses
- Viriods
- Unclassified viruses

- Syndromes caused by a range of viruses
    - Infections of central nervous system,
    - viral infections of the fetus and neonates(congenital)
    - viral infections of the immunocompromised patients
- Principles of diagnosis and control of viral infections
    - Safety in virology laboratory
    - The laboratory diagnosis of viral infections
    - Immunoprophylaxis of viral diseases(Viral Vaccines)
    - Viral vectors for gene therapy
    - Antiviral chemotherapy including emerging resistance to antiviral drugs
    - The emergence and re emergence of viral diseases
- Vaccines, anti-viral drugs & anti-viral agents

PARASITOLOGY

- **General Parasitology**
    - ✓ History
    - ✓ World- wide importance of parasites
    - ✓ Epidemiology
    - ✓ Immunology and Immunopathology of parasitic infections
    - ✓ Control of parasitic diseases
    - ✓ Diagnosis of parasitic infections
    - ✓ Antiparasitic agents
- **Protozoa**
    - ✓ Cellular organization of parasitic protozoa
    - ✓ Classification
    - ✓ Introduction to parasitic protozoa
    - ✓ Protozoan parasites of medical importance including Entamoeba, Free living amoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium,Toxoplasma, Cryptosporidium

Sarcocystis, , Cyclospora, Isospora, Babesiosis, Blastocystis Microsporidium, Balantidium, etc.

- **Helminths**
  - ✓ Helminths of medical importance including those belonging to
    - Cestodes (Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dipyllidium, Multiceps, etc.),
    - Trematodes (Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides, Paragonimus, Clornorchis, Opisthorchis, etc.) and Gastrointestinal Nematodes Trichiuris, Ancylostoma, Necator, Ascaris, Enterobius,
    - Trichinella
    - Strongyloides
    - Toxocara,
    - Lymphatic Filarial worms,
    - Oncocerciasis
    - Dracunculus
    - Angiostrongylus
- Entomology: common arthropods & other vectors viz, mosquito, sandfly, ticks, mite, Cyclops, louse, myiasis.

APPLIED MICOBIOLOGY

- **General Ecosystem**
  - ✓ Human microbiota
  - ✓ Airborne bacteria
  - ✓ Bacteriology of water
  - ✓ Bacteriology of food
  - ✓ Bacteriology of Milk and milk products
- **Infectious Diseases**
  - ✓ Epidemiology
  - ✓ Theory of infectious diseases transmission and control
  - ✓ Emergence and resurgence of bacterial infectious diseases

- ❖ Health care associated infections
- ❖ Management of hospital waste.
- ❖ Investigation of an infectious outbreak
- ❖ Organ and system infections
    - ✓ Blood stream infections and Endocarditis
    - ✓ Meningitis
    - ✓ Other CNS infections
    - ✓ Infections of the eye
    - ✓ Infections of the Upper respiratory tract
    - ✓ Infections of the lower respiratory tract
    - ✓ Infections of the genital tract
    - ✓ Infections of the Urinary tract
    - ✓ Infections of the bones and joints
    - ✓ Opportunistic infections

Recent advances in Microbiology & Immunology(diagnosis & management)

- ❖ Quality assurance & quality control in microbiology
- ❖ Accreditation of laboratories
- ❖ Information technology (Computers) in microbiology
- ❖ Automation in Microbiology
- ❖ Statistical analysis of microbiological data and research methodology
- ❖ Animal and human ethics involved in microbiological work.

5. TEACHING LEARNING METHODS

The following teaching learning methods are recommended.

- ❖ Lectures
- ❖ Case based discussion
- ❖ Bed side clinics
- ❖ Teaching on ward rounds
- ❖ Symposia
- ❖ Seminars

- ❖ Journal clubs
- ❖ Problem based learning
- ❖ Telemedicine (where available)

6. STRUCTURED TRAINING PROGRAM

Duration of Course – Three years

	Details of Training M.D. (MICROBIOLOGY)		
1.	Collection of Clinical samples in the Central Laboratory	:	2 weeks
2.	Sterilisation & disinfection, Central sterile supplies department (CSSD)	:	2 weeks
3.	Media preparation and sterilization of lab materials	:	1 month.
4.	Bacteriology • Bacteriological techniques – 1 month • Bacterial culture Antibiogram and reporting • Blood Culture – 2 Months • Urine & genitor urinary specimens culture – 6 weeks • Exudate – – 6 weeks • Respiratory specimens – 2 months • Sterile Body fluids – 2 month • Stool – 1 Month	:	11months
5.	Serology – Diagnostic Techniques and Reporting	:	2 months.
6.	Special Microscopy and Staining	:	1 month.
7.	Preparation for Dissertation Protocol submission	:	1 month.
8.	Mycobacteriology • RNTCP & DOTS clinic – 2 Weeks • Mycobacteriology conventional culture and microscopy - 4 Weeks • MGIT, LPA, Genexpert – 2 weeks	:	2 months.
9.	Anaerobic culture	:	1 month
10.	Mycology	:	2 months

11.	Parasitology	:	2 months.
12	Virology (Should include tissue culture, molecular diagnosis, viral serology and other viral diagnostic techniques) - 6 weeks Posting at ART centre- 2 weeks	:	2 months.
13.	Immunology (Should include diagnostic techniques in auto immune diseases, transplantation and cancer immunology)	:	2 months.
14.	Preparation of antigens and antisera		1 week
15.	Vaccinology • Vaccine preparation & Biological control- 2 weeks • Immunisation Clinic – 2 week	:	1 month
16.	Molecular Biology & Biotechnology & Microbial Genetics	:	1 month
17.	Medical Statistics (Research Methodology) & Epidemiology –	:	1 week.
18.	Dermato-Venereology including Leprology	:	1 week
19	Pathology	:	1 week.
20.	Clinical diagnosis of infectious diseases, HAI Surveillance , Antibiotic Stewardship • posting to medical and pediatric wards-3 months • posting to ICU's- IMCU, ISCU, PICU / NICU-1 Month	:	4 Months
21.	Within the gamut of the course the dissertation must be completed by the students as an ongoing process, within the stipulated time as deemed fit by the guides.		
	TOTAL		**35 Months**

During 2nd year, the Students are encouraged to undergo special postings for learning new advanced techniques / procedure / skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department.

7. Evaluation of the candidates in both theory and practical aspects will help the candidate in improvement of his/her knowledge, skills and attitude

8. COMPETENCY ASSESSMENT

1. OVERALL:

a) Communication / commitment / Contribution / Compassion towards patients and Innovation - 5 Marks

b) Implementation of newly learnt techniques/skills

2. Number of cases presented in Clinical Meetings/ Journal clubs/seminars - 5 marks

3. Number of Posters/Papers presented in Conferences/ Publications and Research Projects - 5 marks

4. No. of Medals / Certificates won in the conference / Quiz competitions and other academic meetings with details. - 5 marks

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Total 20 Marks

PG NON – CLINICAL COURSE

VIVA including Competency Assessment - 60 Marks (40 + 20)

Pedagogy - 40 marks

ASSESSMENT SCHEDULE IS AS FOLLOWS

Year of study	Period				Total Max.20 marks
I year	Upto Jan	10 marks	Upto July	10 marks	20 Marks
II year	Upto Jan	10 marks	Upto July	10 marks	20 Marks
III year	Upto Nov	10 marks	Upto March	10 marks	20 Marks
	AVERAGE				20 Marks

9. DISSERTATION AND PUBLICATION IN UNIVERSITY JOURNAL OF MEDICAL SCIENCES

As per the 49th SAB Resolution under Point No. 2 and in the 52nd SAB it was reiterated regarding the topic for dissertation

The topic for the dissertation should be registered and sent to the University after Ethics Committee approval before 31st of December of the first Post Graduate Year. Only one change of topic with proper justification from the Head of the Department is permitted before 31st March of the first Post Graduate Year. The change of dissertation title will not be permitted after 31st March of the First Post Graduate Year. This modification in regulation will be scrupulously followed from the academic year 2015-16 admission onwards.

As per MCI Clause 14 (4)(a), thesis shall be submitted atleast 6 Months before the Theory and Clinical/Practical Examination.

A candidate shall be allowed to appear for the Theory and Practical/Clinical Examination only after the acceptance of the Thesis by the Examiners.

The periodical evaluation of dissertation/log book should be done by the guide / HOD once in every six months. The HOD should ensure about the submission of dissertation within the stipulated time.

Regarding submission of articles to the University Journal of Medical Sciences for all the PG Degree/Diploma courses, it is mandatory that the students have to submit at-least one research paper. Case Reports are not considered as Research Paper.

10. LOG BOOK

The Post Graduates students shall maintain a record (Log) book of the work carried out by them and the training Programme undergone during the period of training.

Periodic review of Log book and Dissertation have to be done in the Department by guide/HOD once in every 6 months

A detailed log book should be maintained for the entire duration of the course. It should contain the following details.

1. Procedures performed
2. Journal clubs
3. Seminars
4. Important cases discussed/ presented

11. THEORY EXAMINATION

There shall be four question papers, each of three hours duration. Each paper shall consist of 10 short essay questions carrying 10 marks each .Total marks for each paper will be 100.

Paper I = 100 Marks

Paper II = 100 Marks

Paper III = 100 Marks

Paper IV = 100 Marks

Total = 400 Marks

Paper –I	General Microbiology and Immunology
Paper-II	Systematic Bacteriology
Paper-III	Virology & Parasitology
Paper-IV	Mycology, Applied Microbiology and Recent Advances

12. PRACTICAL EXAMINATION

Reframed practical scheme for 2 days duration

	Division	Exercises	Marks
1	Bacteriology A) Preliminary sample processing & report – **15 marks** B) Clinical Sample processing (Simulated Sample with streaked plate and Case scenario**) – 35 marks** C) Bacterial Techniques – Pure Culture Identification & Antimicrobial Susceptibility testing- **30 Marks**		80
2	Mycology One slant / slide culture/ One Pathogenic yeast		20
3	Virology PCR / ELISA		20
4	Immunoserology Bacteriology (Widal / ASO / CRP / RA. etc) rapid test for Viral infections - Point of care tests		20
5	Parasitology laboratory diagnosis of parasitic infections in stool		20
6	OSPE Exercises-Including Case scenario – discussion (2X10)		20
7	Microscopy Including histopathology Slides – Discussion		20
8	Pedagogy		40
9	Viva voce including Competency Assessment		60
		TOTAL	**300**

DAYWISE DISTRIBUTION OF EXERCISES	
DAY 1	**DAY 2**
1. Bacteriology- A,B,C	1.Bacteriology- B & C
2. Mycology	5. Parasitology
3. Virology	7. Microscopy
4. Immunoserology	8. Pedagogy
6. OSPE including Case Scenario	
	9. Viva voce

13. VIVA including Competency Assessment

VIVA including Competency Assessment - 60 Marks (40 + 20)

14. PEDAGOGY

Pedagogy Assessment (8 minutes Presentation and 2 Minutes Q & Ans.)

Demeanour	-	10
Audio Visual Aids usage, Voice modulation and Attitude	-	10
Subject Content	-	10
Q & Ans.	-	10
Total	-	40

15. OSPE (Objective Structural Practical Examination)

The following are suggested stations for the OSCE. Any 4 can be chosen at the discretion of the examiners. All the 4 stations should be common to all candidates appearing on that day.

1. Special Staining - Albert's staining
   Ziehl Neelson staining
   RNTCP grading
   Negative staining
2. Media preparation & Checking of PH wherever applicable
   * Alkaline peptone water
   * Bbod Agar Plate
   * Chocolate Agar Plate
   * Triple sugar Iron Agar/ Simmons Citrate Agar
   * Sabouraud's dextrose Agar
3. Sputum concentration /stool / concentration techniques
4. E-Test
5. Modified Hodge test
6. Bio Medical waste management & infection control

Maximum marks for M.D. Microbiology	Theory	Practical & Viva	Grand Total
	400	300 (Practical – 200 & Viva – 100)	700

MARKS QUALIFYING FOR A PASS

Obtaining a minimum of 40% marks in each theory paper and not less than 50% cumulatively in all the four papers for degree examination. Obtaining of 50% marks in Practical examination shall be mandatory for passing the examination as a whole in the degree examination.

16. REFERENCE BOOKS

MICROBIOLOGY

1. Jawetz Melnick & Adelbergs Medical Microbiology
2. Topley & Wilson's Microbiology
3. Murray Rosenthal pfaller Medical Microbiology
4. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases
5. Greenwood Medical Microbiology- David Greenwood, Mike Barer, Richard Slack, and Will Irving
6. Bailey & Scott's Diagnostic Microbiology
7. Collee J.G.Mackie and MC cartney practical Medical Microbiology
8. Koneman's Colour Atlas & Textbook of Diagnostic Microbiology
9. Prescott's Microbiology
10. Harrison's Principles and Practice of Medicine
11. Manson's Tropical Diseases

VIROLOGY

1. Fields Virology (5th edition)
2. Laboratory diagnosis of viral infections by Lennette's

MYCOLOGY

1. Text book of Medical Mycology – Jagdish Chander
2. Essentials of Clinical Mycology –Carol A Kauffmann, Peter G Pppas
3. Clinical Mycology –Elias J Anaistic ,Michal R Mc Ginnis
4. Medical Mycology –Current Trents & Future Prospects- Mehdi Razzaghi
5. Textbook of mycology –Gopinath Hait
6. Fundamentals of Diagnostic Mycology-Fisher & Cook

PARASITOLOGY

1. Diagnostic Medical Parasitology - Garcia
2. Parasitology- An Integrated Approach
3. K.D.Chatterjee - Parasitology
4. Human Parasitology – Fatik Baran Mandal
5. Textbook of Medical Parasitology - Subhash Chandra Parija
6. Microbiology & Parasitology K Rajeshniar Reddy
7. Human Parasitology Fatik Baran Mandal

Infection Control

1. Infection Control in Clinical Practice –Jennie Wilson
2. Clinical Infectious Disease –David Schlossderg
3. Manual of Infection prevention and Control- Damani
4. Hospital Acquired Infections prevention and control by Purva Mathur

IMMUNOLOGY

1. Kuby Immunlogy
2. Medical Immunology – Daniel Stites
3. Roitts Immunolgy
4. Sander's Immunology
5. Basic And Clinical Immunology- Peakman
6. Lipincott's Immunology

Communication

1. Communicate, Care, Cure A Guide to Health Care communication by Dr Alexander Thomas

Research and statistics

1. Methods in Biostatistics for medical students and research workers by B K Mahajan

**** Note : The editions are as applicable and the latest editions shall be the part of the syllabi**

17. JOURNALS

1. Journal of Clinical Microbiology
2. Journal of Infectious Diseases
3. European Journal of Clinical Microbiology & Infectious Diseases
4. American Journal Of Bacteriology
5. PLOS Pathogen
6. Indian Journal of Medical Microbiology
7. Indian Journal of Pathology & Microbiology
8. Indian journal of Medical Microbiology
9. International journal of Medical Microbiology
10. International Journal of Antimicrobial Agents
11. Journal of Hospital Infection

VIROLOGY

1. Viruses
2. Annual Review of Virology
3. Journal Virology
4. Journal of Clinical Virology
5. Journal of General Virology
6. Virology and Antivirus research
7. Virus Disease(Indian journal of Virology)
8. Journal of Antivirus and Antiretrovirals

IMMUNOLOGY

1. Journal of Clinical; & Cellular Immunology
2. Journal of Immunological Technique & Infectious Diseases
3. Indian Journal of Allergy Asthma & Immunity
4. Journal of Rheumatology Current Research
5. Journal of Clinical Immunology

MYCOLOGY

1. Journal on Studies in Mycology
2. Journal of Medical Mycology
3. Journal of Fungal Diversity
4. Journal of Mycological Research

5. Journal of fungal genetic and Biology
6. An International Journal on Fungal Biology
7. Journal of Infection Disease and therapy
8. American Journal of Infection Control
9. International Journal of Infection Control
10. Medical Mycology – case reports

PARASITOLOGY

1. Journal of Vector Borne Disease
2. Journal of Bacteriology l & Parasitology
3. International Journal for Parasitology
4. Parasitology International
5. Comparative Parasitology
6. Tropical Parasitology

POSTGRADUATE STUDENTS APPRAISAL FORM

Name of the Department/Unit :
Name of the PG Student :
Period of Training : From……To……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based /recent advances learning				
2.	Patient based /Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External Activities / CMEs				
6.	Thesis				
7.	Research work				
8.	Log Book Maintenance				

Publications Yes/ No, if yes how many articles
Remarks*_____
_____
_____

***REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned.**

For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE **SIGNATURE OF CONSULTANT**

SIGNATURE OF HOD

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