SANKALCHAND PATEL UNIVERSITY

FACULTY OF MEDICINE

BACHELOR OF MEDICINE AND BACHELOR OF SURGERY

(M.B.B.S.)

MICROBIOLOGY

CURRICULUM/ SYLLABUS & ASSESSMENT

(AS PER COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE-2018, MEDICAL COUNCIL OF INDIA)

Faculty of Medicine
Nootan Medical College & Research Centre

Teaching & Evaluation Scheme for Faculty of Medicine

Semester/Year: Second Year M.B.B.S.

Program Name: Bachelor of Medicine and Bachelor of Surgery

Effective from Academic Year: 2020-2021

Program Code: MB01

Course Code	Subject Name	Hrs/Week			UA		IA		Total	
		L	P	Total	Max	Min	Max	Min	Max	Min
1MI201	Microbiology-I	5	-	5	100	40	-	-	200	100
1MI202	Microbiology-II		-		100	40	-	-		
1MI203	Microbiology Practical	-	4	4	100	50	-	-	100	50
1MI204	Microbiology IA Theory	-	-	-	-	-	100	40	200	100
1MI205	Microbiology IA Practical	-	-	-	-	-	100	40		

Note:

1. Minimum to pass in Internal Assessment:50% combined in theory and practical, and must secure at least 40% separately in Theory and Practical of Internal Assessment to be eligible for appearing for University Examinations

2. Pass Criteria =

i) Mandatory 50% marks separately in Theory and practical (Practical = Practical/Clinical + Viva)

ii) Subjects with two papers, the student must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both paper together) to pass

3. Mandatory to pass separately in 1) Theory 2) Practical and 3) Internal Assessment

UA = University Assessment, IA = Internal Assessment

MICROBIOLOGY

COURSE CONTENT

PREAMBLE

General Microbiology deals with the world of microorganisms around us. Diseases and death has always held the attention of human mind since the ancient times. Different kind of microorganisms had a great impact on health and well being of the humans. Medical microbiology is the study of microorganisms which infects humans, diseases they cause and application of this knowledge in diagnosis, prevention and treatment of infectious disease. Along with providing a deep knowledge and understanding of the nature of pathogens, this line of study has also been applied in understanding of immune response of human host to the microbial and other antigens. Through the development of vaccines against invading organisms, deadly and debilitating diseases such as small pox, polio, and rabies have been either eradicated or are more treatable because of the efforts of scientists and researchers in the field of medical microbiology.

This draft syllabus has been created from the list of competencies mentioned in the Competency Based Curriculum (CBC) developed by the Medical Council of India for the MBBS batch of 2019 onwards. Microbiology subject has been divided into the following broad areas:

1. General Microbiology
2. Immunity
3. CVS and Blood
4. Gastrointestinal and hepatobiliary system
5. Musculoskeletal system skin and soft tissue infections
6. Central Nervous System infections
7. Respiratory tract infections
8. Genitourinary & Sexually transmitted infections
9. Zoonotic diseases and miscellaneous
10. Ethics in microbial laboratory investigations

In each of these broad areas, topics have been specified. The content to be covered under each topic has been mentioned in detailed syllabus.

Goal:

The goal of teaching Medical Microbiology to undergraduate medical student is to provide understanding of the natural history of infectious diseases in order to deal with the etiology, pathogenesis, pathogenicity, laboratory diagnosis, treatment, control and prevention of these infectious diseases. The major focus is to enable undergraduate medical students to attain basic skills of planning and interpretation of laboratory investigations and correlate them with clinical manifestations and etiological agents.

Objectives:

A. Knowledge:

At the end of the course the student will be able to:

1. Understand and classification of micro-organisms, role of microbial agents in health and disease and describe the host parasite relationship
2. Knowledge about the natural history, mechanisms and clinical manifestations of infectious diseases and their relatedness to the properties of microbial agents
3. The sources and modes of transmission of pathogenic and opportunistic micro-organisms including knowledge of insect vectors & their role in transmission of infectious diseases
4. Describe the functions of immune system and mechanisms of immune response to microbial and other antigens
5. An understanding of the basis of choice of laboratory diagnostic tests and their interpretation, antimicrobial therapy, control and prevention of infectious diseases.
6. Apply methods of disinfection and sterilization to control and prevent hospital and community acquired infections
7. Knowledge of the principles and application of infection control measures in tertiary care hospital
8. Understand the importance of confidentiality of patient in laboratory results

B. Skills

At the end of the course the student shall be able to:

1. Perform & identify the different causative agents of infectious disease by Gram stain & ZN stain
2. Identification of Ova/Cysts of parasites in wet mount of stool specimens for routine microscopy
3. Identify motility of bacteria by various laboratory methods.
4. Able to use appropriate method of sterilization & disinfection to be used in specific situation in the laboratory, in clinical & surgical practice
5. Application of immunological mechanism in diagnosis of diseases by various serological methods.
6. Identify the common microbial agents on the basis of culture and biochemical characteristics
7. Identify the common etiological agents causing rheumatic heart disease, infective endocarditis, diarrhea, dysentery, encephalitis, meningitis, respiratory tract infection, sexually transmitted diseases, food and water borne diseases
8. Identify causative agents of malaria & filariasis in peripheral blood smear
9. Choosing the appropriate laboratory test and interpretation of test results in diagnosis of common infectious disease.
10. Demonstrate the appropriate method for collection, transport and storage of samples for

microbiological investigations

11. Demonstrate Infection Control Practices & use of Personal Protective Equipment (PPE)
12. Demonstrate confidentiality pertaining to patient identity in laboratory test

Syllabus (with MCI competency number)

General Microbiology & Immunity (MI 1.1 to 1.11)	
Lecture/Integrated teaching	• Introduction to microbial world and role of microbes in health & disease • Morphology of bacteria Part I • Morphology of bacteria Part II • General properties and morphology of viruses • Parasitology- General morphology and classification • Fungus- General morphology and classification • Sterilisation & Disinfection Part I • Sterilisation & Disinfection Part II • Bacterial genetics & resistance to various antimicrobial drugs • Various laboratory techniques in diagnosis of Infectious disease • Microbial infection and Pathogenicity • Basics of immunity and immunological mechanisms in health • Structure & Function of immune system • Immune response in host in response to infection. • Immunological basis of vaccines and Universal immunization schedule • Hypersensitivity part I • Hypersensitivity part II • Invitro immunological reactions in diagnosis of infectious disease • Disorders of immune system-Autoimmune disorders and Immunodeficiency disease • Immunological mechanisms of transplantation and tumor immunity
Practical	• Microscope & Micrometry • Morphology of bacteria – Slide demonstration • Staining : Gram stain with Certification • Staining : Ziehl-Neelsen stain with Certification • Collection & Transport of clinical specimen • Practical aspects of Sterilisation • Practical aspects Disinfection • Culture Media-Demonstration of media & colony characters & Anaerobiosis • Methods of cultivation of bacteria • Identification of bacteria- cultural & biochemical characteristics • Antimicrobial susceptibility testing-Demonstration

	• Antigen-Antibody reactions • Diagnostic virology • Diagnostic parasitology – stool examination • Diagnostic mycology
Small Group teaching/Tutorials	• Role of microorganisms in Health. Advantages and disadvantages of microorganisms. • Types and uses of different microscopes. • Nutrition and metabolic requirement of Microorganisms • Mechanism of antimicrobial agents acting on microorganisms • Nucleic acid multiplication methods in diagnosis of infectious disease • Factors affecting immunity • Structure of Antigen & Antibody • Complement system • MHC complex
Self Directed learning (SDLs)	• Sterilisation methods used in hospital & laboratory set up • Biomedical waste guideline 2016.
CVS and Blood (MI 2.1 to 2.7)	
Lecture/Integrated teaching	• Streptococcus pyogenes- causative agent of rheumatic fever & its laboratory diagnosis • Infective endocarditis: Etiopathogenesis, clinical features & diagnostic modalities • Microbial agents in etiopathogenesis of anemia- Hookworm & Roundworm • Plasmodium- as causative agent of Malaria • Leishmania- as causative agent of Kalaazar • W. bancrofti- as causative agent of filaria • HIV infection and its laboratory diagnosis • Viruses causing hemorrhagic fever-Dengue, chikungunya
Practical	• Laboratory diagnosis of blood stream infections • Practical demonstration of microbial agents causing rheumatic heart disease & Infective endocarditis • Practical demonstration causative agents of malaria & filariasis
Small Group teaching/Tutorials	• Microbial agents in etiopathogenesis of anemia- D. latum, Trichuris trichiura, blood invading trematodes, Hemoflagellates • Trypanosoma, Babesia • Brucellosis, Leptospirosis and Borreliosis • Interpretation of peripheral blood smear in diagnosis of malaria and

	common variations in results in relation to parasitic cycle of plasmodium spp. in human being. • Strategies and interpretation of test results in diagnosis of HIV infection in Human being. • Common opportunistic infections in relation to CD4 count in HIV-AIDS patients. • Management and post exposure prophylaxis in HIV exposure. • Systemic mycosis
Self Directed learning (SDLs)	• Normal microbial flora
Gastrointestinal and hepatobiliary system (MI 3.1 to 3.8)	
Lecture/Integrated teaching	• Microbial agents in etiopathogenesis of Diarrhea- V. cholerae • Microbial agents in etiopathogenesis of Dysentery- Shigella • Microbial agents in etiopathogenesis of Dysentery- E. histolytica • Etiopathogenesis and laboratory diagnosis of enteric fever- S. typhi & S. paratyphi • Etiopathogenesis and laboratory diagnosis of food poisoning-S. aureus, B, cereus, Cl. botulism, V. parahemolyticus • H. pylori as causative agent of Acid-Peptic disease. • Microbiological aspects of viral hepatitis. (Hepatitis A, E virus) • Microbiological aspects of viral hepatitis. (Hepatitis B, C, D virus) • Agents of viral hepatitis (Yellow fever, Cytomegalovirus, Epstein-Barr virus)
Practical	• Lab. Diagnosis of diarrhea & dysentery • Lab. Diagnosis of enteric fever – Tests related to duration of illness • Laboratory diagnosis of viral hepatitis • Stool routine microscopy : Certification
Small Group teaching/Tutorials	• Miscellaneous microbial agents causing diarrhea & dysentery- B. coli, Giardia, Intestinal coccidian parasites, intestinal cestodes including E. granulosus & intestinal nematodes, Fasciola hepatica infection • Parasitic infections infecting bile duct- Clonorchis, Opisthorchis • Viruses: Campylobacter, Rotavirus • Etiology of food poisoning in relation to onset of disease. Role of mycotoxin in occurrence of food poisoning. • Epidemiology and prevention food borne and blood borne Hepatitis virus. • Serological markers of HBV
Self Directed learning (SDLs)	• Giardiasis

Musculoskeletal system; skin and soft tissue infections (MI 4.1 to 4.3)	
Lecture/Integrated teaching	• Gas gangrene- Etiopathogenesis and Laboratory diagnosis • Tetanus-Etiopathogenesis and Laboratory diagnosis • Gram positive & Gram negative aerobic bacteria causing Bones & Joints infections. Anthrax, Leprosy, Pseudomonas, Melioidosis, Actinomycetes and Nocardia • Common superficial bacterial skin infections- Staphylococci & Streptococci • Etiopathogenesis and laboratory diagnosis of Leprosy • Etiopathogenesis and laboratory diagnosis of Mycetoma • Cutaneous manifestation of viral diseases- Herpes Simplex & Zoster, Pox virus, Measles, Mumps • Cutaneous mycosis- Dermatophytes
Small Group teaching/Tutorials	• Importance of sample collection and rapid diagnosis of gas gangrene in critical care facility. • Viral exanthems (in detail)- Measles, rubella, parvovirus, HHV-6, Pox viruses, Varicella zoster (chickenpox and zoster) Herpes simplex virus (in detail) • Tissue nematode infections of skin and soft-tissue- Onchocerca, Loa loa, Mansonella and Dracunculus, Trichinella, cysticercosis, Larva migrans and other parasitic infections of lower animals infecting man • Miscellaneous microbial agents causing infections in skin & subcutaneous tissue-D. medinensis, Sarcoptes scabies, Louse, Malassezia furfur, Sporothrix, Rhinosporidium seeberi, etc
Self Directed learning (SDLs)	• Leprosy
Central Nervous System infections (MI 5.1 to 5.3)	
Lecture/Integrated teaching	• Microbial agents in etiopathogenesis of Meningitis-N. Meningitidis • Agents of aseptic meningitis-1: Viral agents: (including polio, coxsackie virus, mumps) • Agents of aseptic meningitis-2: Other agents: Spirochaetal meningitis, tubercular meningitis, cryptococcal meningitis and other fungi affecting CNS • Etiopathogenesis, clinical manifestation & laboratory diagnosis of encephalitis • Viral agents of encephalitis-1: Rabies and HSV encephalitis • Viral agents of encephalitis-2: Arboviral encephalitis (JE and West Nile), Nipah virus infection, Slow viral infections
Practical	• Lab. Diagnosis of meningitis

Small Group teaching/Tutorials	• Miscellaneous bacterial agents in Meningitis- Listeria, Str. pneumoniae, H. influenzae, • Miscellaneous viral agents in Meningitis-Echovirus, Coxsackie • Parasites invading Central Nervous System
Self Directed learning (SDLs)	• Tuberculous meningitis
Respiratory tract infections (MI 6.1 to 6.3)	
Lecture/Integrated teaching	• Etiopathogenesis, clinical course & laboratory diagnosis of Diphtheria • Etiopathogenesis, clinical course & laboratory diagnosis of Upper respiratory tract infection -Mumps & Measles • Mycobacterium tuberculosis • Atypical pneumonia-Chlamydia, Mycoplasma, Legionella • Etiopathogenesis, clinical course & laboratory diagnosis of Upper respiratory tract infection- Influenzae virus • Viral URTI-1: Influenza-like illness and orthomyxovirus • Viral URTI-2: Rhinovirus, adenovirus and infectious mononucleosis (EBV) Fungal URTI: Zygomycosis • Viral agents of LRTI Paramyxovirus infections- Parainfluenza, RSV Corona viruses including SARS-CoV and MERS CoV
Practical	• Laboratory diagnosis of respiratory tract infections • Throat swab Gram staining-1,2,3 (smears made from S. pyogenes, C. diphtheriae Candida) and certification • Sputum Gram staining-1,2,3 (smears made from S. pneumoniae, Klebsiella, H. influenzae) and certification
Small Group teaching/Tutorials	• Microbial aspects of pneumonia- Klebsiella, Str. pneumoniae, Parainfluenza virus • Fungal agents causing respiratory tract infection: zygomycosis, aspergillosis, pneumocystosis • Parasitic agents causing respiratory tract infection: paragonimiasis
Self Directed learning (SDLs)	• Diphtheria
Genitourinary & Sexually transmitted infections (MI 7.1 to 7.3)	
Lecture/Integrated teaching	• Urinary tart infection- etiology, pathogenesis & laboratory diagnosis • Sexually transmitted infections- Gonorrhoeae

	• Sexually transmitted infections-Syphilis, LGV, Granuloma inguinale, soft chancre, HSV
Practical	• Lab. Diagnosis of urinary tract infections • Lab. Diagnosis of sexually transmitted infections
Small Group teaching/Tutorials	• UTI- Microbial aspects: Enterococcus, S. saprophyticus, Trichomonas, Gardnerella, S. haematobium • Agents of urethritis- Gonorrhoeae and non-gonococcal urethritis (including Chlamydia, Ureaplasma, HSV, Candida • Agents of genital warts- HPV (Human papilloma virus) • STD- Chlamydia, H. ducreyi
Self Directed learning (SDLs)	• Laboratory diagnosis of syphilis
Zoonotic diseases and miscellaneous (MI 8.1 to 8.16)	
Lecture/Integrated teaching	• Zoonotic infection-Anthrax, Plague, Leptospirosis, Rabies, Echinococcus granulosus • Arboviruses-Brief revision • Opportunistic Infections-Candidiasis • Opportunistic Infections-Cryptococcus neoformans • Opportunistic Infections-Systemic Mycosis-Dimorphic fungi • Oncogenic viruses • Emerging infectious diseases • Hospital acquired infections: Surveillance & types. • Infection control in tertiary care facility • Microbial contamination of food, water and air • Importance of patient's identity and other demographic data in interpretation and dispatch of laboratory test results • National Health Programs in the prevention of common infectious disease
Practical	• Use of Personal Protective Equipments (PPE) • Spill management : Blood and mercury • Needle stick injury: Prevention & Management • Antimicrobial Stewardship • Environmental Surveillance (Bacteriology of water, air, surface, milk & food) • Practical aspects of collection & transport of various clinical specimens • Various case scenario in applied microbiology
Small Group teaching/Tutorials	• Zoonotic infection-Rickettsia, Brucella, Borrelia • Zoonotic infection-Toxoplasma, Taenia, Trichinella spiralis

	• Zoonotic infection- Trypanosoma • Miscellaneous opportunistic infection- Pneumocystis jiroveci, CMV, Strongyloides, Isospora, Aspergillus, Zygomycetes, etc • Factors affecting Hospital acquired infections • Factors affecting performance of laboratory tests in reference to collections & transport of clinical specimen • Automation in Microbiology laboratory • Hazards of non compliance in maintaining patient's identity and confidentiality in laboratory tests.
Self Directed learning (SDLs)	• Rabies • Ocular/Ear infection • Hand washing/PPE

SUGGESTED AREAS FOR INTEGRATION:

As per the "Competency based Undergraduate Curriculum for the Indian Medical Graduate 2018: Medical Council of India"

SUMMARY OF TIME ALLOTTED, TEACHING AND LEARNING METHODS AND STUDENT ASSESSMENT

TIME ALLOTTED

Curricular component	Time allotted in hours
Lectures	70
Small group teaching / tutorials / integrated learning /practical	110
Self-directed learning	10
Total	190

To be noted:

- The number of hours mentioned above are rough guidelines that can be modified to suit the specific requirements of a medical college.
- It is recommended that didactic teaching be restricted to less than one third of the total time allotted for that discipline.
- Greater emphasis is to be laid on hands-on training, symposia, seminars, small group discussions, problem-oriented and problem-based discussions and self- directed learning.
- Students must been courage to take active part in and shared responsibility for their learning.

SCHEME OF EXAMINATION:

Internal Assessment

Scheme for calculation of internal assessment marks:

Theory (maximum marks)	Marks	Practical (Maximum Marks)	Marks
1st Terminal Examination	20	1st Terminal Examination	10
2nd Terminal Examination	20	2nd Terminal Examination	10
Preliminary Examination	40	Preliminary Examination	20
Day to day assessment	20	Day to day assessment	20
--		Seminar, Project, SDL, Group discussion & Others	40
Total	100	Total	100
o Only the final marks out of 100/100 needs to be submitted to the University, separately for theory and practical for each internal assessment.			

- Internal assessment should be based on competencies and skills.
- Regular periodic examinations shall be conducted throughout the course. There shall be three internal assessment examinations in each paraclinical subject. The third internal examination is the preliminary examination to be conducted on the lines of the university examination.
- A candidate must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.
- Day to day records and log book (including required skill certifications) should be given importance in internal assessment. Internal assessment should be based on competencies and skills.
- Level of participation in self directed learning, assignments, seminars, clinical case presentation, project work will be assessed and importance will be given in internal assessment.
- Internal assessment marks will not be added to University examination marks and will reflect as a separate head of passing at the summative examination.
- The results of internal assessment should be displayed on the notice board within 1-2 weeks of the test.
- Students must secure at least 75% in theory and 80% in practical /clinical of total attendance for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

- The 1st, 2nd and 3rd internal examinations shall be held on or before Dec 2020 - January 2021, April - May 2021 and July 2021respectively. Remedial examination should be taken after the results of preliminary examination for the students who are not eligible for University are declared and before submission of internal assessment marks to the University.
- A clear record of all components that add to the internal assessment marks needs to be maintained by the institution and retained by them for at least 5 years after completion of the examination. Institutions may be asked to provide these details by the University as and when required.
- The internal and formative assessments provide ideal opportunities for students and teachers to identify learning gaps. Teachers should provide high quality feedback to each student to enable them to bridge these learning gaps.
- Formative assessments also enable the early identification of students who are struggling to achieve the intended learning outcomes. Early and appropriate targeted remediation must be planned for such students.

Internal Exam	Topics		Suggested time
	Theory	Practical	
1st Internal exam Theory 100 marks- 1 paper Practical 50 marks	• General Microbiology • Immunity • Infections of blood stream and cardiovascular system	• Staining exercise • Blood smear exercise • Applied clinical microbiology/hospital infection control • Viva voce	December/ January
2nd Internal exam Theory 100 marks- 1 paper Practical 50 marks	• Gastrointestinal and hepatobiliary system • Musculoskeletal system skin and soft tissue infections • Central Nervous System infections • Respiratory tract infections • Genitourinary & Sexually transmitted infections	• Staining exercise • Blood smear exercise • Applied clinical microbiology/hospital infection control • Viva voce	March/April
3rd Internal/ preliminary examination Theory 100 marks- 2 paper Practical 100 marks	Curriculum of 1st and 2nd internal exam + Miscellaneous and zoonotic disease	As per university practical exam	July

UNIVERSITY EXAMINATIONS

TABLE SHOWING SCHEME FOR CALCULATION OF UNIVERSITY EXAMINATION MARKS

Name of the subject	Evolution parameter	Maximum marks	Passing marks
Microbiology	Written – Theory		
	Paper – I	100	50
	Paper –II	100	50
	Practical/Oral	100	50

- Mandatory 50% marks in theory and practical (practical = practical/ clinical + viva) [theory=theory paper(s) only]
- Internal assessment marks are not to be added to marks of the University examinations and should be shown separately in the grade card.
- As per proposed GMER 2019, the University examinations will be held in the month of September for second phase.
- In subjects that have two papers, the learner must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass in the said subject.

A. THEORY: 200Marks

There shall be two theory papers of 100 marks each and duration of each paper will be of 3 hours.

Theory		Topics	Marks	
Paper I	Section A	• General Microbiology • Immunity	50	100 marks
	Section B	• Infections of blood stream and cardiovascular system • Gastrointestinal tract • Hepatobiliary system	50	
Paper II	Section A	• Musculoskeletal system skin and soft tissue infections • Central Nervous System infections	50	100 marks
	Section B	• Respiratory tract infections • Genitourinary & Sexually transmitted infections • Zoonotic diseases and Miscellaneous	50	

- Each section (Total 50 marks) in theory papers (section IA, IB, IIA, IIB) contains
  - One Long assay question (LAQ)-10 marks
  - Short assay question SAQ- 5 marks X 6
  - Ultra short question/MCQ- 1 marks X 10
- There should be at least one short question either in paper I or paper II from AETCOM

module

- Designing of question paper should take into consideration all levels of knowledge domain e.g. Bloom's taxonomy of cognitive domain.
- Attempt should be made to maintain appropriate proportion of questions from each section e.g. General Microbiology, Immunology, bacteriology, virology, parasitology, mycology, hospital infection control, miscellaneous and AETCOM

B. PRACTICAL: 100 Marks

There shall be five practical exercises each carrying the 20 marks. Distribution of content for each exercise would be

No	Type of exercise	Marks (Total 100)
Practical 1	Staining exercise/Staining viva- Gram /Z-N stain	20
Practical 2	Identification parasite from stool preparation	10
Practical 3	Identification parasite from blood smear preparation	10
Practical 4	Hospital infection control • Infection control parameters • Infection control measures • Hand hygiene, • Biomedical waste • Spill management • Sterilisation & Disinfection • Use of personal protective equipment (PPE) • Antimicrobial Stewardship	10
Practical 5	Applied clinical microbiology exercise • Collection, preservation & transport of clinical specimen • Processing of sample and identification by culture & biochemical characteristic • Interpretation of laboratory report of bacteriology and serology	20
Practical 6	Table viva-1 • General Microbiology • Immunity • CVS and Blood • Gastrointestinal and hepatobiliary system Table viva-2 • Musculoskeletal system skin and soft tissue infections • Central Nervous System infections • Respiratory tract infections • Genitourinary & Sexually transmitted infections • Zoonotic diseases and miscellaneous	15+15

RECOMMENDED TEXTBOOKS (with latest edition and as per competency based medical education curriculam)

1.	Essentials of Medical Microbiology	Apurba S. Sastry
2.	Textbook of Microbiology	R. Ananthanarayan; C. K. Jayaram Panikar
3.	Complete Microbiology	C P Baveja
4.	A Textbook of Microbiology	P. Chakraborty
5.	Textbook of Microbiology and Immunology	Subhash Chandra Parija
6.	Textbook of Medical Parasitology	Dr. R.P. Karyakarte and Dr. A.S. Damle
7.	Textbook of Medical Parasitology	KD Chatterjee
8.	Textbook of Medical Parasitology	P. Chakrrborty

REFERENCE TEXTBOOK

1.	Diagnostic Microbiology	KONEMAN (Allen And Janda Et Al)
2.	Diagnostic Microbiology	Bailey And Scott
3.	Practical Medical Microbiology	Mackie McCartney
4.	District laboratory practice in Tropical countries (Vol-I&II)	Monica Cheesbrough
5.	Principles of Bacteriology, Virology & Immunology vol. 1,2,3,4,5	Topley Wilsons
6.	Essential Immunology	Roitt (Ivan.M)
7.	Textbook of Medical Mycology	Jagdishchandra Bose