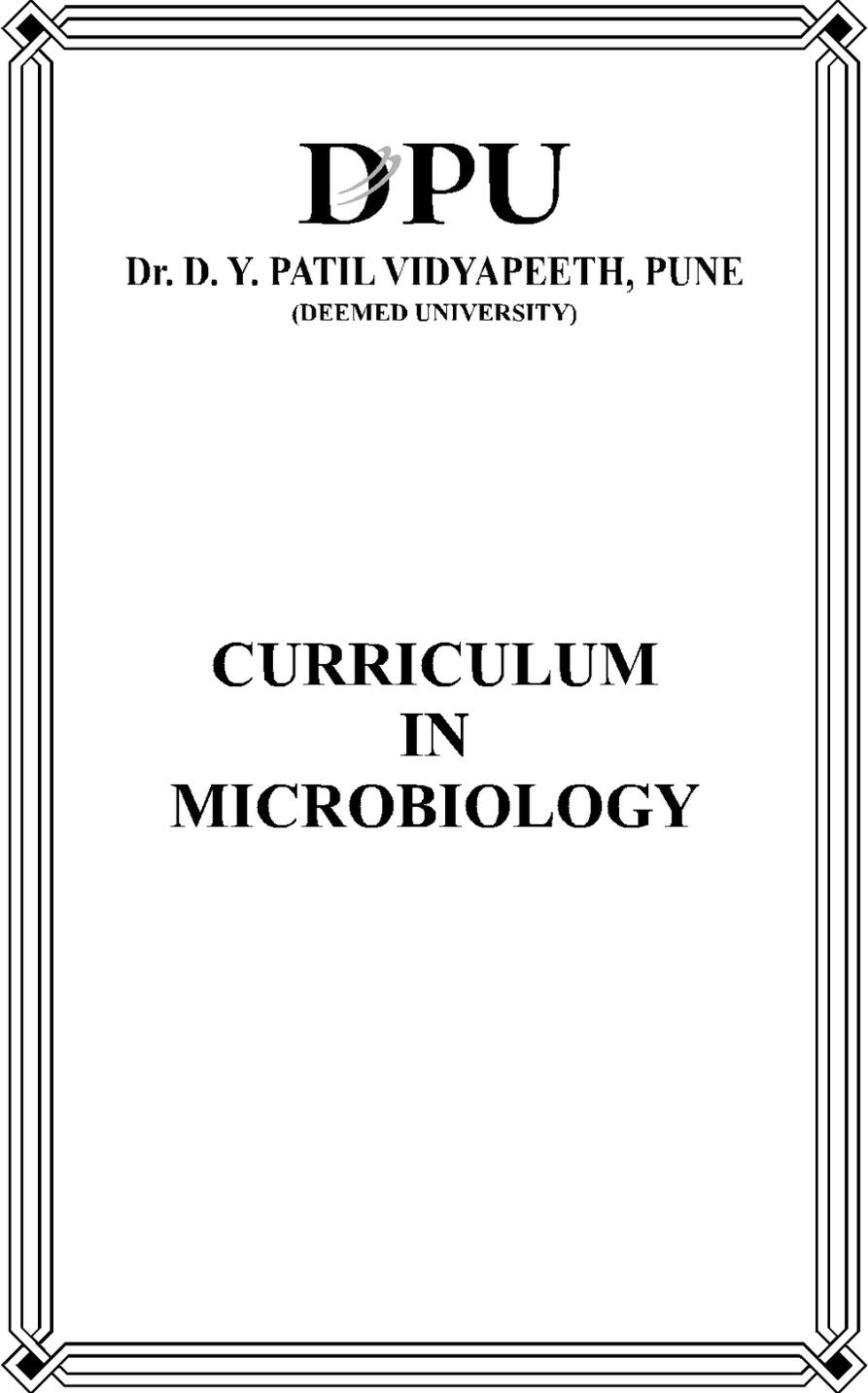


**DPU**

**Dr. D. Y. PATIL VIDYAPEETH, PUNE**  
(DEEMED UNIVERSITY)

**SYLLABUS**  
**for**  
**II - MBBS**  
**(Para - Clinical Subjects)**

**2014-15**

A decorative border with a double-line design and ornate corner pieces.

**DPU**

**Dr. D. Y. PATIL VIDYAPEETH, PUNE**  
(DEEMED UNIVERSITY)

**CURRICULUM  
IN  
MICROBIOLOGY**

## **ANNEXURE NO. VI**

### **1. GOAL**

The goal of teaching Microbiology 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 infections and infectious diseases.

### **2. EDUCATIONAL**

#### **OBJECTIVES**

##### **KNOWLEDGE**

The student at the end of one and half years should be able to: -

state the etiology, pathogenesis and methods of laboratory diagnosis and apply that knowledge in the diagnosis, treatment, prevention and control of communicable diseases caused by microorganisms.

understand commensally, opportunistic and pathogenic organisms of human body and describe host parasite relationship.

know and describe the pathogenesis of diseases caused by microorganisms.

state the sources and modes of transmission of pathogenic and opportunistic micro-organisms including knowledge of insect vectors & their role in transmission of infectious diseases.

choose appropriate laboratory investigations required for clinical diagnosis.

##### **SKILLS**

plan and interpret laboratory investigations for diagnosis of infectious diseases and correlate the clinical manifestations with the etiological agent.

identify common infectious agents with the help of laboratory procedure, acquire knowledge of antimicrobial agents, use of antimicrobial sensitivity tests to select suitable antimicrobial agents for treatment.

perform simple laboratory tests, which help to arrive at rapid diagnosis.

be conversant with proper methods of collection, storage & transport of clinical material for microbiological investigations.

understand the principles of immunology and its application in the diagnosis and prevention of infectious diseases including immunization schedule, acquire knowledge of the scope of immunotherapy and different vaccines available for the prevention of communicable diseases.

understand methods of disinfection and sterilization and their application to control and prevent hospital and community acquired infections including universal biosafety precautions and waste disposal.

recommend laboratory investigations regarding bacteriological examination of food, water, milk and air.

the student should be well equipped with the knowledge of prevalent communicable diseases of national importance and of the newer emerging pathogens.

### **ATTITUDE**

the student will be regular, sincere, punctual and courteous and regular in studies.

the student will follow all the rules laid down by the department and participate in all activities.

the student will understand the importance of, and practice asepsis, waste segregation and appropriate disposal.

the student will understand the importance of, and practice the best methods to prevent the development of infection in self and patient. (E.g. hand washing, using aprons for hospitals in hospitals only, regularly washing the aprons, wearing gloves (as and when required / handling specimens etc.).

the student will understand the use of the different antimicrobial agents including antibiotics to use judiciously and prevent misuse, (prescribing attitude).

the student will understand the significance of vaccinations and will receive appropriate vaccines (e.g. TT, Hepatitis B and any other as per needs).

the student will wash his/her hands with soap after each practical class.

the student will leave the area allotted for his practical neat and

tidy.

the student will discard the slides in the appropriate container provided for the same.

the student will report any injury sustained in class, immediately.

the student will report any breakage occurring during class times immediately.

the student may give suggestions to improve teacher student association.

### **3. DURATION OF PARA-CLINICAL TEACHING**

Semesters	:	03
Teaching days	:	360
Teaching Hours	:	250

**(As per MCI guidelines 1997).**

### **4. SYLLABUS**

#### **LEARNING METHODS**

Lectures, practicals Distribution of teaching hours -

A) Theory :	Lectures	71
	Tutorials	26
	<b>Total</b>	<b>97</b>
<hr/>		
B) Practical and Revision		120
C) Assessments		33
	<b>Total</b>	<b>250</b>

#### **SEQUENTIAL ORGANISATION OF CONTENTS**

The areas of study in Microbiology will include General Microbiology, Systemic Microbiology including Bacteriology, Immunology, Mycology, Virology, Rickettsia, Chlamydia, Parasitology and Applied microbiology in relation to infections and diseases of various systems of the body.

#### **I. GENERAL MICROBIOLOGY: (n=10)**

**A) Introduction and Historical background.**

**Definitions** : Medical Microbiology, Pathogen, commensal, symbiont etc.

**In History** : Anton van Leeuwenhoek, Pasteur, Lister, Koch, Flemming etc.

**B) Morphology of bacteria and Classification.**

Bacterial cell and its organelles, morphological classification, methods of Studying bacteria, staining methods & their principles. Grams & Ziehl Neelsen staining, their Importance in presumptive diagnosis, negative staining, dark ground illumination, phase contrast and

fluorescent, microscopy, briefly about electron microscopy. Principles and applications of all microscopes.

**C) Physiology including growth requirements & metabolism.**

Nutrition, Respiration ( anaerobic & aerobic ) and growth of bacteria, growth curve, Physical factors influencing growth. Culture media: Definition, classification and application.

**D) Sterilization**

Definition of sterilization, disinfections, asepsis, antiseptics. Ubiquity of bacteria, modes of killing microbes and preventing them, factors determining selection of the mode, Factors adversely affecting sterilization. Enumeration of physical methods of sterilization including principle & their application.

Work and efficacy testing of autoclave, inspissator and hot air oven, Central Sterile Supply Department (CSSD).

**E) Disinfectants**

Asepsis and antiseptics, modes of action of chemical agents on microbes, Phenols, Halogens, Aldehydes, Acids, Alcohol, heavy metals, oxidizing agents etc. Dyes, soaps and detergents. Concentration and contact time. Universal bio-safety precautions.

**F) Waste disposal**

Definition of waste, classification, segregation, transport and disposal.

**G) Bacterial genetics and drug resistance to antimicrobial agents.**

Introductions—codon, lac-operon, mutation, transformations, transductions & conjugations, R-Factor, mode of action of antimicrobials on bacteria, Mechanism of drug resistance and antimicrobial susceptibility test, steps taken to minimize emergence of resistant strains (Antibiotic policy, formulations) Microorganisms as modes in Molecular Biology and Genetic engineering.

**H) Host parasite relationship and bacterial infections.**

Commensals, pathogenic, and opportunistic organisms, their pathogenic factors and modes of transmission.

Microbial factors : spores, capsule, toxins, enzymes, intracellular parasitism, antigenic variation & extrinsic factors etc. leading to establishment of infection.

Type of infection: primary, secondary, general, local, natural, nosocomial iatrogenic, zoonotic

**I) Normal flora**

Introduction – various sites, types and role

**J) Methods of identification of bacteria. Diagnosis of infections (direct and indirect)**

Principles of laboratory diagnosis of infectious diseases. General procedures for collection transport, processing of specimens for microbiological diagnosis. PCR, RIA, DNA probes.

**II. IMMUNOLOGY : (n=12)**

**A) Introduction**

- Definition of immunity, type of immunity, factors responsible, mechanism of innate immunity.
- Herd immunity.

**B) Antigens, HLA**

Definition, types, antigen determinants, properties of antigen. MHC – concept, class – I,II & III functions,

indications, indication of typing, MHC restriction.  
Nature of determinants, e.g. of haptens, e.g. of cross-reactive antigen.

### **C) Antibodies**

Definition, nature, structure of immunoglobulins-immunoglobulin classes, physical and biological properties of immunoglobulins,

Pepsin digestion, amino acid sequence, immunoglobulin domain, abnormal immunoglobulins.

Understand isotypic, allotypic, and idiotypic markers.

### **D) Serological reactions**

Definition, characteristics, titre, sensitivity & specificity, antigen-antibody interaction- primary,

Secondary & tertiary, prozone phenomenon, principle, types and application of precipitation, agglutination, complement fixation, enzyme immunoassay, Radio-immunoassay, Immune-fluorescence test, neutralization and opsonisation.

Techniques of precipitation and their uses, blocking antibodies, antiglobulin reactions, co-agglutination, on In-vitro test, techniques of EIA, IF & electron microscopy.

### **E) Immune response**

Types, developments, role of- thymus, bone marrow, lymph nodes & spleen, cell of lympho-reticular system, morphology and role of T subsets, NK cells, B cells, plasma cells and macrophages, B & T cell activation, antigen processing and presentation, primary and secondary immune response, principle and use of monoclonal antibodies, factors affecting antibody production, theories of antibodies formation,

CMI –definition, type and role of T cells and macrophages, Lymphokines and their role, clonal selections, mechanism of immune-regulation, detection of CMI . Definition of immune-tolerance and mechanism of tolerance.

### **F) Complement**

Definition, synthesis, pathways, activations, role & biological function, components, measurement.

Complement deficiency

Regulation of complement activation,

### **G) Hypersensitivity**

Definition, classification, difference between immediate and delayed reaction, mechanism of anaphylaxis, type I,II,III, IV and V reaction, ADCC, Schwartzman phenomenon.

### **H) Autoimmunity**

Definition, mechanism, classification. Pathogenesis.

### **I) Transplantation & tumor immunology**

Type of transplants, mechanism of transplant rejection, prevention of graft rejection GVH reaction, IR to tumors, tumor antigens, mechanism of IR to tumors.

Type of tumor antigens, immune surveillance

### **J) Immunodeficiency diseases**

Classification, examples, laboratory test for detection, manifestations.

## **III. SYSTEMIC BACTERIOLOGY: (n=21)**

**Host-parasite Relationship:** Infectious agent Habitat, Source, Reservoir, Mode of infection, Infective dose , Virulence factors, Multiplication, spread, pathology, Immunological response, Clinical features, Complications

**Laboratory diagnosis:** Specimen selection, Collection Transport , Primary smear, hanging drop

Selection of media , Cultural characteristics, Pathogenicity testing , Anti microbial drug susceptibility testing, Serological interpretation , Treatment, prevention

### **Topics for Lectures:**

- 1) Staphylococci
- 2) Streptococci Pneumococci
- 3) Neisseria
- 4) C.diphtheriae
- 5) M .Tuberculosis

- 6) Atypical mycobacteria
- 7) M.leprae
- 8) Bacillus, methods of anaerobiosis & classification. Non sporing anaerobes.
- 9) Clostridium perfringens, Cl tetani, Cl botulinum
- 10) Enterobacteriaceae
- 11) Salmonella typhi, S. paratyphi
- 12) Shigella
- 13) Vibrio & Campylobacter
- 14) Pseudomonas
- 15) Other GNB : Hemophilus, Brucella, Bordetella
- 16) Newer bacteria Listeria, Gardnerella
- 17) Spirochetes
- 18) Actinomycetes & Nocardia
- 19) Rickettsia
- 20) Chlamydia & Mycoplasma
- 21) Bacteriology of air, water, milk and food

#### IV. MYCOLOGY (n=4)

##### **A) Introduction to Mycology**

Nature of fungus (definition, differences with bacteria), characteristics of fungi, common terminologies, brief account of types of sporulation and morphological classification of fungi. Growth requirements, ecological, medical and industrial importance of fungi. Methods of identification, Infections produced, Lab Diagnosis, processing of skin, hair and nail.

##### **B) Agents of Superficial mycosis**

Predisposing factors, morphological features and Lab diagnosis.  
Colony Characteristics of common dermatophytes

##### **C) Subcutaneous mycosis**

Predisposing factors, Mycetoma, Rhinosporidiosis, Pathogenesis and Lab diagnosis

##### **D) Systemic mycosis opportunistic fungal infections**

Classification, predisposing factors, Candida, Cryptococcus, Histoplasma morphology pathogenesis, Lab. Diagnosis

Classification, predisposing factors, Mucor,  
Aspergillus, pneumocystis carinii  
Cultural characteristic

## **V. VIROLOGY: (n=12)**

Morphology, pathogenesis, laboratory diagnosis,  
prevention and control for all viruses.

### A) General Virology

Size, shape, symmetry, structure, resistance,  
multiplication, properties and classification of  
viruses, pathogenesis, bacteriophages, concept of  
virions

### B) Laboratory diagnosis of viral infections

Collection of samples, transport, cultivation and  
methods of diagnosis

### C) Viral immunity

Viral immunity, interferon, viral vaccines

### D) Pox viruses

Small pox and Molluscum

### E) Other DNA viruses

Papova, Adeno, Herpes viruses (Herpes simplex,  
Varicella zoster, CMV, EBV)

### F) Respiratory viruses

Orthomyxo and paramyxo viruses, Ag shift  
and drift, Rhinoviruses

### G) Picorna viruses

Polio, Coxsackie, Entero-viruses (Polio), Viruses  
causing diarrhea – Rota viruses, Immunity

### H) Hepatitis viruses

Hepatitis viruses, immunity and laboratory diagnosis

### I) Arbo-viruses

Dengue, KFD, Japanese Encephalitis – definition,  
classification, enumeration in India, Pathogenesis,  
laboratory diagnosis and control

### J) Rhabdo-

viruses

Rabies

### K) Slow and Oncogenic viruses

Characteristics of slow virus infection,  
pathogenesis and laboratory diagnosis and viruses  
associated with it

### L) Retroviruses

HIV/AIDS, Immunity, Clinical features, Lab diagnosis  
Prevention

## **VI. PARASITOLOGY: (n=10)**

Geographical distribution Habitat

Morphology (different stages) found in human beings Life cycle

Pathogenesis

Laboratory diagnosis

Treatment

Control

Immuno-prophylaxis

- A. Introduction to medical Parasitology
- B. Parasites : their nature, classifications, and explanation of terminologies, epidemiology, emerging parasitic infections, (pathogenicity and laboratory diagnosis)
- C. E.histolytica  
Amoebic infections,  
Intestinal and Extra-intestinal  
Amoebiasis
- D. Free living amoebae, Acanthamoeba, Naegleria,  
Intestinal Flagellates : Giardia and Trichomonas
- E. Haemo-flagellates  
L. donovani: life cycle, morphology,  
pathogenicity, and lab. diagnosis etc.  
Brief account of trypanosomes.
- F. Malaria  
Malaria parasites: life cycle,  
morphology, pathogenicity,  
laboratory Diagnosis etc.
- G. Misc. pathogenic protozoa  
Toxoplasma, Cryptosporidium,  
Isospora, B.coli, Cyclospora.
- H. Cestodes  
Taenia saginata and solium, Echinococcus  
granulosus, life cycle, morphology,  
pathogenicity and laboratory diagnosis.  
Brief mention of other cestodes
- I. Trematodes  
Schistosomiasis: life cycle, morphology, pathogenicity,  
and lab. Diagnosis  
i. Brief account of fasciola hepatica.
- J. Intestinal Nematodes  
duodenale, A. lumbricoides, E. vermicularis, T.  
tritura, brief mention of S. stercoralis life cycle,  
morphology lab. Diagnosis

K. Tissue Nematodes  
bancrofti, D. medinensis, T. spiralis.

**VII. APPLIED CLINICAL MICROBIOLOGY (n=8)**

- (a) Urinary tract infection
- (b) Respiratory tract infection
- (c) Gastro-intestinal tract infection & Food poisoning
- (d) Surgical site infection (Nosocomial infection)
- (e) Septicaemia
- (f) Acute meningitis
- (g) Pyrexia of unknown origin
- (h) Sexually transmitted infections

## 5. EVALUATION

### METHODS

#### Theory, Practical & Viva

No		Total marks
1	Theory ( 2 papers – 40 marks each)	80
2	Oral (Viva)	14
3	Practical	26
4	Internal assessment ( theory –15, practicals –15)	30
	<b>TOTAL</b>	<b>150</b>

**Passing:** A candidate must obtain 50% in aggregate with minimum 50% in Theory+ orals, 50% in Practicals.

#### a. TOPIC DISTRIBUTION

##### A) MICROBIOLOGY PAPER I

- General Microbiology
- Systematic bacteriology including Rickettsia, Chlamydia and Mycoplasma
- Related applied microbiology.

##### B) MICROBIOLOGY PAPER II

- Parasitology
- Mycology
- Virology
- Immunology
- Related applied Microbiology.

**PATTERN OF THEORY EXAMINATION:  
DISTRIBUTION OF MARKS, QUESTIONS, TIME.**

**Nature of Question Paper**

- i) Total duration - 4 hrs (each paper of 2 hrs or 120 minutes) ii) Each paper will have 2 sections

***Suggested pattern and marking for each paper of 40 marks***

Sections	Nature of Questions	Total No. of Questions	Marks for Each Question	Total Marks
Section - A	(i) One Sentence Answer Questions	8 out of 10	01	08
	(ii) Structured Long Answer Question	2 out of 3	07	14
Section - B	Short Answer Question	6 out of 8	3	18
<b>Total</b>				<b>40</b>

\* One compulsory question of 7 marks on applied Microbiology in each paper. Long question have break down of marks

*Paper I - Related to General Microbiology & Systematic Bacteriology Paper II – Related to Parasitology, Mycology, Virology & Immunology*

**PRACTICAL EXAMINATION**

Practical examination in MICROBIOLOGY will be of 26 marks and oral (viva) of 14 marks of THREE hours duration.

Q.1: Gram staining	6
Q.2: Ziehl – Neelsen's staining	6
Q.3: Stool examination for Ova/cyst	4
Q.4: Spot identification (Ten spots)*	10
<b>Total-</b>	<b>26</b>

(\*Spots- Microscopic slides, Mounted specimen, Instruments used in laboratory, Serological tests, Inoculated culture medium, Sterile culture medium, Vaccines / serum), Lab Animal.

The journal should be scrutinized by the teacher concerned and presented during university examination."

<b>VIVA (TWO TABLES)</b>	<b>Marks</b>
A: General & Systemic Microbiology	7
B: Mycology, Parasitology, Virology, Immunology	7

## INTERNAL ASSESSMENT

Marks for Internal Assessment:

Theory : 15  
 Practical: 15

Pattern for computation of ' Internal Assessment 'in the subject of Microbiology. (Applicable to the batch joining in June 2001)

### **THEORY:**

Internal assessment shall be computed on the basis of three term ending examinations (two terminals & one preliminary examination before the university examination).

EXAMINATION	No. of Papers	Pattern	Duration of each paper	Total Marks
1 <sup>ST</sup> TERMINAL	One – 50 Marks	MCQs- 20 (10 Marks) SAQs- 8/9 (24 Marks) LAQs- 2 (16 Marks)	2 Hours 30 Minutes	50
2 <sup>ND</sup> TERMINAL	One – 50 marks	MCQs- 20 (10 Marks) SAQs- 8/9 (24 Marks) LAQs- 2 (16 Marks)	2 Hours 30 Minutes	50
PRELIMINARY (As per final University pattern)	Two – PAPERS 40 marks each	Each paper- Sec A One line answer 8/10 (08 Marks) LAQs- 2/3 (14 Marks) Sec B SAQs- 6/8 (18 Marks) (Total- 40 Marks paper)	2 Hours As for find	80
TOTAL				180

There will be 03 mid-term examinations

1<sup>st</sup> Mid term examination MCQ type -15 marks

2<sup>nd</sup> Mid-term examination Practical/ MCQ -15 marks

3<sup>rd</sup> Mid term examination Journal/ MCQ -15 marks

Best two of three performances will be considered for internal assessment

Final internal assessment in THEORY shall be computed on the basis of actual marks obtained out of (180+30) 210, reduced to marks out of 15.

