



Dr. D. Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)

**Syllabus for
Post Graduate
(Para - Clinical Subjects)**

2014 - 15
(Amended / Revised upto July 2019)



Dr. D.Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)

(Re-accredited by NAAC with a CGPA of 3.62 on a four point scale at 'A' Grade)
(An ISO 9001 : 2015 Certified University)

Dr. A. N. Suryakar
Registrar

Ref. No. : DPU/875-vii/2019

Date : 11/09/2019

NOTIFICATION

Whereas in pursuance of the following decisions taken by the Board of Management, it is hereby notified to all concerned that the "Syllabus for Post Graduate (Para-Clinical Subjects) – 2014-15" is revised upto July 2019 and hereby published.

- Modifications in Question Paper format of MD Pathology University examination vide Resolution No. BM-16(ix)-18, dated 21st July, 2018.
- Change in duration of MD Microbiology practical examination vide Resolution No. BM-10(ii)-19 dated, 12th April, 2019.
- Graduate Attributes, Programme Outcomes (POs), Course Outcomes (Cos) and gap analysis for all courses of UG and PG Programmes for Para-Clinical and Surgical Subjects vide Resolution No. BM-10(vii)-19 dated, 12th April, 2019.
- Interdisciplinary subjects of M.B.B.S, M.D./M.S. and Super-specialty (D.M./M.Ch.) Programs under the Faculty of Medicine vide Resolution No. BM-10(viii) dated 12th April, 2019.

The Syllabus for Post Graduate (Para-Clinical Subjects) – 2014-15" is revised upto July 2019 will be useful to all the concerned. This will come into force with immediate effect.




(Dr. A. N. Suryakar)
Registrar

Copy to:

1. PS to Chancellor for kind information of Hon'ble Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
2. PS to Vice Chancellor for kind information of Hon'ble Vice Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
3. The Dean, Dr. D. Y. Patil Medical College Hospital & Research Centre, Pimpri, Pune
4. The Controller of Examinations, Dr. D. Y. Patil Vidyapeeth, Pune.
5. Director (IQAC), Dr. D. Y. Patil Vidyapeeth, Pune.
6. Web Master for uploading on Website.

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**MAPPING OF PROGRAMME OUTCOMES [POs] AND COURSE
OUTCOMES [COs] OF PG PROGRAMMES**

No	
PO 1	Knowledge and Skills
PO 2	Planning and problem solving abilities
PO 3	Communication
PO 4	Research Aptitude
PO 5	Professionalism and Ethics
PO 6	Leadership
PO 7	Societal Responsibilities
PO 8	Environment and Sustainability
PO 9	Lifelong Learner

MICROBIOLOGY

Year

Course Code	Course Title
PCO6	MD Microbiology

PROGRAMME OUTCOMES

Course 1 (Subject Code)

CO No.	At the end of the course, the learner should be able to:	Mapped Programme Outcomes
PCO6.1	Recognize the importance of clinical microbiology in the context of the health needs of the community and the national priorities in the health section.	PO1,PO2,PO3, PO4, PO5, PO6, PO7,PO9
PCO6.2	Practice clinical microbiology ethically and in step with the principles of primary health care.	PO1,PO2,PO3, PO4, PO5, PO6, PO7,PO9
PCO6.3	Demonstrate sufficient understanding of the basic sciences relevant to clinical microbiology	PO1,PO2,PO3, PO4, PO5, PO6, PO9
PCO6.4	Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive and primitive measure/strategies	PO1,PO2,PO3,PO 4, PO5, PO6, PO7,PO8, PO9
PCO6.5	Diagnose and manage majority of the conditions in clinical microbiology on the basis of clinical assessment, and appropriately selected and conducted investigations including prevention	PO1,PO2,PO3, PO4, PO5, PO6, PO7,PO8, PO9
PCO6.6	Demonstrate skills in documentation of individual case details as well as morbidity and mortality rate relevant to infectious diseases.	PO1,PO2,PO3, PO4, PO5, PO6, PO7,PO8, PO9
PCO6.7	Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectations	PO1,PO2,PO3, PO5, PO6, PO7, PO8,PO9

CO No.	At the end of the course, the learner should be able to:	Mapped Programme Outcomes
PCO6.8	Organize and supervise the chosen/assigned health care services demonstrating adequate managerial skills in the clinic/hospital or the field situation.	PO1,PO2, PO3, PO4, PO5, PO6, PO7,PO8, PO9
PCO6.9	Develop skills as a self-directed learner, recognize continuing education needs; select and use appropriate learning resources in clinical microbiology	PO1,PO2,PO3, PO4, PO5, PO7, PO8,PO9
PCO 6.10	Demonstrate competence in basic concepts of research methodology and epidemiology and be able to critically analyze relevant published research literature as well as effectively and responsibly implement national health programme.	PO1,PO2, PO3, PO4, PO5, PO6, PO7,PO8, PO9
PCO 6.11	Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers	PO1,PO2, PO3, PO4, PO5, PO6, PO7,PO8, PO9
PCO 6.12	Function as an effective leader of a health team engaged in health care, research or training.	PO1,PO2, PO3, PO4, PO5, PO6, PO7,PO8, PO9



MICROBIOLOGY

MICROBIOLOGY

I. INTRODUCTION :

The aim of this course is to train the students of Medicine in the field of Medical Microbiology. Knowledge and practical skills shall be acquired by the candidates in the sub-specialties of Bacteriology including Mycobacteriology, Virology, Parasitology, and Immunology & Mycology so as to be able to deal with diagnosis and prevention of infectious diseases in the community. They are trained in basic research methodology so that they are able to conduct fundamental and applied research. They are also trained in teaching methods so that they can take up teaching assignments.

II. GOAL :

The goal of the postgraduate medical education shall be to produce competent specialist and Medical teacher:

- i. Who shall recognise the health needs of the community and carry out professional obligations ethically in keeping with the objectives of the national health policy.
- ii. Who shall have mastered most of the competencies, pertaining to Microbiology that are required to be practiced at the secondary and the tertiary levels of the health care delivery system.
- iii. Who shall be aware of the contemporary advances and developments in Microbiology.
- iv. Who shall have acquired the spirit of scientific inquiry and is oriented to the principles of research methodology and epidemiology.
- v. Who shall have acquired the basic skills of teaching of the medical and paramedical professionals.

III. EDUCATIONAL OBJECTIVES:

A. KNOWLEDGE:

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

- i. State the clinical features, etiology, pathogenesis and methods of laboratory diagnosis and apply that knowledge in the treatment, prevention and control of communicable diseases caused by micro-organisms.

- ii. State the principles of immunity and immunological phenomenon which help to understand the pathogenesis, laboratory diagnosis of infectious and non-infectious diseases.
- iii. Establish and practice “laboratory medicine” for diagnosis of infectious diseases in hospitals and community in the field of bacteriology, parasitology, virology, mycology and immunology in the light of clinical findings.
- iv. Organise the prevention and control of communicable diseases in the community.
- v. State the recent advances in the field of Medical Microbiology and apply this knowledge in understanding aetiopathogenesis and diagnosis of diseases caused by micro-organisms.
- vi. Carry out fundamental and applied research in the branches of medicine involving microbiological work.
- vii. Develop specialization in any of the above sub-specialities.
- viii. Undertake teaching assignments in the subject of Microbiology.
- ix. State the etiology, pathogenesis and methods of laboratory diagnosis and apply that knowledge in the treatment, prevention and control of communicable diseases caused by micro-organisms.

B. SKILLS:

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

- i. Plan the laboratory investigations for diagnosis of infectious diseases.
- ii. Perform laboratory procedures to arrive at the etiological diagnosis of diseases caused by bacteria, fungi, viruses and parasites.
- iii. Perform and interpret immunological and serological tests.
- iv. Operate routine and sophisticated instruments in the laboratory.

IV. INTEGRATION OF TEACHING :

All PG Students from allied departments to participate, to be conducted in form of Seminar/Group Discussion. Suggested topics for integrated teaching:

- * Tuberculosis

- * Leprosy
- * Sexually Transmitted Diseases
- * Malaria
- * HIV / AIDS
- * Hepatitis
- * Arbovirus Diseases
- * Opportunistic Infections

V. TEACHING SCHEDULE:

Semesters	VI
Teaching days	600
Teaching hours	160 hrs.
Journals	40 hrs
Seminar	40 hrs
Group Discussion	40 hrs
Lectures	40 hrs

ATTACHED APPENDICES A, B, C & D.

(A) – RECORD OF INTRINSIC & EXTRINSIC POSTINGS

Posting	Period	Procedures Carried out	No. of samples processed & reported	Sign

(B) – JOURNAL CLUB

Date	Topic	Journal	Presented/ attended	Sign of faculty

(C) – SEMINARS

Date	Topic	Journal	Presented/ attended	Sign of faculty

(D) – GROUP DISCUSSIONS

Date	Topic	If participated	Preferences of study	Sign.

(E) – SLIDE SEMINARS/ LECTURES

Date	Slide	Clinical data	Presented/ Attended	Sign.

METHODS OF TRAINING:-

Each student will undergo rotation in following disciplines, under this guidance of a P.G teacher. The resident will undergo practical training in this discipline including skill lab and note down in the Logbook. The same will be authenticated by the section in charge P.G teacher.

- i) Diagnostic bacteriology
- ii) Serology & Immunology
- iii) Diagnostic Mycology
- iv) Principles of virological techniques
- v) Virtual Animal experiments
- vi) Parasitology & Entomology
- vii) Automated blood culture and identification system,
- viii) Polymerase chain reaction (PCR) and hybridization

ATTACHED APPENDICES A, B, C, D**A – POSTING SCHEDULE**

Month	Year and signature of faculty							
	Year	Sign	Year	Sign.	Year	Sign	Year	Sign
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

VI. DETAILED SYLLABUS OF MD MICROBIOLOGY :

The main aim of this course is to train students of Medicine in the field of Medical Microbiology. Theoretical as well as practical training is imparted to the candidates in the sub-specialties viz. Bacteriology, Virology, Parasitology, Immunology and Mycology so that they can participate in good patient care and prevention of infectious diseases in the community. They are introduced to basic research methodology so that they can conduct fundamental and applied research. They are also imparted training in teaching methods in the subject which may enable them to take up teaching assignments in Medical Colleges/Institutes.

It Shall Also Include –

- a) History of Microbiology
- b) High proficiency in Microbiology in all its aspects
- c) General Bacteriology
- d) Systematic Bacteriology
- e) Virology
- f) Mycology
- g) Parasitology
- h) Entomology
- i) Immunology
- j) Animal care & breeding
- k) General principles of clinical pathology
- l) Recent advances in Microbiology

AIMS AND OBJECTIVES

At the end of the course the students should be able to:

1. Establish good clinical microbiological services in a hospital and in the community in the fields of bacteriology, virology, parasitology, immunology and mycology.
2. Plan, execute and evaluate teaching assignments in medical microbiology and
3. Plan, execute, analyse and present the research work in medical microbiology.

COURSE CONTENTS (SYLLABUS)

DESIRABLE :

- PAPER-I General Microbiology Including Recent Advances
- PAPER-II Systemic Bacteriology Including Recent Advances
- PAPER-III Immunology & Parasitology Including Recent Advances
- PAPER-IV Virology & Mycology Including Recent Advances

GENERAL MICROBIOLOGY :

1. History of microbiology
2. Microscopy
3. Bio-safety including universal precautions
4. Physical and biological containment
5. Sterilization and disinfection
6. Morphology of bacteria and other microorganisms
7. Nomenclature and classification of microorganisms
8. Normal flora of human body
9. Growth & nutrition of bacteria
10. Bacterial metabolism
11. Bacterial toxins
12. Bacteriocins

13. Microbiology of hospital environment
14. Microbiology of air, milk and water
15. Host-parasite relationship
16. Antibacterial substances and drug resistance
17. Bacterial genetics & bacteriophages
18. Molecular genetics relevant for medical microbiology
19. Quality assurance & quality control in microbiology
20. Accreditation of laboratories

IMMUNOLOGY :

1. Components of the immune system
2. Innate and acquired immunity
3. Cells involved in immune response
4. Antigens
5. Immunoglobulins
6. Mucosal immunity
7. Complement
8. Antigen & antibody reactions
9. Hypersensitivity
10. Cell mediated immunity
11. Cytokines
12. Immunodeficiency
13. Auto-immunity
14. Immune tolerance
15. MHC complex
16. Transplantation immunity
17. Tumor immunity

18. Vaccines and immunotherapy
19. Measurement of immunological parameters
20. Immunological techniques
21. Immunopotential & immunomodulation

SYSTEMATIC BACTERIOLOGY

1. Isolation & identification of bacteria
2. Gram positive cocci of medical importance including Staphylococcus, Micrococcus, Streptococcus, anaerobic cocci etc.
3. Gram negative cocci of medical importance including Neisseria, Branhamella, Moraxella etc.
4. 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.
5. Gram negative bacilli of medical importance including Vibrios, Aeromonas, Plesiomonas, Haemophilus, Bordetella, Brucella, Gardnerella, Pseudomonas and other non-fermenters, Pasteurella, Francisella, Bacteroides, Fusobacterium, Leptotrichia and other anaerobic gram negative bacilli etc.
6. Helicobacter, Campylobacter and Spirillum
7. Enterobacteriaceae
8. Mycobacteria
9. Spirochaetes
10. Chlamydiae
11. Mycoplasmatales: Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.
12. Rickettsiae, Coxiella, Bartonella etc.
13. Actinomycetes & Nocardia

VIROLOGY :

1. General properties of viruses
2. Classification of viruses
3. Morphology: Virus structure
4. Virus replication
5. Isolation & identification of viruses
6. Pathogenesis of viral infections
7. Genetics of viruses
8. DNA viruses of medical importance including Poxviridae, Herpesviridae, Adenoviridae, Hepadna virus, Papova and Parvo viruses etc.
9. RNA viruses of medical importance including Enteroviruses, Togaviridae, Flaviviruses, Orthomyxoviruses, Paramyxoviruses, Reoviridae, Rhabdoviridae, Arenaviridae, Bunyaviridae, Retroviridae, Filoviruses, Human immunodeficiency virus, Arboviruses, Coronaviridae, Calci viruses etc.
10. Slow viruses including prions
11. Unclassified viruses
12. Hepatitis.
13. Virioids
14. Vaccines & anti-viral drugs

PARASITOLOGY:

1. General characters & classification of parasites
2. Methods of identification of parasites
3. Protozoan parasites of medical importance including Entamoeba, Free living amoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Microsporidium, Cyclospora. Isospora, Babesia, Balantidium etc.

4. Helminthology of medical importance including those belonging to Cestoda (Diphyllbothrium, Taenia, Echinococcus, Hymenolepis, Dipylidium, Multiceps etc.), Trematoda (Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides, Paragonimus, Clonorchis, Opisthorchis etc.) and Nematoda (Trichiuris, Trichinella, Strongyloides, Ancylostoma, Necator, Ascaris, Toxocara, Enterobius, Filarial worms, Dracunculus etc.)
5. Entomology: common arthropods & other vectors viz. mosquito, sandfly, ticks, mite, cyclops, louse, myasis.
6. Antiparasitic agents.

MYCOLOGY

1. General characteristics & classification of fungi
2. Morphology & reproduction of fungi
3. Isolation & identification of fungi
4. Tissue reactions to fungi
5. Yeasts and yeast like fungi of medical importance including Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces etc.
6. Mycelial fungi of medical importance including Aspergillus, Zygomycetes, Pseudoallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes etc.
7. Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffeii etc.
8. Dermatophytes
9. Fungi causing mycetoma, keratomycosis & otomycosis.
10. Pythium insidiosum
11. Prototheca
12. Pneumocystis jirovecii
13. Rhinosporidium seeberi & Loboa loboi
14. Common laboratory contaminant fungi
15. Mycetismus & mycotoxicosis
16. Antifungal agents & invitro antifungal susceptibility tests.

APPLIED MICROBIOLOGY :

1. Epidemiology of infectious diseases
2. Hospital acquired infections
3. Emerging & re-emerging infection
4. Management of hospital waste
5. Investigation of an infectious outbreak
6. Infections of various organs and systems of human body viz. respiratory tract infections, urinary tract infections, central nervous system infections, congenital infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear and nose, septicaemia, endocarditis, haemorrhagic fever etc.
7. Opportunistic infections.
8. Sexually transmitted diseases
9. Vaccinology: principle, methods of preparation, administration of vaccines
10. Gene cloning
11. Molecular techniques as applicable to microbiology
12. Automation in Microbiology
13. Statistical analysis of microbiological data and research methodology
14. Animal & human ethics involved in microbiological work
15. Bioterrorism & its interventions

**PSYCHOMOTOR SKILLS FOR POSTGRADUATES STUDENTS IN
M.D. (MICROBIOLOGY)****BACTERIOLOGY - MUST ACQUIRE**

1. Collection/transport of specimens for microbiological investigations
2. Preparation, examination & interpretation of direct smears from clinical specimens
3. Plating of clinical specimens on media for isolation, purification, identification and quantitation purposes.

4. Preparation of stains viz. Gram, Albert's, capsules, spores, Ziehl Neelsen (ZN) Silver impregnation stain and special stains for capsule and spore etc.
5. Preparation and pouring of media like Nutrient agar, Blood Agar, Mac-conkey agar, Sugars, Serum sugars, Kligler iron agar, Robertson's cooked meat broth, Lowenstein Jensens medium, Sabouraud's dextrose agar etc. christenson's urea agar
6. Preparation of reagents -oxidase, Kovac etc.
7. Quality control of media, reagents etc.
8. Operation of autoclave, hot air oven, distillation plant, filters like Sietz and membrane filters
9. Care and operation of microscopes
10. Washing and sterilisation of glassware (plugging and packing)
11. Care and maintenance of common laboratory equipments like water bath, centrifuge, refrigerators, incubators etc.
12. Aseptic practices in laboratory and safety precautions
13. Sterility tests
14. Identification of bacteria of medical importance upto species level (except anaerobes which could be upto generic level).
15. Techniques of anaerobiosis
16. Tests for Motility:hanging drop, Cragie's tube, dark ground microscopy for spirochaetes
17. In-vitro toxigenicity tests- Elek test, Naegler's reaction
18. Special tests-Bile solubility, chick cell agglutination, sheep cell haemolysis, niacin and Catalase tests for Mycobacterium, satellitism, CAMP test, catalase, slide & tube agglutination tests. Coagulase test – (slide & tube method)
19. Preparation of antibiotic discs; performance of antimicrobial susceptibility testing, eg. Kirby- Bauer, Stoke's method, Estimation of Minimal Inhibitory/Bactericidal concentrations by tube/ agar dilution methods
20. Tests for Beta-lactamase production including ESB, AmpC & MBL

21. Inoculation of infective material by different routes in animals and Bleeding techniques of animals including sheep (only viva) Virtual animal experiments
22. Care and breeding of laboratory animals viz. mice, rats, guinea pigs, rabbits etc.
23. Testing of disinfectants -Phenol coefficient and “in use” tests
24. Quantitative analysis of urine by pour plate method and semi quantitative analysis by standard loop tests for finding significant bacteriuria
25. Disposal of contaminated materials like cultures
26. Disposal of infectious waste. Biomedical waste management
27. Bacteriological tests for water, air and milk
28. Maintenance and preservation of bacterial cultures, fungal culture

BACTERIOLOGY - DESIRABLE TO ACQUIRE

1. Conjugation experiments for drug resistance
2. Serum antibiotic assays e.g. gentamicin
3. Phage typing for Staphylococci, S.typhi, etc.
4. Bacteriocin typing viz. Proteocin, etc.
6. Serologic grouping of Streptococci
8. Antimicrobial susceptibility tests for Mycobacteria
9. Molecular typing methods
10. Special staining techniques for Mycoplasma, Treponemes, Gardenerella.
11. Polymerase chain reaction (PCR) for M. tuberculosis
12. Bect /Alert ,vitek-2 application
13. Epsilometer test (E. test)

IMMUNOLOGY - MUST ACQUIRE

1. Collection of blood by venepuncture, separation of serum and preservation of serum for short and long periods
2. Preparation of antigens from bacteria or tissues like Widal, Weil Felix, VDRL, ASO and group polysaccharide of Streptococcus etc. and their standardisation.
3. Raising of antisera in laboratory animals
4. Performance of serological tests viz. Widal, Brucella tube agglutination, indirect hemagglutination, VDRL, ASO, Rose Waaler test, IFA.
5. Immunodiffusion in gel (Ouchterlony), counter-immunoelectrophoresis.
6. Enzyme linked immunosorbent assay (ELISA)
7. Latex agglutination tests
8. Preparation & preservation of complement & complement titration

IMMUNOLOGY - DESIRABLE TO ACQUIRE

1. Radial immunodiffusion for estimation of serum Immunoglobulins
2. Immunoelectrophoresis
3. Crossed immunoelectrophoresis
4. Neutrophil phagocytosis
5. Immunoblotting
6. Performance of serological tests viz. Weil Felix, cold agglutination, Paul Bunnell test
7. Leukocyte migration test
8. T - cell rosetting
9. Separation of lymphocytes by centrifugation, gravity sedimentation etc.

MYCOLOGY - MUST ACQUIRE

1. Collection and transport of specimens
2. Processing of samples for microscopy and culture
3. Direct examination of specimens by KOH, Gram's, Acid fast, Giemsa, Lactophenol cotton blue & special fungal stains
4. Examination of histopathology slides for fungal infections
5. Isolation and identification of medically important fungi & common laboratory contaminants
6. Special techniques like Wood's lamp examination, hair baiting, hair perforation, paraffin baiting and slide culture
7. Maintenance of stock cultures
8. for fungal pathogenicity study

MYCOLOGY-DESIRABLE TO ACQUIRE

1. Antigen preparation -viz. from Candida, Aspergillus, Histoplasma, Sporothrix
2. Antibody detection in candidiasis, aspergillosis, histoplasmosis, blastomycosis, Cryptococcosis, zygomycosis, coccidioidomycosis
3. Antigen detection in cryptococcosis, aspergillosis, candidiasis
4. Skin test using aspergillin, candidin, histoplasmin, sporotrichin
5. Isolation and identification of actinomycetes .
6. Calcofluor staining & examination under fluorescent microscope

PARASITOLOGY - MUST ACQUIRE

1. Collection and transport of specimens for diagnosis of parasitic diseases
2. Examination of faeces for parasite ova and cysts etc. By direct and concentration methods (salt floatation and formol-ether methods)
3. Egg counting techniques for helminths micrometry and mounting of slides
4. Examination of blood for protozoa and helminths by wet mount, thick and thin stained smears

5. Examination of blood for microfilariae including concentration techniques
6. Examination of other specimens eg. Urine, CSF, Bone marrow etc. For parasites
7. Histopathology sections -examination and identification of parasites
8. Preparation & performance of stains -Leishman, Giemsa, Lugol's iodine
9. Micrometry
10. Identification of medically important adult worms
11. Preparation of media -NIH, NNN etc.
12. Copro-culture for larvae of hook worms
13. Identification of common arthropods and other vectors viz. mosquito, sandfly, ticks, mites, cyclops
14. Preservation of parasites-mounting, fixing, staining etc.

PARASITOLOGY - DESIRABLE TO ACQUIRE

1. Maintenance of parasites in laboratory either in vivo in animals or by in-vitro cultures
2. Permanent staining techniques like iron hematoxylin
3. QBC for Malaria & filaria .
4. In-vitro culture of parasites like Entamoeba, Leishmania, P falciparum, Acanthamoeba etc.
5. Antigen preparation -viz. Entamoeba, filaria, Toxoplasma, hydatid for serological tests for IRA, ELISA and skin tests like Casoni ' s test

VIROLOGY - MUST ACQUIRE

1. Preparation of glassware for tissue cultures (washing, sterilisation).
2. Preparation of buffers like PBS, Hank's salt solution
3. Preparation of clinical specimens for isolation of viruses
4. Collection & transport of specimens
5. Recognition of CPE producing viruses

6. Serological tests -ELISA for HIV & HBsAg, Haemagglutination Inhibition test for Influenza, Measles
7. Chick Embryo techniques-inoculation and harvesting
8. Handling of mice, rats and guinea pigs for collection of blood, pathogenicity tests, etc.
9. Special staining procedure for viruses

VIROLOGY - DESIRABLE TO ACQUIRE

1. Electron microscopy of virus -TEM, SEM
2. Preservation of viruses
3. Preparation of viral antigens.
4. Molecular techniques in virology
5. Preparation of monkey kidney cells (primary) and maintenance of continuous cell lines by subculture. Preservation in -70°C and liquid nitrogen
6. Performance of haemadsorption for Parainfluenza, Haemagglutination of Influenza, Immunofluorescence, Neutralisation for Enteroviruses and Respiratory viruses. Identification tests on tissue cultures and supernatants etc.
7. Serological tests: Haemadsorption for Parainfluenza

BIOLOGICAL PRODUCTS:-

- Care & maintenance of Lab animals
- Production of antisera
- Production of antigens
- Stocking and preservation of cultures
- Quality control

B – ASSIGNED EXERCISES

Date	Nature of exercise	Results	Sign.

C – UNDERGRADUATE TEACHING ASSIGNMENTS

Date	UG Batch	Topic	Lect./ Demo/ Seminar	Sign.

D. P.G SEMINAR SCHEDULE**E. P.G JOURNAL CLUB SCHEDULE****VII. TITLE OF THEORY PAPERS WITH CONTENTS :**

	M.D. Branch (Microbiology)	Marks
Paper-I	Basic Sciences, General Bacteriology, Clinical Pathology	100
Paper-II	Systemic Bacteriology including recent advances.	100
Paper-III	Immunology & Parasitology including recent advances.	100
Paper-IV	Virology and Mycology including recent advances	100
	Total Marks	400

D - PRACTICALS

This will be of 2 days duration

EXERCISE WILL BE ON THE FOLLOWING ASPECTS: -

- Bacteriological techniques and identification, serology and immunology.
- Experimental microbiology and Animal experiments, Mycology, Parasitology, including elementary clinical pathology.
- Principles of virological techniques

VIVA-VOCE

A candidate will be declared as passed, passed with distinction or failed, according to his/her overall performance in the examination.

VIII. DISSERTATION

AIM:

To Orient the students to various methodologies of research, induce them to get acquainted with them and facilitate fruitful research, which will add to existing body of knowledge in the fields of Microbiology.

OBJECTIVES: To –

- i. Identify a relevant research, questions
- ii. Conduct critical review of literature
- iii. Formulate a hypothesis
- iv. Determine most suitable study design
- v. State the objectives of the study
- vi. Prepare a study protocol
- vii. Get approval from the ethics committee
- viii. Conduct the study, compile the data
- ix. Analyse & interpret the data
- x. Draw conclusions, declare results
- xi. Write two research papers and publish in peer reviewed journal
- xii. Present paper/poster at state/national level conference

GUIDELINES:

- i. Student: Teacher Ratio of 1:1 must be strictly maintained
- ii. Scope of the study should be such that it is possible to conduct within the resources & time available
- iii. More emphasis should be given on methodology rather than results
- iv. Ethical issues and consideration must be given priority & all concerned inclusive of entire department must be committed.
- v. Within 3 months of Registration as a Post-Graduate student-Protocol/ Synopsis (approx. 200 words) consisting of
 - Title of study
 - Aims/Objectives
 - Material & methods

- Adequate numbers of references (8-10) must be submitted.
 - It is to be signed by student, P.G. teacher, Head of the Department, Head of the Institution.
 - Penalty of Rs.100 or equivalent will be levied for late submission.
- vi. Candidate presenting for the M.D. Microbiology final examinations shall be required to submit dissertation 6 months before commencement of the examination.
- vii. It should not exceed approximately 2500 words
- viii. Ideally / Preferably this should be written during 2nd & 3rd year of M.D. training course.

LOGBOOK –

Each PG student will fill up a logbook which will have this following particular and submit to his/her guide every month, who in turn will fill up to HOD for perusal.

The log should be maintained as per the following needs.

1. Bio –Data
2. Academic Activities
3. Clinical and Scientific Meetings
4. Symposia/Seminars/ Workshops....
5. Journal Club
6. Conference attended
7. Research Activities
8. Teaching Rounds Attended
9. Case presentation
10. Clinics/ Lectures/ Treatment undertaken
11. Procedures undertaken
12. For Surgery Subjects....
13. Remarks of the guide including....
14. Seminars
15. Slide Seminars
16. Group Discussions

17. Assigned Exercises
18. Record of intrinsic & extrinsic postings
19. Undergraduate teaching assignments
20. Personal Notes

IX. Evaluation of students for PG Degree (MS / MD)

For postgraduate degree and diploma classes in various subjects the overall evaluation of the students will consist of internal assessment and the university examinations at the end of the course.

1) Final Year University Examination

Final university examination shall be at the end of three years and shall have -

- a) Four theory papers each paper of 100 marks – total 400 marks

Paper I, II and III will have following pattern -	
5 SAQ of 10 mark each - 50 marks	100 marks
2 LAQ of 25 mark each - 50 marks	

Final marking of theory at Dr. D. Y. Patil Vidyapeeth = 400 marks

b) Exercise in Practical PG Exam – (2 days)

1. Long Bacteriology - 50
2. Short Bacteriology - 20
3. Serology / Immunology - 20
4. *Mycology / Media* - 20
5. Media preparation - 20
6. Stool Exam (Parasitology) - 20
7. Clinical Path - 20
8. Virology / Virtual Animal Expt. - 20
9. Slides - 30
10. Grand Viva - 100
 - a) Bacterio / Myco - 50
 - b) Immuno / Parasito Viro - 50

Final marking of practical at Dr. D.Y. Patil Vidyapeeth = 400 marks