REGULATIONS AND CURRICULUM GOVERNING

M.Sc. MEDICAL MICROBIOLOGY PROGRAM

(2024-25)

Name of the Constituent Unit/Centre: Yenepoya Medical College



Deralakatte, Mangalore, Karnataka.

NOTIFICATION FROM THE UNIVERSITY

YENEPOYA
UNIVERSITY

Office of the Registrar
University Road
P.O. Nithyananda Nagar
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Ref: No. YU/REG/ACA/3-ACM/2009 31.10.2009

NOTIFICATION

Sub: Starting of M.Sc. in pre & para clinical departments

Ref: Resolution of the Academic Council at its 3rd meeting held on 31.10.2009 vide agenda - 3

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The Academic Council at its 3rd meeting and subsequently the Board of Management at its 9th meeting held on 31.10.2009 have resolved to approve the proposal to start following M.Sc. in pre & para clinical departments:-

1. M.Sc Medical Anatomy
2. M.Sc Medical Physiology
3. M.Sc Medical Biochemistry
4. M.Sc Medical Pharmacology
5. M.Sc Medical Microbiology

This notification is issued for implementation with effect from the academic year 2010-2011.

I/c REGISTRAR
Registrar
YENEPOYA
(Deemed to be University)

To:

The Principal - YMC

Copy to:

1. Controller of Examinations
2. File copy

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CONTENTS

Sl. No	Topic	Page No.
1.	Objectives & Course Duration	3
2.	Course Content	4-7
3.	Teaching hours, Theory and Practical Topic Distribution	7-8
4.	Laboratory Postings, Training Methods	8-9
5.	Scheme of University Examination	9-10
6.	Content Weightage & Marks Distribution	10-12
7.	Recommended & Reference books	12-13
8.	Model Question Paper	14-16

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MSc Medical Microbiology

Regulations governing the "Master of Science (Medical) degree program "(Applicable to 2012 batch onwards) of Yenepoya University.

Title of the programme: The programme shall be called Master of Science leading to the award of MSc (Medical) degree.

Areas of specialty:

Medical Microbiology

Eligibility for admission to the programme: To be filled by the office of admission, YU

Duration of the programme: 3 years

Course of study:

The programme shall consist of two parts:

i. **M.Sc.(Preliminary)-1 year duration**
ii. **M.Sc (Speciality)-2 year duration**

Course curriculum:

M.Sc (preliminary): Consists of study of basic medical sciences, namely Anatomy, Physiology and Biochemistry. The curriculum is common to all the speciality subjects.

M.Sc (Speciality):

CURRICULUM FOR M.Sc MEDICAL MICROBIOLOGY

OBJECTIVES: The aim of this course is to train the students in the field of medical microbiology. Theoretical and practical training is given to the students in the subspecialties i.e., Bacteriology, Virology, Parasitology, Immunology and Mycology.

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

1. Carry out fundamental research in microbiology.
2. Establish good laboratory practice in hospitals.
3. Be eligible to join for doctoral degree eg. PhD Medical Microbiology in any of the sub specialties.
4. Undertake teaching profession

DURATION OF COURSE: 3 years

1st year the students have to be trained in basic medical sciences i.e. Anatomy, Physiology and Biochemistry.

The next two years they will be trained in the respective fields.

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Syllabus for II & III rd year MSc Medical Microbiology

COURSE CONTENT

II YEAR

General Microbiology: **10 hrs**

1. Historical introduction
2. Microscopy
3. Morphology and physiology of bacteria
4. Bacterial taxonomy, nomenclature and classification of microbes
5. Growth and nutrition of bacteria
6. Bacterial metabolism
7. Sterilization and disinfection
8. Bacterial antagonism: Bacteriocins
10. Culture media
11. Culture methods
12. Identification of bacteria
13. Bacterial pathogenesis
14. Bacterial Genetics
15. Laboratory hazards and biosafety
16. Antimicrobial agents, susceptibility testing and antimicrobial stewardship program
17. Molecular Genetics- Genetic Engineering, Hybridization techniques. Molecular detection methods (Probe), Blotting techniques, DNA Amplification techniques – PCR, LAMP, DNA Microarray, Sequencing based Assays (Genetic mapping, Next Generation sequencing

Immunology: **30 hrs**

1. Infections
2. Immunity
3. Antigens
4. Antibodies – Immunoglobulins
5. Antigen – Antibody reactions
6. Complement system
7. Structure and functions of the immune system
8. Immune response
9. Immunodeficiency diseases

10. Hypersensitivity
11. Autoimmunity
12. Immunology of Transplantation and Malignancy
13. Immunohematology

Systematic Bacteriology: **60hrs**

1. Staphylococcus
2. Streptococcus
3. Pneumococcus
4. Neisseria
5. Corynebacterium
6. Bacillus
7. Clostridium
8. Nonsporing anaerobes
9. Enterobacteriaceae
10. Vibrio
11. Pseudomonas
12. Yersinia, Pasteurella, Francisella
13. Haemophilus
14. Bordetella
15. Brucella
16. Mycobacterium
17. Spirochetes
18. Mycoplasma
19. Actinomycetes
20. Rickettsiaceae
21. Chlamydiae
22. Miscellaneous bacteria

III YEAR

Virology: **40 hrs**

1. General properties of viruses
2. Virus host interactions
3. Bacteriophage
4. Poxviruses

5. Herpesviruses
6. Adenoviruses
7. Picornaviruses
8. Orthomyxoviruses
9. Paramyxoviruses
10. Arboviruses
11. Rhabdoviruses
12. Coronaviruses
13. Hepatitis viruses
14. Miscellaneous Viruses – Reo viruses, Human Papillomaviruses, Rubella virus, Ebola virus, Slow virus infections and Prions, viruses causing diarrhea, Emerging and re-emerging viral diseases.
15. Oncogenic viruses
16. Human Immunodeficiency Virus: AIDS

Parasitology: **30 hrs**

1. Protozoans:
    i. Intestinal
    ii. Genital
    iii. Protozoans in blood
    iv. Opportunistic protozoans
2. Helminths:
    i. Cestodes: Taenia, Echinococcus, Hymenolepis and emerging
    ii. Trematodes of medical importance
    iii. Nematodes: Intestinal, Tissue
3. Medical entomology with reference to vectors
4. Recent advances in emerging and re-emerging parasites

Mycology: **20 hrs**

1. The morphology, classification and reproduction in fungi
2. Antifungal agents– classification, antifungal resistance, antifungal susceptibility testing
3. Superficial mycotic infections
4. Fungi causing subcutaneous mycoses
5. Fungi causing systemic infections
6. Contaminant and opportunistic fungi

7. Mycotoxicoses and mycetismus

Applied Microbiology **10 hrs**

1. Normal Microbial flora of the Human Body
2. Bacteriology of Water, Milk and Air
3. Quality control in microbiology
4. Immunoprophylaxis
5. Health care associated infections and Infection control practices
6. Biofilms
7. Biomedical waste management
8. Care, experiment and breeding of experimental animals used in Microbiology research

Teaching hours :

	TOPIC	No. of Teaching Hours
1	General Microbiology	30
2	Immunology	40
3	Systematic Bacteriology	60
4	Virology	40
5	Parasitology	30
6	Mycology	30
7	Miscellaneous	20
	Total	250

TERM	TOPIC DISTRIBUTIONS
III	General bacteriology, Immunology, Systematic Bacteriology
IV	Systematic Bacteriology, Parasitology
V	Virology, Mycology
VI	Applied Microbiology, Project submission

PRACTICALS:

SKILLS:

1. Perform and interpret different staining techniques such as Gram's stain, Acid fast and Albert stain.

2. Perform and interpret Gram's staining of various clinical specimens such as sputum, throat swab, CSF, body fluids, vaginal smear, pus and other exudates.
3. Perform and interpret stool hanging drop for cholera.
4. Perform and interpret KOH mount for fungal infections
5. Preparation, sterilization and quality assurance of various culture media
6. Be able to process and report various clinical samples such as blood, pus, urine, CSF, body fluids, stool, sputum, throat swabs and other exudates for culture and sensitivity.
7. Perform and interpret various serological tests such as VDRL, ASO, WIDAL, HIV, Rheumatoid factor, Hepatitis and ELISA
8. Perform and report stool examination for ova and cysts
9. Perform stool concentration technique
10. Interpret blood smear for parasites causing malaria and filariasis.
11. Perform and interpret molecular techniques such as PCR.

POSTINGS IN DIAGNOSTIC LABORATORY

Sl No	Section	Duration in months
1	Glass ware, Culture media, Staining, sterilization,	3
2	Bacteriology	2
3	Serology, Immunology	2
4	Mycology, Parasitology	2
5	Molecular Diagnostic Lab	1
	Total	10

METHODS OF TRAINING:

The training is given under the following headings:

1. Topic discussions
2. Seminars
3. Culture seminars and serological tests
4. Journal clubs
5. Preparation of project under the guidance of a teacher.

MONITORING THE PROGRESS OF STUDIES:

1. Work diary, Log book

2. Periodic tests and viva voce
3. Project submission under the guidance of a teacher.

SCHEME OF UNIVERSITY EXAMINATION:

1. Internal examination pattern:

Eligibility for final examination: A minimum of average 40% marks in internal assessment is mandatory for appearing final university exam

A. Internal assessment examination

	Portions	**Total marks**	**Practicals and viva**
I Internal exam	**General Microbiology and Immunology**	100 marks	100 marks
II Internal exam	**Systematic Bacteriology and Mycology**	100 marks	100 marks
III Internal exam	**Virology and Parasitology**	100 marks	100 marks

B. Scheme of final University examination

Maximum Marks	**Theory (3 papers of 100 marks each)**	**Internal assessment theory**	**Practical**	**Internal assessment practical**	**Viva voce (35)** / **Project viva (15)**	**Total**
MSc Medical Microbiology	300	25	100	25	50	500

A. Theory

There shall be three questions papers, each of three hours duration. Each paper shall consist of 2 long essay questions carrying 20 marks and 6 short essay questions carrying 10 marks

each. Total marks for each paper will be 100. Questions on recent advances may also be asked.

Details of distribution of topics for each paper will be as follows:

PAPER 1- General Microbiology and Immunology

PAPER2- Systematic Bacteriology and Mycology

PAPER3- Virology and Parasitology

The topics assigned to the different papers are generally evaluated under those sections. However a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.

B. Practicals

Duration of examination: 2 days [as per the scheme enclosed]: Marks: 100

The examination will consists of the following exercises conjointly conducted and evaluated by four examiners [2 internals and 2 externals]

1. Exercise in bacteriological techniques-
   Identification of bacteria from a pure culture and antibiotic susceptibility test
2. Identification of fungi and slide culture
3. Exercise in virology techniques
4. Exercise in parasitology
5. Serology exercise

C. **Viva voce** : Marks: 50

The viva voce examination consists of questions on Bacteriology, Mycology, Virology, Immunology, and Parasitology topics; it will also include recent advances, history and scope of Microbiology. The project viva of 15 marks will be included in the viva voce

Students will be examined by all the examiners (2 Internal + 2 External Examiners) together about comprehension, analytical approach, expression and interpretation of data.

CONTENT WEIGHTAGE PAPER-WISE FOR THE THEORY PAPERS

Summative Theory Examination – 3x 100 =300 marks

Weightage should be given to higher levels in Bloom's taxonomy (application and above).

All long essays should be structured.

In Paper I, 40% of the questions should be related to general microbiology, 50% of the questions should be from immunology and 10% of the questions should be pertaining to molecular biology.

In Paper II, 60% of the questions should be related to bacterial and 40% of the questions should be pertaining to fungal pathogens.

In Paper III, 50% of the questions should be related to viral pathogens and 50% of the questions should be pertaining to parasitic pathogens

Marks distribution for theory question papers

Theory	Topics		Question Pattern	Marks allotment
PAPER I	**General Microbiology & Immunology**			
	1.	General Microbiology	Long essay	1 X 20=20
			Short essay	2 X 10=20
	2.	Immunology	Long essay	1 X 20=20
			Short essay	3 X 10=30
	3.	Molecular Biology	Short essay	1 X 10=10
			Total	**100**
PAPER II	**Systematic Bacteriology & Mycology**			
	1.	Bacteriology	Long essay	1 X 20=20
			Short essay	4 X 10=40
	2.	Mycology	Long essay	1 X 20=20
			Short essay	2 X 10=20
			Total	**100**

PAPER III	Virology and Parasitology			
	1.	Virology	Long essay	1 X 20=20
			Short essay	3 X 10=30
	2.	Parasitology	Long essay	1 X 20=20
			Short essay	3 X 10=30
			Total	100

RECOMMENDED BOOKS [Recent Editions]

1. Ananthanarayan: [Ananthanarayan & Jayaram Paniker's] Textbook of Microbiology, Et. & Orient Longman Ltd., Chennai.
2. Textbook of Microbiology by Apurba Sankar Sastry and Sandhya Bhat K
3. Jawetz [Melnick] et al. Medical Microbiology, ed. Z Appleton and Lange, USA
4. Zinsser [Joklik and Willett] et. Al. Microbiology, Appleton and Lange, USA
5. Chatterjee [KDC], Parasitology, Chatterjee Medical Publishers, Calcutta.
6. Paniker [C.K. Jayaram], Text book of Medical Parasitology, Jaypee, New Delhi
7. Bhatia and lchhpujani, Essential of Medical Microbiology, Jaypee, New Delhi
8. A text book of Microbiology by Chakraborthy, New Delhi.

REFERENCE BOOKS:

1. Green wood, Medical Microbiology, Ed-15, Churchill Livingstone.
2. Roitt [Ivan.M] Essential Immunology, Ed.6, ELBS, Hong Kong
3. MIMS [Cedric, Playfair] et al, pathogenesis of Infectious diseases, Academic Press, London
4. Rippon, Medical Mycology, Ed.2. W.B. Saunder's and Co.
5. KONEMAN [Allen and Janda et al], Diagnostic Microbiology, J.B.Lippincott Co.
6. BELLANTI, Immunology, ed.3, W.B.Saunder's and Company.
7. BALOWS, Manual of clinical Microbiology, ASM, Washington DC.
8. STITES [Terr and Parslow], Medical Immunology, Appleton and Lange USA
9. ROITT [Brostoff and Male] Immunology, Mosby, London
10. EMMONS [Bin ford] et al, Medical Mycology, K.M. Varghese Co., Bombay
11. MANSON – BARR [BELL], Manson's Tropical diseases, ELBS
12. BEAVER, [Jung and Corpp], Clinical Parasitology

13. TOPLEY and WILSON – Principles of Bacteriology, Virology, Immunity, Edward Arnold.

13. BERGEY'S manual, [Holt and Krieg] et al, Determinative bacteriology, Williams and Wilkins, Maryland, USA.

14. ROITT, Encyclopedia of Immunology, Academic Press Ltd., London

15. HOEPRICH, Infectious diseases, Harper and Rao Publishers, Philadelphia.

16. MANDELL [Donerglas Aan Bennett], Principles and practice of infectious diseases, Churchill Livingstone.

17. BAILEY AND SCOTT, Diagnostic Microbiology, Mosby Publishers

18. MACKIE AND MACCARTENY – Vol II [Collee & Duguid] et al, Churchill Livingstone.

19. Clinical Microbiology procedures Handbook, Henry D. et al. ASM

20. COWAN & STEEL [Barrow & Feltham], Manual for the identification of Medical bacteria, Cambridge university press.

21. STOKES [Ridgeway and Wren], Clinical Microbiology, Edward Arnold, London

22. Basic Laboratory Procedures in clinical bacteriology, WHO, Vandepitte et al, Jaypee

23. Basic Laboratory Procedures in Medical Parasitology, WHO, Vandepitte et al, Jaypee

Journals:

1. Journal of Medical Microbiology, Lippincott-Raven publishers, Pathological Society of Great Britain & Ireland
2. Microbiology and Molecular Biology Review [mmbr] Pub: American Society for Microbiology
3. The Journal of infectious Diseases, Pub: The University of Chicago Press
4. Indian Journal of Medical Microbiology, Pub: Indian Associates of Medical Microbiologists
5. The Indian Journal of Medical Research, Pub: Indian council of Medical research, New Delhi
6. Annual Review of Microbiology, Pub: Annual Reviews, Inc. Palo Alto. California, USA

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MSc MEDICAL MICROBIOLOGY

MODEL QUESTION PAPER

PAPER-I

General Microbiology & Immunology

Date: **Time: 3 hrs** **Max marks: 100**

Instructions: Answer all the questions

Draw neat labelled diagram wherever necessary

I. Long Essays **(1 x 20=20 marks)**

1. Define and classify sterilization. Describe in detail about autoclave. Add a note on sterilization control (2+3+12+3)
2. Define and classify immunity. Describe the mechanisms of innate immunity. Add a note on toll like receptors and their significance (2+3+10+5)

II Short Essays: **(6 x 10=60 marks)**

3. Type IV Hypersensitivity reactions
4. Classify disinfectants. Write in brief about their mode of action and tests to determine their efficacy. (2+5+3)
5. HLA typing and cross matching
6. Describe mechanisms of antimicrobial resistance and transfer of drug resistance in bacteria (5+5)
7. Discuss about molecular methods in diagnostic microbiology
8. Describe pathways of complement activation. Add a note on complement deficiency diseases (8+2)

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MSc MEDICAL MICROBIOLOGY

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MODEL QUESTION PAPER

PAPER-II

Subject: Bacteriology & Mycology

Date: **Time: 3 hrs** **Max marks: 100**

Instructions: Answer all the questions

Draw neat labelled diagram wherever necessary

II. Long Essays **(1 x 20=20 marks)**

1. Describe etiology, pathogenesis and laboratory diagnosis of enteric fever. Add a note on its prophylaxis (2+ 6+9+3)
2. Define opportunistic mycoses. Describe etiology, pathogenesis and laboratory diagnosis of zygomycoses (2+2+6+10)

II Short Essays: **(6 x 10=60 marks)**

1. Describe etiology, pathogenesis and laboratory diagnosis of Weil's disease (1+5+4)
2. Discuss the etiology, pathogenesis and laboratory diagnosis of Madura foot (2+3+5)
3. Nontuberculous Mycobacteria
4. Describe pathogenesis and laboratory diagnosis of diphtheria. Add a note on its prophylaxis (3+5+2)
5. Classify Vibrio. Describe pathogenesis, laboratory diagnosis and prophylaxis of cholera (1+ 4+4+1)
6. Describe pathogenesis and laboratory diagnosis of histoplasmosis (5+5)

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MSc MEDICAL MICROBIOLOGY

MODEL QUESTION PAPER

PAPER-III

Subject : Virology and Parasitology

Date: **Time: 3 hrs** **Max marks: 100**

Instructions: Answer all the questions

Draw neat labelled diagram wherever necessary

I. Long Essays **(1 x 20=20 marks)**

1. Describe the morphology, pathogenesis and laboratory diagnosis of Rabies. Describe the prophylactic measures for a case of dog bite (2+7+6+5).
2. List the parasites causing diarrhoea in HIV infected person. Describe the life cycle, pathogenesis and laboratory diagnosis of Cryptosporidium parvum (2+6+5+7).

II Short Essays: **(6 x 10=60 marks)**

3. Describe pathogenesis and laboratory diagnosis of Lymphatic filariasis (5+5)
4. List the flavi viruses. Describe the pathogenesis and lab diagnosis of Dengue virus infections (2+3+5).
5. Classify Herpes viruses. Describe pathogenesis, clinical features and laboratory diagnosis of Herpes simplex viruses (2+2+2+4).
6. Cysticercoses
7. Slow viral diseases
8. Laboratory diagnosis of haemoflagellates

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