SYLLABUS

for Courses affiliated to the

Kerala University of Health Sciences

Thrissur 680596

MASTER OF SCIENCE IN

MLT - Microbiology

Course Code: 291

(2024-25 Academic year onwards)

2. COURSE CONTENT

2.1 Title of course:

Name of the course shall be the **''Master of Science in Medical Laboratory Technology- Microbiology'' (MSc MLT- Microbiology)**

2.2 Objectives of course

Post Graduate programme in Medical Laboratory Technology (Biochemistry, Microbiology and Pathology) gives opportunity for specialized study in the field of Medical Laboratory Technology for B.Sc (MLT) graduates .Candidates who successfully complete M.Sc (MLT) course shall be able to

1. Learn theories and principles of Medical Laboratory science and Technology
2. Demonstrate the ability to plan and effect the change in laboratory practice and health care delivery system.
3. Setup and manage specialized clinical laboratories and to deliver better health care System to the public.
4. Practice as Specialized Technologists in the concerned subject.
5. Function as effective educators in the field of Medical Laboratory Technology
6. Conduct independent research works and utilize the research findings in Laboratory practice and education.
7. Evaluate various educational programmes in Medical Laboratory Technology.
8. Demonstrate interest in continued learning and research for personal and professional advancement.
9. Establish collaborative relationship with Clinicians and members of other disciplines.

2.3 Medium of instruction:

Medium of instruction shall be English

2.4 Course outline

The course of study ensures student's knowledge and skills in several major categorical areas of medical laboratory technology. The post graduate degree in medical laboratory technology provides specialised skills to practicing laboratory professionals in health administration, leadership, quality assurance, managements and health informatics. It is a two year professional post graduate Degree course comprising four papers in first year and two papers and dissertation in second year. Total course duration is 4500 hours including 200 hours of training in reputed external Hospitals/institutes. There will be three internal examinations conducted by the Institutes/Colleges and one public examination at the end of each academic year.

2.5 Duration

Course of study including the dissertation work shall be for a period of two year with 365 days/year. The students shall do One year internship/service after successful completionof the course.

Course of study including dissertation work shall be for a period of two years.

Week/Year - 52 weeks

Leave - 20 days.

Examination - 2 weeks

Total weeks available - 47 weeks

Total working hours /week - 48 hours

Total working hours/year, - 48hrs x 47 weeks = 2250 hours/year

Total hours for two years - 4500 hours

2.6 Subjects

Paper-I	General Microbiology
Paper-II	Systematic& Diagnostic Bacteriology
Paper -III	Medical Parasitology
	and Mycology
Paper- IV	Immunology

Second year	
Paper -V	Medical Virology
Paper -VI	Applied Medical Microbiology and Recent Advances
	Dissertation

The concept of health care counseling shall be in corporated in all relevant areas.

2.7 Total number of hours

Week/Year	-	52 weeks
Leave	-	20 days.
Examination	-	2 weeks
Total weeks available	-	47 weeks
Total working hours /week	-	48 hours
Total working hours/year, hours/year	-	48hrs x 47 weeks = 2250
Total hours for two years	-	4500 hours

2.8 Branches if any with definition :

Not applicable

2.9 Teaching learning methods:

During a period of two years, intensive theoretical and practical training will be imparted to the candidates as follows.

Cognitive

1 Attending didactic lectures: one lecture (followed by discussion).

2 Seminar: one seminar (followed by discussion) of 1h duration weekly. 3 Journal club: for 1h (including discussion) weekly.

4 case presentation

5 Group discussions/ review clubs.

6 Tutorials for BSc MLT students

Presentation skill

1 Seminars: M.Sc trainees present seminars under the moderation of a Faculty Member. Each trainee presents a minimum of 6 seminars,

2 Journal club: M.Sc trainees present at least 6 journal clubs in two years.

Training / visit

1. Clinical Laboratory Practices/duty in theconcerned sub specialties of the Hospital/college
2. Training / visit in concerned sub specialty Laboratories of national or international reputed Institutions in India (Molecular biology, virology techniques,mycology technique, vaccine preparation , laboratory animal handling, Milk analysis, water analysis, updates in bacteriological laboratory) .

Qualification of teacher

i. Professor in MLT- M.Sc. MLT with PhD in the concerned subject having 8 years of full time teaching experience in the subject after the acquisition of M.Sc (MLT) Degree.

OR

M.Sc. MLT with 10 years of teaching experience in the concerned subject after the acquisition of M.Sc (MLT).

ii. Associate Professor in MLT-M.Sc (MLT) in the concerned subject (Biochemistry, Microbiology, Pathology) having 8 years of full time teaching experience in the subject after the acquisition of M Sc (MLT).

iii. Assistant Professor-M.Sc (MLT) in the concerned subject (Biochemistry / Microbiology /Pathology).

2.10 Content of each subject in each year

M.Sc Medical Laboratory Technology (Microbiology) Detailed Syllabus

PART I (First year)Paper I -General Microbiology.

Introduction to Microbiology

History & scope of microbiology, safety methods in microbiology Laboratory, first aid in microbiology laboratory, **aseptic practices and safety precautions microbiology laboratory** safety cabinets, common glassware for microbiology and its cleaning and sterilization, disposal of waste materials in microbiology,**CSSD.**

Sterilization and disinfection.

Physical methods-

Heat -Dry heat and moist heat

Hot air oven ,autoclave, incineration

Filtration (liquid, air)

Radiation.

Chemical methods-

Disinfectants, Antiseptics, Testing of disinfectants.

Disinfection of thermo labile equipments ,

Plasma sterilization,

Sporicidal agents

Mycobacterial disinfection Quality control in sterilization

Microscope

Principle, methods of safe working, different parts, preparation of smears forexamination, applications of following microscopes –

Bright field, dark ground, phase contrast, differential interference contrast, fluorescent, electron (scanning, transmission (STEM), polarizing, tunneling and confocal.

Micrometry. Bacterial morphology

Ultra structure of bacterial cell, cell wall, capsule, flagella, fimbria, bacterial spores, cytoplasmic inclusions.

Staining methods for bacteria

Principles, preparation of stains and reagents, preparation of smears,

modification offollowing staining methods

Simple staining, differential staining (Gram staining, AFB staining), Negative staining, Fluorochrome staining, Staining of Volutin granules, Staining of spirochetes, spore staining, capsular staining, flagellar staining,automated staining techniques in microbiology

Quality control in staining.

General Bacteriology

Classification of Medically important Bacteria

Bacterial Metabolism, Bacterial growth, Growth Requirements,

Growth Curve.Culture Media

Classification of culture Media, Preparation of Culture Media,

Quality Control of Culture Media.

Inoculation, Incubation & purification methods in bacteriology.

Quantitation of bacterial growth

Preservation of bacteria.

Biochemical tests for Identification

Principle, Media & Reagents, Method, Interpretation & Quality Control of Biochemical tests. Tests for metabolism of carbohydrates.

Tests for metabolism of proteins and amino acids. Tests for enzymes.

Tests for metabolism of fats.

Rapid identification systems.

Bacterial genetics

Phenotypic and genotypic variations, Regulation and expression of gene activity, Plasmid Genetictransfer in bacteria.

Paper II Systematic and Diagnostic Medical

BacteriologySystemic Bacteriology

Isolation and identification of bacteria.

Gram positive cocci of medical importance including Staphylococcus, Micrococcus, Streptococcus, Enterococcus,

Mycobacteria: general characters and classification.

Gram negative cocci of medical importance including Neisseria, Branhamella, Moraxella, Veillonella

Gram positive bacilli of medical importance including Laciobacillus,coryneform organisms, Gardnerella, Bacillus, Actinomyces, Nocardia, Actinobacillus and other Actinomycetales, Propionibacterium, Bifidobacterium, Eubacterium, Erysipelothrix, Listeria, Clostridium and other spore-bearing anaerobic bacilli.

Gram negative bacilli of medical importance including Entero bacteriaceae,Vibrio, Aeromonas, Plesiomonas, Haemophilus, Bordetella, Brucella, Pasteurella, Francisella, Legionella, Pseudomonas, Burkholderia, Chromobacterium, Flavobacterium, Acinetobacter, Achromobacter, Cardiobacterium and other non-fermenters, Bacteroides, Fusobacterium, Prevotella, Porphyromonas, Leptotrichia, Mobiluncusand other anaerobic Gram negative bacilli,Helicobacter, Campylobacter and Spirillum,Spirochaetes,Mycoplasmas and chlamydiae, Rickettsiae including

Bartonella, Coxiella, etc.

Knowledge of the above family/ genus/ species should include definition, historical perspectives, classification, morphology, cultural characteristics, metabolism, and antigenic structure, laboratory isolation and identification, tests for virulence and pathogenicity, susceptibility.

Diagnostic Bacteriology

Epidemiology of bacterial infections, Guidelines for the collection, Transport, Processing analysis, isolation of bacterial pathogens and reporting of cultures from specimens for bacterial infections

Bacterial infections of respiratory tract.

Bacterial infections of gastro intestinal tract and food poisoning.Bacterial urinary tract infections.

Bacterial infections of genital tract and reproductive organs. Bacterial infections of central nervous system.

Skin and soft tissue infections.

Bone and joint infections

Eye ear and sinus infections

Cardiovascular infections

Tissue samples for culture

Anaerobic infections

Zoonotic infections.

Infections associated with immunodeficiency and immune suppression

Pyrexia of unknown origin

Bacterial immuno serology

Enteric fever Streptococal infections

Syphilis

Rickettsial infections

Brucellosis

Primary atypical pneumonia

New rapid serological diagnostic methods for bacterial infections.

Antibiotics in clinical laboratory

Antibiotics and mechanism of action MIC&MBC

Invitro susceptibility tests-Different methods Rapid methods of antibiotic susceptibility testsAntibiotic resistance mechanisms

Detection of methicillin resistant staphylo coci

General parasitology

Classification of medically important parasites, epidemiology of parasitic infections, immunology of human parasitic infections Diagnostic parasitology

Systemic study of following parasites (Geographical distribution, habitat, morphology and life cycle, risk of infection, pathogenesis, laboratory diagnosis prophylaxis and serological diagnosis)

Protozoa – Intestinal amoeba, free living pathologic amoeba, Giardia, Trichomonas, Balantidium, Isospora, Cryptosporidium, Microspora.Malaria, Leishmania, Trypanasoma, Toxoplasma, Babesia.

Helminthes –

Cestodes –Taenia, Echinococus, Diphylobothrium. Trematodes- Schistosoma, Fasciola, Fasciolepsis, Paragonimus. Nematodes- Ascaris, Hookworm, Trichuris, Enterobius, Strongyloides, Filaria, Trichinella, Toxocara, Dracunculus.

Parasitic infections in immunocompromised host.

Immunodiagnostic techniques in parasitology ,pseudoparasites, arthropods and human diseases

Mycology

General Mycology – Fungi – Properties and Classification

Fungal Structure & Morphology, Immunity to Fungal Infections.

Culture Media inMycology , Stains in Mycology.

Diagnostic Mycology

Epidemiology, Pathogenesis, Laboratory Diagnosis of Fungal Infections.

Specimen collection, preservation, Transportation & Identification of Mycological Agent.

Routine mycological techniques used in mycology

Anti fungal agents, anifungal susceptibility testing.

Serological tests for mycotic infections. use of lab animals in Mycology.

Signs and symptoms of fungal infections

Superficial Mycosis – Pityriasis Vessicolor, white piedra, black piedra, tinea nigra, Malassezia species, dermatophytes .

Subcutaneous Mycosis–Mycetoma Sporotrichosis,Chromoblastomycosis, Phaeohyphomicosis, Rhinosporidiosis, Lobomicosis.

SystemicMycosis-Histoplasmosis,Blastomicosis,Coccididiomicosis,Para Coccididiomicosis

Opportunistic Mycosis – Candidiasis, Aspergillosis, Zygomicosis, Penicillin marneffei, pneumocystis Carinii.

Miscellaneous Mycosis- Otomycosis, fungal infections in eyes, Mycotoxins, Allergic Fungal diseases

Fungal infections in immunocompromised host

Mycotoxicosis and mycotoxins

Common fungal laboratory contaminents

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Paper-IV Basic and Applied Immunology

History of immunology, innate and acquired immunity, immune system, antigens, immunoglobulin, Monoclonal antibodies, MHC, complement system, interleukins an interferons, immune responses and cells involved, immunity and infection, tumor immunology, hypersensitivity reactions, autoimmunity and autoimmune diseases, immuno deficiency, transplantation and rejection, immunomodulation including vaccines with recent developments.

Clinical laboratory methods for detection of antigens and antibodies- Precipitation reactions-immuno diffution, immune electrophoresis, Agglutination, complement fixation, neutralization.

Binder ligand assay- ELISA, RIA, Immuno fluoresence, immuno blotting.

Detection of immune complexes, Nephalometry, immune flurescences, CFT, Hemolytic assays , functional assays ,FACS (florescent activated cell sorter , mixed lymphocyte culture, Neutrophil function tests

Clinicallaboratory methods for-

Detection of cellular immune function Delayed hypersensitivity skin tests Assay for lymphocytes

Flow cytometry and cell sorting.

PRACTICALS –FIRST YEAR

PAPER- I

Preparation of bacterial smear and staining methods.

Preparation of media, cultivation of bacteria, Biochemical tests for identification bacteria.

PAPER- II

Study of morphological, cultural and biochemical characters of common bacterial pathogens. Isolation, Characterization and identification of pathogens from various clinicalspecimens.

Study of antibiotic sensitivity of common pathogens

Common serological tests for the diagnosis of bacterial infections.

PAPER III

Examination of stool for parasites.

Examination of blood & bone marrow for parasites.

Examination of other body fluids & biopsy specimens for parasites.

Culture techniques for parasites.

Serological diagnostic methods in parasitology.

Media & Stains preparation for Mycology,

Routine mycological techniques used in mycology

Diagnostic Methods in Mycotic Infections,Identification test in Mycology,

Serological tests in Mycology.

PAPER IV

Haemaglutination test ,Haemaglutination inhibition test ,Complement fixation test

Immunoelectrophoresis ,Double diffusion technique ,Radial immunodiffusion ,Latex agglutination tests ,Counter current immunoelectrophoresis,FITC conjugation of antibody,Lymphocyte culture,Isolation of lymphoid organs of mice,ELISA,RIA demonstration,Western blotting demonstration,WIDAL test,VDRL test

PART II

Second year

Paper V - Medical Virology

General virology- General characteristics and classification of viruses,

Morphologyand structure of viruses, Bacteriophage, satellite viruses ,

propagation and identification of viruses-viral cultivation (media ,vessels,methods used , cell lines, maintainace of celllines)-Cell culture, embryonated eggs, animal inoculation,

-Detection and identification of viruses in culture

-Viral replication and virus-host cell interactions

Systematic Virology- Systematic study of following viruses

Parvo viruses, Adeno viruses, Papova virus, Herpes virus, Pox virus, orthomyxovirus, paramyxovirus , Rubella virus, Arbovirus, Rhabdo virus, Hepatits viruses, Retro viruses, Human enteric viruses, Oncogenic viruses, Prions of humans

Diagnostic virology-

Laboratory diagnosis of viral infections.

Collection, Preservation, transportation, Processing, and reporting of various clinical specimens for viral infections.

Pathogenesis of viral infections Immune response to viral infections

Epidemiology ofviral infections

Immunodiagnostic techniques in virology.

Antiviral agents, invitro testing of antiviral agents

Viral infections in immunocompromised patients.

Emergence and re-emergence of viral infections.

Paper VI Applied and Recent advances in Medical Microbiology

Nosocomial infections

Epidemiological aspects of control infections and diseasesTyping methods in Bacteriology

Hospital acquired infections

Surgical and trauma related infections

Microbial bio – film -prevention, control and removal

Role of microbiology lab for infectioncontrol in hospital

Emerging infectious diseases

Public health Microbiology

Microbiology of air Bacteriology of water and water born infections Microbiology of milk and milk products Milk born infections

Bacteriology of food and food born diseases Vaccines for infectious diseases Molecular diagnostic methods in microbiology Automation in diagnostic microbiology Microbiology Laboratory Physical design, Management and organization Quality in theclinical Microbiology Laboratory

Genetically modified microorganisms microbiology laboratory physical design, management and organization

Principle, techniques and application of fermentation, BACTEC, VITEC 2 & MGIT culture and other automated techniques in micrbiology

Molecular Diagnostic methods

Molecular diagnostic techniques relevant to medical microbiology.

PCR and its modificationsincluding nested PCR, Multiplex PCR.

Special emphasis to Real-time PCR.

Principles of different hybridization techniques

Principles of recombinant DNA technology.

Nucleic acid based detection methods in microbiology

Molecular probes and its applications

Gene therapy

DNA finger printing, TCR, RFL

Role of molecular biology techniques in diagnosis in microbiology

Application of recombinant and technology in medicine therapeutic proteins,

human genome project.

chip based diagnostics: DNA sequence analysis, gene expression profiling, biomarker detection, their role in detection of diseases or their susceptibility.

Care and management of laboratory animals

Handling feeding, breeding of common laboratory animals Bleeding of lab animals

Killing of animal and disposal of carcasses.

PRACTICAL II YEAR

PAPER V

Diagnostic tests in virology, Animal-cell cultures, Media, Sterilization, Demonstration of cell lines, CPE, embryonated egg inoculation, immuno fluorescent techniques, Viral neutralization tests, Viral haemagglutination tests and haemagglutination inhibition tests, serological tests for viral infections, Western blot technique.

(Students should visit and observe all techniques in virology in a reputed Institute)

PAPER VI

Animal inoculation and bleeding. Animal house management Microbial analysis of waterMicrobial analysis of air Microbial analysis of milk Microbial analysis of food.

Identification and isolation of microbial organism from nosocomial infection sample

Reference books

1. Topley & Wilsons – Microbiology & Microbial Infections – 9th Edition LeslieCollier, Albert Balows, Max Sussman – Volume I, II, III, IV, V
2. Mandell, Douglas & Bennetts Principle & Practice of Infectious Diseases – Volume I, II– IVth Edn
3. Colour atlas of & text book of Diagnosis Microbiology – IVth Edn Felmer W.Koneman
4. Bailey & Scott‟s Diagnostic Microbiology – 12th Edn
5. Jawetz Melnick & Adelberg‟s Medical Microbiology
6. Medical Microbiology – Minna Plafair Roitt
7. R.M. Nakamra, F.L. Kiechle, W.W. Grody and C. Strom, ‘Molecular Diagnostics Techniques and Applications for the Clinical Laboratory’, Academic Press.
8. L. Buckingham, ‘Molecular Diagnostics – Fundamentals, Methods and Clinical Applications’, F.A. Davis Company

Paper VII Dissertation

2.11 No: of hours per subject

Paper	*Subject*	*Theory*	*Practica lhours*	*Clinical Laboratory Practice*	*Total hours*
First year					
Paper-I	General Microbiology	100 hrs	600 hrs	1250 hrs	2250 hrs
Paper-II	Systematic	100 hrs			
Paper -III	Medical Parasitology and Mycology	100 hrs			
Paper- IV	Immunology	100 hrs			
Second year					
Paper -V	Medical Virology	100 hrs	300 hrs	1150 hrs	1650 hrs
Paper -VI	Applied and Recent advances in Medical Microbiology	100 hrs			
	Dissertation				600 hrs
Total First and second year including					4500

2.12 Practical training

As given under clause -Number of hours per subject

2.13 Records

To be maintained for all Practical Work

2.14 Dissertation:

Dissertation

(1) Synopsis

☆

Every candidate undergoing M. Sc (MLT) course shall carry out work on a selected research project under the guidance of a recognized guide. The results of such a work shall be submitted in the form of a dissertation.

The dissertation is aimed to train a postgraduate student in research methods and techniques. It includes identification of problem, formulation of hypotheses, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis and comparison of results and drawing conclusions.

Every candidate should submit a synopsis to the registrar of the University in the prescribed format containing particulars of proposed dissertation work after obtaining ethical clearance from the Institutional Ethical Committee comprising principal and senior professor of the college within nine months from the date of commencement of the course on or before the date notified by the university. The synopsis shall be sent throughthe proper channel. Such synopsis will be reviewed and the dissertation topic will be registered by the university.

(2) Dissertation submission

The candidate should submit their dissertation work at the end of 9 months of second year of the M.Sc. (MLT) course. The Scientific Committee of the college /Department should scrutinize and evaluate the dissertation work and make required correction if necessary and accept with modification before submitting to the university.

Four copies of the dissertation work shall be submitted to the registrar on the 21st month of the commencement of course. Hall ticket for the second year examination will be issued to the candidate only after the submission of dissertation to the university.

(3) Dissertation submission

The candidate should submit their dissertation work at the end of 9 months of second year of the M.Sc. (MLT) course. The Scientific Committee of the college /Department should scrutinize and evaluate the dissertation work and make required correction if necessary and accept with modification before submitting to the university.

Four copies of the dissertation work shall be submitted to the registrar on the 21st month of the commencement of course. Hall ticket for the second year examination will be issued to the candidate only after the submission of dissertation to the university.

(4) Dissertation Valuation

Dissertation valuation of the candidates will be conducted by the internal and

external examiners together on the basis of work, presentation and defense viva at the time of second year M.Sc. (MLT) practical examination. The mark distribution is as follows.

Project Content	200
Presentation	50
Defense Viva	100
Continuous Evaluation	50
Total	**400**

Tentative Schedule for dissertation

S. No.	Activities	Scheduled Time
1	Submission of the research proposal	End of 9th month of 1st year
2	Submission of dissertation – Final	End of 9th month of IInd Year

Research Guide

1) Qualification of Guide

(i) Guide: Faculty in Medical Laboratory Technology / expert in the same Specialty with a minimum of 2 years' experience in teaching in the Post Graduate Programme in MLT and a minimum of 5 years of experience after Acquiring MD/M.Sc (MLT) degree.

(ii) Co-Guide: A Co-Guide is a Faculty/expert in the field of study.

(iii) Either Guide or Co-Guide should be a regular faculty in the concernedsubject Having Post Graduate qualification in Medical Laboratory Technology.

2) Guide – Students Ratio

Maximum of 1:4 (including as co-guide)

3) Change of Guide– Guide may be changed only on unavoidable situations with prior permission from the University.

No change in the dissertation topic/Guide shall be made without prior approval from the university.

2.15 Speciality training if any:

Specialty training is not applicable for MSCMLT-Microbiology

2.16 Project work to be done if any

No additional project work other than dissertation

2.17 Any other requirements [CME, Paper Publishing etc.]

A minimum of 2 CME should be attended during the period of study.

2.18 Prescribed/recommended textbooks for each subject

As given under clause "Content of each subject in each year."

2.19 Reference books

As given under clause "Content of each subject in each year."

2.20 Journals

As given under clause "Content of each subject in each year."

2.21 Logbook

All the candidates shall maintain a Log Book for recording performance of activities, seminars, journal Club and other presentations. The Log Book verified bythe course coordinator / concerned faculty in-charge shall be certified by the Head of department and presented in the University Practical Examination.

3. EXAMINATIONS

3.1 Eligibility to appear for exams [including Supplementary]

(a) Attendance and condonation option

All the candidates joining the postgraduate programme should have 80% attendance to appear the University examination. No condonation option for MSc MLT course

(b) Internal Assessment

Internal assessment will be based on assessment examination, Projects, presentation of seminars, Tutorials, Journal Clubs and work assessment during clinical postings. In the case of candidates who fail in the University Examination, fresh internal assessment marks should be sent (without carrying over the previous marks), before each attempt of University examination. The minimum internal assessment marks required for appearing the University examination shall be 50%. The statement of internal assessment marks of all students in a year countersigned by the Head of department and forwarded to the University when required.

(c) Log Book

All the candidates shall maintain a Log Book for recording performance of activities, seminars, journal Club and other presentations. The Log Book verified by the course coordinator / concerned faculty in-charge shall be certified by the Head of department and presented in the University Practical Examination.

3.2 Schedule of Regular/Supplementary exams

(1) Theory Examination

Duration of theory examination for all the papers will be three hours each.

Maximum marks of each paper shall be 100.

(2) Practical & viva

After the theory examination, Practical and Viva examination in each specialty shall be conducted on three consecutive days, at the end of every year.

(3) Dissertation

The evaluation of the dissertation work will be on the basis of project content, Presentation, defense viva and valuation by the internal and external examiners together, appointed by the University.

(4) Supplementary Examination

No supplementary batch will be conducted for M.Sc. (MLT) course but supplementary examination will be conducted within six months after each regular examination. Candidate failing to secure minimum pass mark in any theory paper shall reappear for that paper only. Candidates who fail in the practical examination

shall reappear for both practical and Viva voce in the supplementary examination.

3.3 Scheme of examination showing maximum marks and minimum marks

Scheme of evaluation

Evaluation system for M Sc (MLT) Degree is Centralized double valuation by examiners of affiliated Colleges. The average of marks of the two valuations is taken as the mark of the theory paper. There will be third valuation if the average marks of first and second valuation is at or between 45% and 49% marks and the discrepancy of not less than 15% marks should undergo a third valuation, and the average of aggregate of the highest two will be counted. Practical and Oral examination shall be evaluated jointly by the examiners appointed by the University. No re- evaluation is permitted, only re-totaling can be allowed on request by the candidate.

Scheme of Examination of MSc (MLT)-Microbiology

Year	***Paper***	***Maximum Marks***	***Minimum Marks***
	Paper- I General Microbiology Internal Assessment	 100 50	 50 25
	Paper- II Systematic and Diagnostic Bacteriology Internal Assessment	 100 50	 50 25
	Paper III Medical Parasitology and Mycology Internal Assessment	 100 50	 50 25
1st Year (Part I)	Paper- IV Immunology Internal Assessment	 50 150	 25 75
	Practical-	300 50 50	150 25 25

	Viva voce	400	200
	Total for PART I	**1000**	**500**
2^{nd} Year (Part II)	Paper- V Medical Virology Internal Assessment	100 50 150	50 25 75
	Paper- VI Applied Medical Microbiology and Recent Advances	100 50 150	50 25 75
	Practical Viva voce Internal Assessment	200 50 50 300	100 25 25 150
	Dissertation	400	200
	TOTAL for PART II	**1000**	**500**
GRAND TOTAL		**2000**	**1000**

3.4 Papers in each year:

As given under clause "Scheme of examination showing Minimum & Maximum marks"

3.5 Details of theory exams

As given under clause "Scheme of examination showing Minimum & Maximum marks"

3.6 Model question paper for each subject with question paper pattern

Question paper setters –

Shall be a regular faculty member of the College/Department with MD / MSc (MLT) degree in the concerned subject and having a minimum of 5 years of teaching experience after acquiring Post graduate degree.

Setting of Question paper

All the question paper shall be of standard type. Each theory paper will be of 3 hours duration and shall consist of ten question carry equal mark with a maximum of 100 marks. Theory paper in all the subjects will consists of ten questions of 10 marks each or two sub questions in a ten mark main question.

KERALA UNIVERSITYOF HEALTH SCIENCES

FIRST YEAR MSc (MLT) - MICROBIOLOGY
DEGREE EXAMINATION
MODEL QUESTIONS

PAPER - I. GENERAL MICROBIOLOGY

Time: 3 Hours **Maximum marks: 100**

Answer all questions. Each question carries 10 marks
Draw diagrams wherever necessary

1. Universal safety precautions in laboratory practice.
2. Anaerobic culture techniques.
3. Confocal microscope.
4. Methods of viable bacterial counting.
5. ONPG test.
6. Cell wall of bacteria.
7. Determinants of bacterial virulence.
8. R factor.
9. Hydroclave.
10. Gnotobiotic animals.

KERALA UNIVERSITYOF HEALTH SCIENCES

FIRST YEAR M.Sc (MLT) - MICROBIOLOGY
DEGREE EXAMINATION
MODEL QUESTIONS

PAPER -II SYSTEMATIC AND DIAGNOSTIC BACTERIOLOGY

Time: 3 Hours **Maximum marks: 100**

Answer all questions. Each question carries 10 marks
Draw diagrams wherever necessary

1. Atypical Mycobacterium.
2. Epidemiological typing of Salmonella.
3. Laboratory. diagnosis of plague.
4. Detection of enterotoxin.
5. Pathogenesis and laboratory diagnosis of Rheumatic fever.
6. CAMP test.
7. Fluorescent Treponemal Antibody test.
8. Bartonellosis.
9. Laboratory diagnosis of non- fermentative Gram negative bacilli.
10. Bacterial vaginosis.

KERALA UNIVERSITYOF HEALTH SCIENCES

FIRST YEAR M.Sc (MLT) - MICROBIOLOGY DEGREE EXAMINATION

MODEL QUESTIONS

PAPER - III MEDICAL PARASITOLOGY AND MYCOLOGY

Time: 3 Hours **Maximum marks: 100**

Answer all questions. Each question carries 10 marks
Draw diagrams wherever necessary

1. Preservation of fecal specimen for parasites.
2. Cultivation of Entamoeba histolytica.
3. Laboratory diagnosis of toxoplasmosis.
4. Tissue nematodes.
5. Serodiagnosis of malaria.
6. Fungal aetiology of mycetoma.
7. Selective media for fungi.
8. Identification of yeast.
9. Asexual conidiogenesis.
10. Chromomycosis.

KERALA UNIVERSITYOF HEALTH SCIENCES

FIRST YEAR M.Sc (MLT) - MICROBIOLOGY DEGREE EXAMINATION

MODEL QUESTIONS

PAPER - IV IMMUNOLOGY

Time: 3 Hours **Maximum marks: 100**

Answer all questions. Each question carries 10 marks
Draw diagrams wherever necessary

1. Principle of production of monoclonal antibodies.
2. Immunological memory.
3. Sub populations of T cells.
4. Macrophage migration inhibition test.
5. Adjuvants.
6. Counter current immune electrophoresis and its applications in bacteriology.
7. MHC molecule.
8. Theories of antibody synthesis.
9. Hypersensitivity reactions.
10. Current concepts of antigen presentation.

KERALA UNIVERSITYOF HEALTH SCIENCES

FIRST YEAR M.Sc (MLT) - MICROBIOLOGY DEGREE EXAMINATION

MODEL QUESTIONS

PAPER -V. MEDICAL VIROLOGY

Time: 3 Hours **Maximum marks: 100**

Answer all questions. Each question carries 10 marks
Draw diagrams wherever necessary

1. Viral inclusion bodies.
2. Tissue culture and its use in virology.
3. Live viral vaccines.
4. Pathogenesis and laboratory diagnosis of Rota virus.
5. H_1N_1 Influenza.
6. Transport and storage of samples for viral isolation.
7. Serodiagnosis of viral hepatitis.
8. Antiviral agents.
9. Epstein – Barr virus.
10. Immuno fluorescent techniques in viral diagnoses.

KERALA UNIVERSITYOF HEALTH SCIENCES

FIRST YEAR M.Sc (MLT) - MICROBIOLOGY DEGREE EXAMINATION

MODEL QUESTIONS

PAPER - VI APPLIED MEDICAL MICROBIOLOGY AND RECENT ADVANCES

Time: 3 Hours **Maximum marks: 100**

Answer all questions. Each question carries 10 marks
Draw diagrams wherever necessary

1. Biofilms.
2. E-test and its use.
3. Nosocomial infections.
4. Laboratory investigations to contain MRSA outbreak.
5. DNA probes and its diagnostic applications.
6. Automation in microbiology.
7. Monitoring of operation theatre sterility.
8. Restriction fragment length polymorphism.
9. COSMIDS.
10. Immuno blot assay.

QP Code: **Reg. No.:.....**

Second Year M.Sc MLT Degree Examination (Microbiology)

(Model Question Paper)

PAPER - V Medical Virology

Time: 3 hrs Maximum marks: 100

- ***Answer all questions***
- ***Draw diagrams wherever necessary***

Essays **(10x10=100)**

1. Viral inclusion bodies.
2. Tissue culture and its use in virology.
3. Live viral vaccines.
4. Pathogenesis and laboratory diagnosis of rota virus.
5. H1N1 Influenza.
6. Transport and storage of samples for viral isolation.
7. Serodiagnosis of viral hepatitis.
8. Antiviral agents.
9. Epstein – Barr virus.
10. Immuno fluorescent techniques in viral diagnoses.

QP Code: **Reg. No.:.....**

Second Year M.Sc MLT Degree Examination (Microbiology)

(Model Question Paper)

PAPER - VI Applied Medical Microbiology & Recent Advances

Time: 3 hrs Maximum marks: 100

- ***Answer all questions***
- ***Draw diagrams wherever necessary***

Essays **(10x10=100)**

1. Biofilms.
2. E-test and its use.
3. Nosocomial infections.
4. Laboratory investigations to contain MRSA outbreak.
5. DNA probes and its diagnostic applications.
6. Automation in microbiology.
7. Monitoring of operation theatre sterility.
8. Restriction fragment length polymorphism.
9. COSMIDS.
10. Immuno blot assay.

****

3.7 Internal assessment component

Internal assessment will be based on assessment examination, Projects, presentation of seminars, Tutorials, Journal Clubs and work assessment during clinical postings. In the case of candidates who fail in the University Examination, fresh internal assessment marks should be sent (without carrying over the previous marks), before each attempt of University examination. The minimum internal assessment marks required for appearing the University examination shall be 50%. The class average of internal assessment marks the whole class should not exceed 75% of maximum marks for regular examination and 80% for supplementary examination. The statement of internal assessment marks of all students in a year countersigned by the Head of department and forwarded to the University when required.

3.8 Details of practical/clinical practicum exams

As given under clause "Scheme of examination showing Minimum & Maximum marks"

3.9 Number of examiners needed (Internal & External) and their qualifications

External Examiners-

External Examiner should be a regular faculty member of the College/Department with MD / MSc (MLT) degree in the concerned subject having 5 years of teaching experience after acquiring Post graduate degree.

Internal Examiner-

Internal Examiner should be a regular faculty member of the College/Department with MSc (MLT) degree in the concerned subject having 5 years of teaching experience after acquiring Post graduate degree.

3.10 Details of viva:

As given under clause "Scheme of examination showing Minimum & Maximum marks"

4. INTERNSHIP

4.1 Eligibility for internship

The students shall do One year internship/service after successful completion of the course as per the Govt. norms.

4.2 Details of internship

Duration: The students shall do One year internship/service after successful completion of all the subjects.

Internship posting*:* Internship posting will be on rotation

Maintenance of records by students*:* A practical should be maintained

4.3 Model of Internship Mark lists

Internship completion certificate:

It will be decided by KUHS when the internship is implemented by the Govt.

Extension of internship: Internship shall be extended by the number of days the students remains absent. These extended days of Internship should be completed in the respective external/internal Institution. Any other leave other than eligible leave has to be compensated by extension granted by Principal.

4.4 Extension rules:

Any other leave other than eligible leave has to be compensated by extension granted by the Principal. However the course shall be completed within double the duration of the course.

4.5 Details of Training given

Tutorials in Lecture and practical classes

Regular clinical Laboratory practice to ensure practical skill in diagnostic investigations, laboratory responsibility, quality evaluations, managements and supervision.

Students should present seminars in various clinical subjects in medical laboratory technology to attain presentation skill.

5. ANNEXURES

5.1 Check Lists for Monitoring: Log Book, Seminar Assessment etc. to be formulated by the curriculum committee of the concerned Institution

5.2 Any detils which are not mentioned in the above will be decided by the KUHS after considering the KUHS ACT and Statues, Governing Council decisions, Guidelines of the respective Councils, the government and directives of the Hon'ble Courts.

KERALA UNIVERSITY OF HEALTH AND ALLIED SCIENCES MEDICAL COLLEGE

P.O., THRISSUR – 680 596

PROFORMA FOR RECOGNITION OF POST GRADUATE TEACHER

[Read the instructions carefully before filling up the proforma]

1	**NAME (in Block Letters)**
2	**DATE OF BIRTH:AGE** **(Attested copy of SSLC marks card / proof of date of birth to be enclosed)**
3	**PRESENT DESIGNATION:**
4	**DEPARTMENT:**
5	**ADDRESS:** **Phone (o) :** **Email: Hospital:**
6	**Present Residential** **Address**

6. QUALIFICATION:

(Attested Xerox copies of all the certificates to be enclosed)

Sl No.	Name of the Degree and Specialization	Year of Passing	Name of the college &Place	**Name of the University and Place**	Apex body recognition
UG					
PG					
Ph.D.					

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7. Teaching Experience

Designation	Name of the Institution	Duration of teaching		Subject / „s taught
		UG F T	PG F T	
Total teaching experience				
Total teaching experience		Before PG____After PG_____Total		

Note:

1. Only full time teaching in a teaching institution affiliated to KUHS / other A university established by law in India is considered as teaching experience.
2. Attested copies of appointment order, service certificate, promotion order & PG Degree, to be enclosed to claim teaching experience.
3. Application is to be submitted through proper channel.
4. The envelope should be super scribed as _Proforma for Recognition as Post Graduate Teacher„.
5. Any other relevant information: (Attach a separate sheet)

(Regarding additional qualifications, achievements, publications, awards etc.,)

Declaration by the Teacher

I hereby declare that the above information provided by me is true and correct. I shall take the sole responsibility f o r any wrong information provided and liable for any action taken by the university.

Place :

Date : Signature of the Teacher

Endorsement by the Principal

The information provided by the teacher is verified from the office records and found to be correct. He/She is eligible to be recognized as a PG teacher to guide the dissertation

work of PG students.

Place :

Date : Signature of the Principal

INSTRUCTIONS:

1. The Prescribed Performa must be duly filled by the applicant in his/her own handwriting and submitted to the university through the principal„s office.
2. The Principal should verify all the informations provided especially the date of birth, qualification, experience, and service details before sending the proforma to the university.
3. Ensure that attested copies of all relevant documents are furnished along with the application.
4. The Principal will be held responsible for any false information provided.
5. Incomplete and incorrect applications and applications with false information will be rejected and they are liable for disciplinary action by the university.

Annexure-II

KERALA UNIVERSITY OF HEALTH AND ALLIED SCIENCES MEDICAL COLLEGE P.O., THRISSUR – 680 596

POST GRADUATE DISSERTATION – PROFORMA TO BE SUBMITTED FOR CHANGE OF GUIDE

1. Particulars of Candidate, and Existing Guide

Candidate's Name & Address :

Name of the Institution :

Course of Study & Subject :

Date of Admission to Course :

Title of the Topic :

Name & Designation of Existing Guide :

Signature of the Candidate :

3.Particulars of proposed and Existing Guide

Name & Designation of proposed Guide :

Has the proposed guide been recognized as PG teacher by KUHS: Yes / No

If yes, please furnish the particulars of university letter & If No, Please send his/her proforma for recognition as PG teacher

Signature of the proposed Guide:

Name & Designation of Co-Guide if present: Signature of the Co-Guide: Endorsement for change of guide

1. Remarks and Signature of the HOD :

2. Specific Reason for change of Guide:

3. Remarks and Signature of the Principal:

5.3 Template for Dissertation

Standard format of dissertation

The written text of dissertation shall not be less than 100 pages and shall not exceed 150 pages excluding references, tables, questionnaires and annexure. It should be neatly typed (font size 12 – Time New Roman or font size 123 Arial) in double line spacing on one side of the bond paper (A-4 Size) and bound properly. The Guide and the head of the institution shall certify the dissertation.

The dissertation should be written under the following headings:

(1) Introduction

(2) Objective of study

(3) Review of Literature

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(4) Methodology

(5) Analysis and Interpretation

(6) Results

(7) Discussion

(8) Conclusion

(9) Summary

(10) Reference

(11) Appendices

Proforma for Submission of M. Sc (MLT) Dissertation Proposal/ Synopsis

1. Name & Address of Student:

2. Email ID of the Student:

3. Registration Number:

4. Name & Address of Recognized Institution:

5. Title of the Dissertation:

6. Name of the Guide:

7. Address, phone number and E-mail ID of the Guide:

8. Educational Qualification of the Guide:

9. Experience of teacher in guiding postgraduate students. (in years):

10. Name of the Co-Guide:

11. Address, phone number and E-mail ID of the Co-Guide:

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12. Educational Qualification of the Co-Guide:

13. Synopsis of the study: Attached – Yes/No

Date: Signature of the Guide

Enclosures:

I.) Bio- Data of the Guide

II.) Synopsis of the study (maximum 4-6 pages)

Proposal/Synopsis Outline

1. Title
2. Background /significance of the problem.
3. Purpose of the study
4. Statement of the problem
5. Objectives of the study
6. Operational Definitions
7. Conceptual Framework
8. Assumptions/ Hypotheses
9. Research Methodology
    a) Research Approach
    b) Research Design
    c) Setting
    d) Population, Sample & Sampling Technique
    e) Tools & Technique
    f) Pilot Study
    g) Plan for data collection
    h) Plan for data analysis
10. Work Plan
11. Budget

12. Ethical Considerations

13. References

14. Appendices

Guidelines in writing synopsis

1. The research protocol should be of about 1200 words (4-6 pages of A4 size) on the topic. The research protocol should be submitted with a covering letter signed by the candidate and guide.
2. The work on and writing of protocol/ dissertation should be done under the Guide approved by the University.
3. The guide must be as per University norms.
4. The synopsis should be signed by the candidate and forwarded through the Guide, Departmental head and Principal of the Institution.

Format for the submission of Dissertation Hard &Soft copy

Instructions to candidates

Although your dissertation may be prepared on a computer, consider the following requirements for meeting the standards.

Paper

Use only one side of high-quality, plain white (unlined in any way) bond paper, minimum 20-lb weight, and 8 ½ || x 11|| in size. Erasable paper should not be used.

Type Size and Print

Select fonts type Times New Roman and a size of 12 characters. The size of the titles should be 14 and Bold, the size of subtitles should be 12 and bold. Print should be letter quality or laser (not dot matrix) printing with dark black characters that are consistently clear and dense. Use the same type of print and print size throughout the document.

Pagination

Number all of the pages of your document, including not only the principal text, but also all plates, tables, diagrams, maps, and so on. Roman numerals are used on the preliminary pages (pages up to the first page of text) and Arabic numerals are used on the text pages. The numbers

themselves can be placed anywhere on the page, however they should be consistent.

Spacing

Use double spacing except for long quotations and footnotes which are single-

Margins

To allow for binding, the left-hand margin must be 1.5‖. Other margins should be 1.0‖. Diagrams or photographs in any form should be a standard page size, or if larger, folded so that a free left-hand margin of 1.5‖ remains and the folded sheet is not larger than the standard page.

Photographs

Professional quality black-and-white photographs are necessary for clear reproduction. Colors are allowed, but you should be certain the colored figure will copy clearly and will not be confusing when printed in black and white.

FILE FORMAT

Dissertation format should be in .Doc (Ms Word Document) or PDF (Portable Document Format), Image files in JPG or TIFF format and Audio Visual in AVI (Audio Video Interleave), GIF, MPEG (moving picture expert) files format.

Labeling on CD

CD-ROM Labeling should be standard and should contain title, name of the candidate, degree name, subject name, guide name, name of the department, college, place and year.

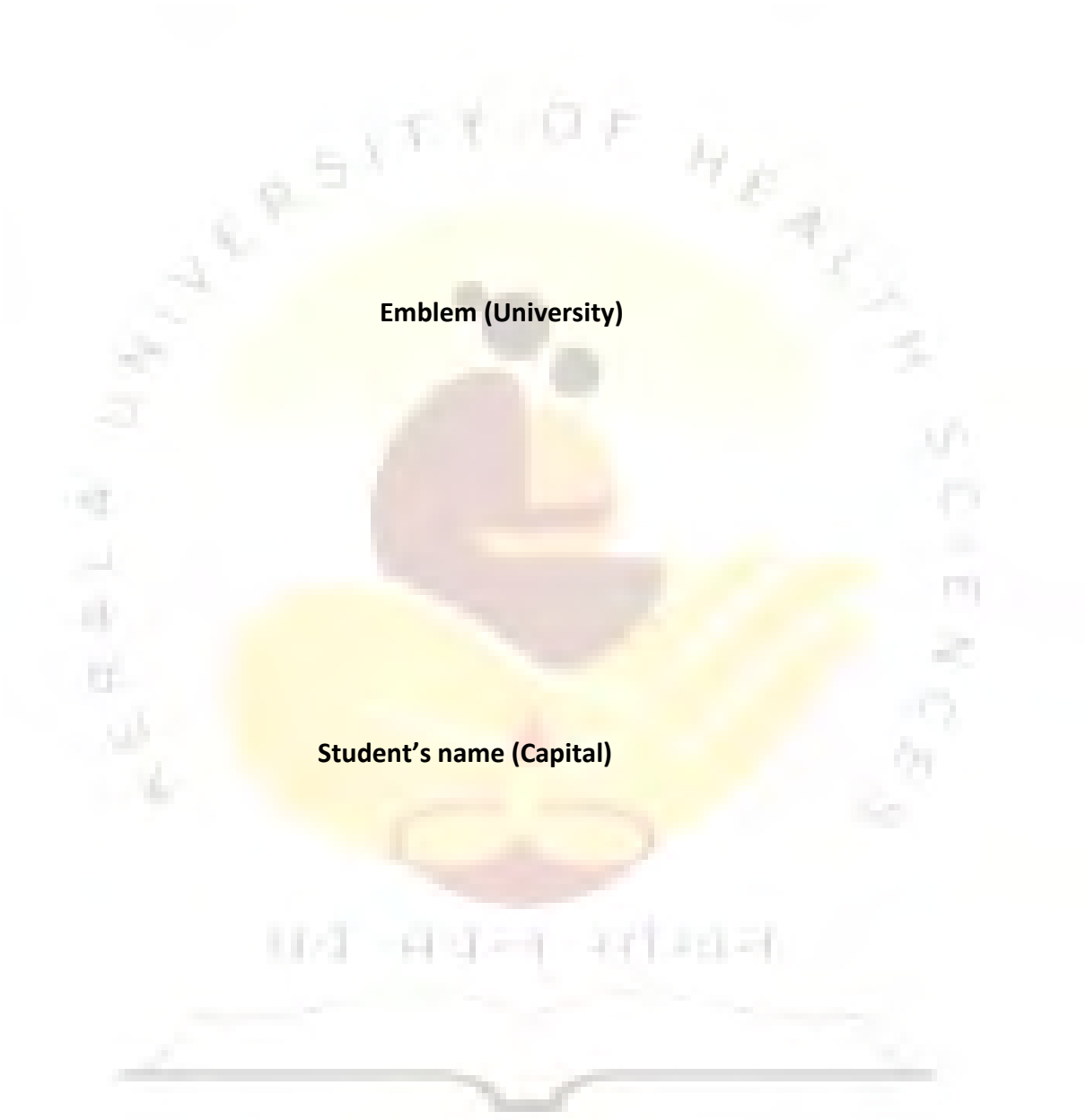
References

Vancouver style format.

GUIDELINES OF DISSERTATIONS FOR M.Sc (MLT) DEGREE

Title (Capital)

Emblem (University)



Student's name (Capital)

Name of the College

DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN MEDICAL LABORATORY TECHNOLOGY KERALA UNIVERSITY OF HEALTH SCIENCES

Year

<----------Title---------->

by

Name of the Candidate

Dissertation Submitted to the

KERALA UNIVERSITY OF HEALTH AND ALLIED SCIENCES THRISSUR

Inpartialfulfillment

of the requirements for the degree

of Degree

Name

in Subject

Name

Under the guidance of

Name of the Guide

Name of the Department

Name of the College Place

Year

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation/thesis entitled -<----------Title-

---------->" is a bonafide and genuine research work carried out by me under the guidance of **Name & designation of the Guide**.

Signature of the candidate

Place:

Date :

☆

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled –<----------Title---------

----------> -is a bonafide research work done by **Name of the Candidate** in partial fulfillment of the requirement for the degree of **Degree Name**.

Signature of the Guide

Place

Date : Name and Designation

☆

ENDORSEMENT BY THE HOD, PRINCIPAL/HEAD OF THE INSTITUTION

This is to certify that the dissertation entitled ----------Title---------

---------- -is a bonafide research work done by **Name of the Candidate** partial fulfillment of the requirement for the degree of **Degree Name**.

Seal & Signature of the HOD

Seal & Signature of the Principal

Name

Name

Place:

Place:

Date:

Date:

☆

COPYRIGHT

Declaration by the Candidate

I hereby declare that the Kerala University of Health and Allied Sciences, Kerala shall have the rights to preserve, use and disseminate this dissertation in print or electronic format for academic / research purpose.

Date : **Signature of the candidate**

Place: **Name**

ACKNOWLEDGMENT

Not lengthy. Avoid Superlatives.

Signature of the Candidate

Place:

Date **Name**

ABSTRACT

(Include problems and objectives, methodology, results, interpretation and conclusion in a single paragraph limited to 250-300 words)

Keywords

(Max. 10)

Keywords shall be chosen from reference Books and Text Books (Each keyword should be separated by semicolon)

TABLE OF CONTENTS

LIST OF TABLES

(14 size bold)

Sl.No	Tables	Pages
1.		
2.		

LIST OF FIGURES

(14 size bold)

Sl.No	Figures	Pages
1.		
2.		

LIST OF APPENDICES

(14 size bold)

Sl.No Figures Pages

1.

2.

CHAPTER 1

1. **INTRODUCTION** (14 size bold)
2. **OBJECTIVES**
3. **REVIEW OF LITERATURE**
4. **METHODOLOGY**
5. **RESULTS**
6. **DISCUSSION**
7. **CONCLUSION**
8. **SUMMARY**
9. **REFERENCES**
10. **ANNEXURES**

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CHAPTER I

Introduction (14 sizes, Bold)

Sub Headings (12 size, bold)

Background of the problem

Need and significance of the study

Statement of the problem

Objectives

Operational definitions

Assumptions (if any)

Hypothesis (write research hypothesis)

Conceptual/theoretical frame work

CHAPTER.2 (14 sizes, bold)

Review of literature

Subheading of the literature reviewed (12 size, bold)

Summary (of reviewed literature at the end)

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CHAPTER 3 (14 SIZE, BOLD)

Methodology

Research approach

Research design

Variables

Schematic representation of the study

Setting of the study

Population

Sample and sampling technique

Inclusion criteria Exclusion criteria

Tool/instruments

Development/selection of the tool

Description of the tool

Content validity

Reliability of the tool

Pilot study

Data collection process

Plan for data analysis

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CHAPTER 4 (14 SIZE, BOLD)

Analysis and interpretation

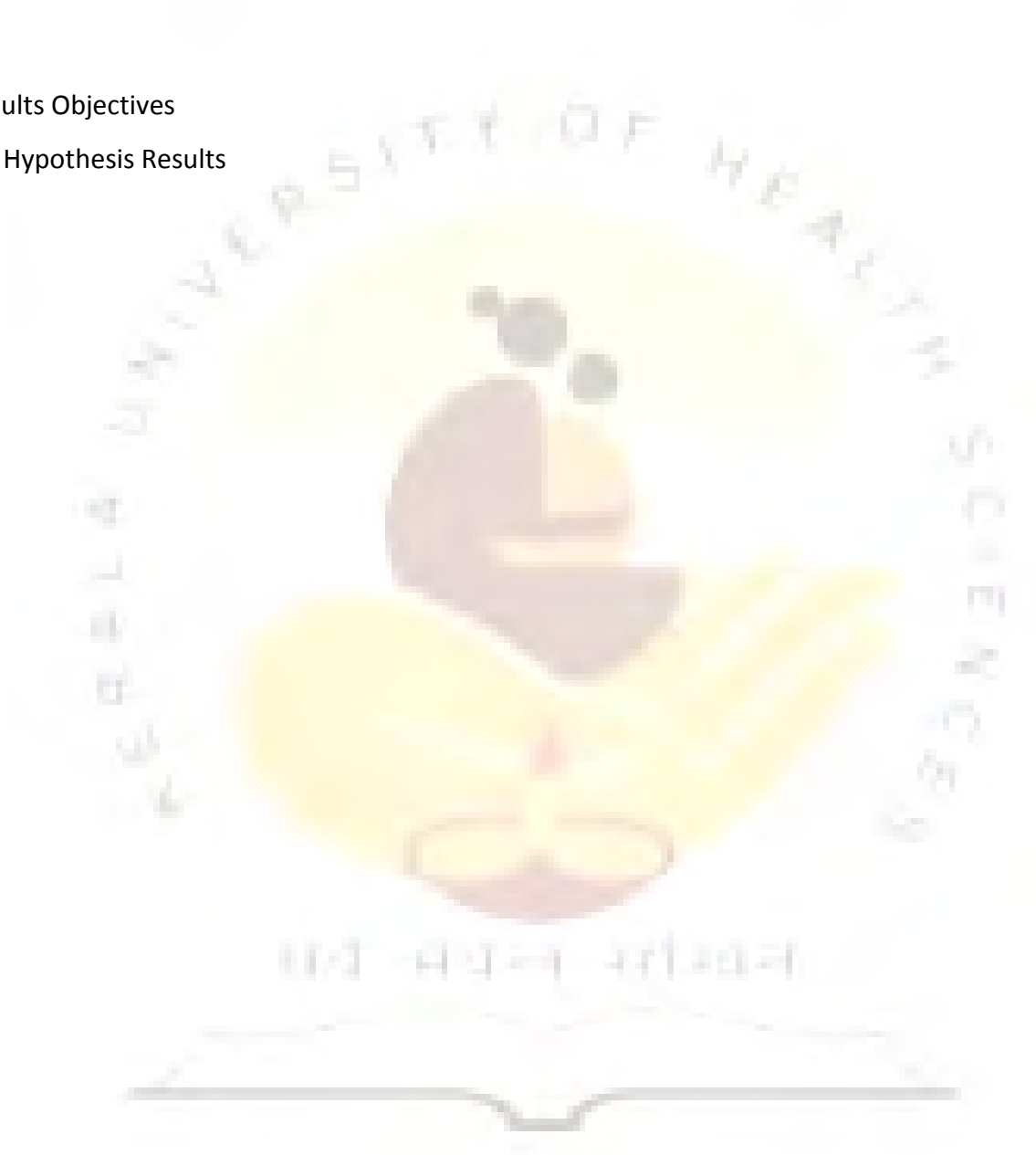
Section title

(Section wise presentation of data)

CHAPTER 5 (14 SIZE, BOLD)

Results Objectives

Hypothesis Results



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CHAPTER 6 (14 SIZE, BOLD)

Discussion, summary and conclusion

Discussion

Summary Conclusion

Implications

Limitations

Recommendations

DISSERTATION STYLE: Vancouver style format is used

Citations in the text

General rules:

1. References are numbered consecutively in the order in which it is cited in the text. Place each reference number in parentheses e.g. (5) or as superscripts Eg. …….was discovered [1.3] throughout the text, and tables. Use Arabic numerals in parentheses e.g. (5) for in-text citation; the number in parentheses links directly to the reference list at the end of the work. If the same reference is used again, re-use the original number. Either square { } or curved brackets () can be used as long as it is consistent.
2. Superscripts Number should be inserted to the left or colons and semi colons. Full stops are placed either before or after the reference number e.g…….. was discovered [1.3] or was discovered [1.3] .

3. Direct quotes are to be used very carefully. If a direct quote is necessary, place quotation marks around the quote and number the reference as usual.

4. Personal communication used as a reference should be avoided, unless it provides essential information not available from a public source. Do not number this type of reference; instead cite the name of the person and date of communication in parentheses in the text.

5. When multiple reference are cited at a given place in a text, use a hyphen to join the first and last numbers that are inclusive, e.g (6-8). Use commas to separate non-inclusive numbers e.g (2,3,4,5,7,9) is abbreviated to (2-5,7,9)
6. The same number is used for a source throughout a paper. This number is determined by the first citation of the source. So, for example, if a work is the fourth source cited in a paper, it will be referred to as (4) or by the superscript number 4 throughout that paper.
7. Whatever format is chosen, it is important that the punctuation is consistently applied to the whole document.

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Tables

Tables must be self-explanatory. The data must be clearly organized and should supplement and not duplicate the text. Data may be presented either in a table or pictorial form. Do not use internal horizontal or vertical lines. Explanatory matter should be given as footnotes. Statistical analysis used must be appropriate. Confidence intervals along with exact probability values must be stated for the results. Round decimals in two digits. Each table must have a title and should be numbered with Arabic numerical e.g. (1, 2) .Type or print each table with double spacing on a separate sheet of paper. Number tables consecutively in the order of their first citation in the text and supply a brief title for each. Give each column a short or an abbreviated heading. Explain all nonstandard abbreviations in footnotes. Table should not be carried over to the next page.

Example for a table

Table 18

Distribution of isolates according to Anti-fungal susceptibility pattern

Isolates	Sensitive	Resistant	Total
C.albicans	37	10(21.3%)	47
C.tropicalis	16	7(30.43%)	23
C.glabrata	9	10(52.63%)	19
C.parapsilosis	8	3(27.27%)	11

Illustrations and figures

Number each figure in the text in consecutive order

Abbreviations and symbols

Use only standard abbreviations; use of non-standard abbreviations can be confusing to readers. Avoid abbreviations in the title of the manuscripts. The Spelled-out abbreviation followed by the abbreviation in parenthesis should be used on first mention unless the abbreviation is a standard unit of measurement.

Abstract

Abstract provides a brief summary of the dissertation/thesis, summing up clearly the problem examined, the methods used, and the main findings. The abstract is a one-

paragraph, self- contained summary of the most important elements of the paper. The abstract word limit is between 250 and 300 words. All numbers in the abstract (except those beginning a sentence) should be typed as digits rather than words. Key words (max.10) should be given, chosen from subject concerned headings. Each word should be separated by semicolon.

References

- The reference list should appear at the end of the paper and provide the full bibliographic information about the sources cited.

- List all reference in order by number, not alphabetically. Each reference is listed once only, since the same number is used throughout the paper. It should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in text and tables by Arabic numerals in parentheses.

- The titles of journals should be abbreviated according to the style used in the list of journals. The following information is included for journal articles: author(s), article title, abbreviated journal title, year, month(if applicable), day, volume number, issue number(if applicable), page numbers. For books author (s), title, Edition, place of publication, publisher and year.

- List each author's last name and initials; full first names are not included. List all authors, but if the number exceeds six, give the first six followed by "et al").

- For books with chapters written by individuals authors, list the authors of the chapter first, then the chapter title, followed by "In:" the editors "names, and the booktitle.

- Initials follow the family names of authors and editors, with no space or full stops between the initials of an author, e.g. Halpern SD, Ubel PA, Caplan AL.

- Commas are used to separate each author's name. Note that "and" is not used to separate the last two names.

- Minimal capitalization is used for the article title, ie only the first word and words that normally would begin with a capital letter are capitalized.

- Full stops are used after the last authors initials, after the article title, after the abbreviated journal title and at the end of the entry.

  Gerald Collee J,Andrew G Fraser,Barrie P Marmion,Anthony simmons. Mackie&Maccartney Practical medical microbiology.Newyork:Churchil Livingstone;1996.

- The date is followed by a semicolon (with no space after it) and the volume number or issue number is followed by a colon (with no space after it)

  Mardani M,Hanna HA,Girgawy,Raad I.Nosocomial candida guilliermondi fungemia in cancer patients.Infect control Hosp epidemiol.2000;21:336-337.

Reference: Examples

Book (one author)

John Bernad Hendry .Clinical diagnosis and management by Laboratory methods.19 th ed. Philadelphia:W B Saunders;1996.

Book (two or more authers)

Betty A Forbes, Daniel F Sahm,Alice S.Weissfeld.Bailey & sciott‟s Diagnostic Microbiology. 10th ed.Mosby: Elsevier;2007.

Chapter in edited book

Leslie Collier, Albert BalowsMax sussman.Microbiology and microbial infections.In:Virology. Brain W J Mahy, Leslie Collier, editors. The immune response to viral infections. New York: Arnold; 1998.p173-192.

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Journals

- List up to the first 6 Authors;1-6 – authors:Eg: Growther RA,Kiselev NA.Three diamontional structure of Hepatitis B virus core particles determined by electron cryomicroscopy.J Bio chem. cell. 1994; 77: 943-50
- If the article has more than 6 authors, list the first six, followed by et al. Give the first six names in full and add "et al". The authors are listed in the order in which they appear on the title page.
- If the journal carries continuous pagination throughout a volume, the month and or issue number may be omitted.
- Halpern SD Ubel PA,Caplan AL.Solid-organ transplantation in HIV infected patients.N Engl J Med.2002;347:284-87.

Journal article on the internet:

Sun Ah Lee, Jimin Kahng, Yonggoo Kim, Yeon-Joon Park, Kyungja Han, Seung-Ki Kwok.et al. Comparative Study of Immunofluorescent Antinuclear Antibody Test and Line Immunoassay Detecting 15 Specific Autoantibodies in Patients With Systemic Rheumatic Disease.J CLA.2012. July 26(4) p. 307–314[cited 2012 July 18].available from: http://onlinelibrary.wiley.com/doi/10.1002/jcla.2012.26.issue-4/issuetoc

Books on the internet

Joel D Hubbard.A concise review of clinical laboratory science .2nd ed.Philadelphia : Wolters Kluwer Health/Lippincott Williams & Wilkins;c2010.Available from: http://www.docin.com/p- 294624555.html.

General principles

Paper

Use only one side of high quality, plain white (unlined in any way) bond paper, minimum 20-lb weight, and 8 ½ " x 11" in size. Erasable paper should not be used.

Type size and print

The fond size should be visible to the reader, preferably Times New Roman 12 pt .No italicization.

☆

Size of the title should be 14 and bold,the size of sub-title should be 12 and bold. Print should be letter quality or laser (not dot matrix) printing with dark black characters that are consistently clear and dense. Use the same type of print and print size throughout the document.

Pagination

Number all of the pages of your document, including not only the principal text, but also all plates, tables, diagrams, maps and so on. Romam numerals are used on the preliminary pages (pages up to the first page of text) and Arabic numerals are used on the text pages. The numbers themselves can be placed anywhere on the page, however they should be consistent.

Spacing

Use double spacing except for long quotations and foot notes which are single spaced.

Margins

Margin size; "generous"- Use plenty of room on the top,bottom,left&right(1"minimum).

To allow for binding, the left hand margin must be 1.5". other margin should be 1.0". Diagrams or photographs in any form should be a standard page size, or if larger, folded so that a free left- hand margin of 1.5" remains and the folded sheet is not larger than the standard page.

Photographs

Professional quality black-and-white photographs are necessary for clear reproduction.colors are allowed,but you should be certain the colored figure will copy clearly and will not be confusing when printed in black and white.

File Format

Dissertation format should be in Doc (Ms word document) or PDF(portable document fomat),Image file in JPG or TIFF format and audio visual in AVI(Audio Video Interleave),GIF,MPEG (moving picture expert) files format.

Labeling on CD

CD-ROM labeling should be standard and should contain title, Name of the candidate, degree name, subject name, Guide name, name of the department, College, place and year

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3.3 Template for Mark List showing Maximum & Minimum

First Year M.Sc. MLT Microbiology Exam

Sl.No.	Subject		Theory			Practical			Total			Result
	Paper		Max	Min	Awarded	Max	Min	Awarded	Max	Min	Awarded	
1	General Microbiology	IA	50	20		-	-	-	150	75		
		University	100	50		-	-	-				
		Viva	-	-		-	-	-				
		Group Total	150	75		-	-	-				
2	Systematic And Diagnostic Bacteriology	IA	50	20		-	-	-	150	75		
		University	100	50		-	-	-				
		Viva	-	-		-	-	-				
		Group Total	150	75		-	-	-				

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3	Medical Parasitology And Mycology	IA	50	20		-	-	-	150	75		
		University	100	50		-	-	-				
		Viva	-	-		-	-	-				
		Group Total	150	75		-	-	-				
4	Immunology	IA	50	20		-	-	-	150	75		
		University	100	50		-	-	-				
		Viva	-	-		-	-	-				
		Group Total	150	75		-	-	-				
5	Microbiology Practical	IA	-	-	-	50	20		400	200		
		University	-	-	-	300	150					
		Viva	-	-	-	50	-					

		Group Total	-	-	-	400	200					
Grand Total									**1000**	**500**		
(Grand Total in Words)												

Second Year M.Sc. MLT Microbiology Exam

Sl.No.	**Subjects**		**Theory**			**Practical**			**Total**			**Result**
	Paper		Max	Min	Awarded	Max	Min	Awarded	Max	Min	Awarded	
1	Medical Virology	IA	50	20		-	-	-	150	75		
		University	100	50		-	-	-				
		Viva	-	-		-	-	-				
		Group Total	150	75		-	-	-				
2	Applied Medical Microbiology and Recent Advances	IA	50	20		-	-	-	150	75		
		University	100	50		-	-	-				
		Viva	-	-		-	-	-				

		Group Total	150	75		-	-	-				
3	Microbiology - Practical	IA	-	-	-	50	20		300	150		
		University	-	-	-	200	100					
		Viva	-	-	-	50	-					
		Group Total	-	-	-	300	150					
4	Dissertation	IA	-	-	-	50	-		400	200		
		University	-	-	-	350	-					
		Viva	-	-	-	-	-	-				
		Group Total	-	-	-	400	200					
GRAND TOTAL									**1000**	**500**		
(Grand Total in Words)												