



MALWANCHAL UNIVERSITY, INDORE

**Curriculum implemented by statutory body (M.P. PARAMEDICAL COUNCIL) for
MSc (MMLT) Master in Medical Laboratory Technology**

Programme name: - MSc (MMLT) Master in Medical Laboratory Technology

Programme name	Programme code
MSc (MMLT HAEMATOLOGY)	MUPP-12HA
MSc (MMLT MICROBIOLOGY)	MUPP-12MB
MSc (MMLT BIOCHEMISTRY)	MUPP-12BC
MSc (MMLT HISTOPATHOLOGY)	MUPP-12HP

SYLLABUS & SCHEME OF EXAMINATION

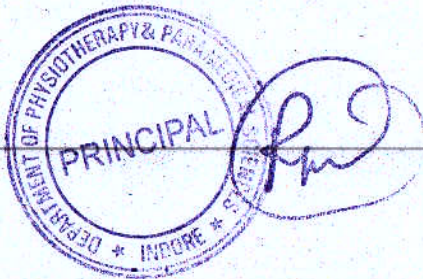
**MASTER OF MEDICAL LAB.
TECHNOLOGY**

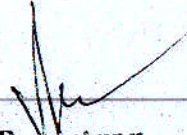
(M.M.L.T 1st Year)

2 YEAR POST-GRADUATION PROGRAM

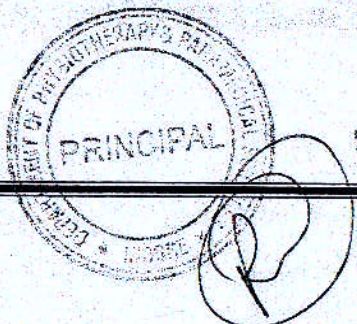
BRANCHES

**(Medical Histopathology, Medical Microbiology, Medical
Biochemistry, Haematology Branches)**




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(AR. Academics)

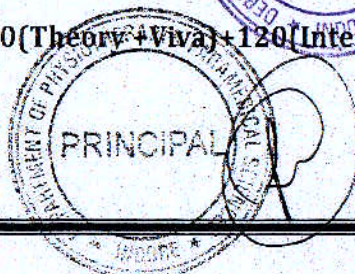
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SYLLABUS & SCHEME OF EXAMINATION FOR MMLT 1st Year
Branch-Medical Haematology, Medical Histopathology, Medical
Microbiology, Medical Biochemistry

SCHEME OF EXAMINATION

MMLT 1 st : Internal Exam (Institutional Exam)						
S.No.	SUBJECT	Theory	Viva	Int. Ass.	Practical	Total
1.	Medical Haematology ✓ (Review of the introduction and basic aspects)	80	40	20	60	200
2.	Medical Histopathology ✓ (Review of the introduction and basic aspects)	80	40	20	60	200
3.	Medical Microbiology ✓ (Review of the introduction and basic aspects)	80	40	20	60	200
4.	Medical Biochemistry ✓ (Review of the introduction and basic aspects)	80	40	20	60	200
5.	Molecular Biology & Applied genetics	80	--	20	--	100
6.	Instrumentation, Biostatistics & Clinical Pathology Instrumentation	80	--	20	--	100
Total		640		120	240	1000

Total-640(Theory+Viva)+120(Internal Assessment)+240(Practical)=1000



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SYLLABUS FOR MMLT-1ST YEAR

Branch:-Medical Haematology, Medical Histopathology, Medical Microbiology, Medical Biochemistry

PAPER-I: MEDICAL HAEMATOLOGY SCHEME OF EXAMINATION

Time: 3.00 Hrs

Max. Marks: 100

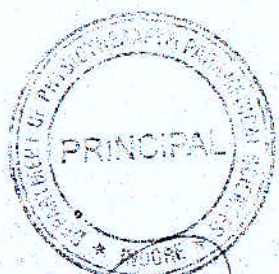
Subject	Max. Marks	Minimum Passing Marks
Medical Haematology	200	100

INSTRUCTION FOR THE PAPER SETTER

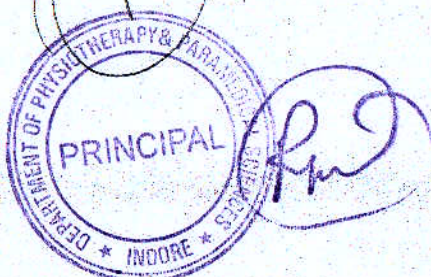
The pattern of theory examination will be as under for 80 Max. Marks.

Type of Question	Marks for each question	Total Max. Marks
Essay Type	3 (Any 3 Out of 4)	20X3=60
Short Answer Type	4 (Any 4 Out of 5)	5X4=20

INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.



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MMLT – I Year
Paper - I
MEDICAL HAEMATOLOGY

(REVIEW OF THE INTRODUCTION AND BASIC ASPECTS)

Introduction to Basic Haematology

a) Haematopoietic,

- Physiological Aspects,
- Morphological Aspects, and
- Biochemical Aspects

b) Blood and Its Constituents,

- Erythrocytes,
- Leukocytes,
- Thrombocytes,
- Haemoglobin,
- Iron metabolism,
- Various Haemoglobin and its various derivatives.


Haematological Disorders

a) Erythrocyte Disorder with Its Laboratory Diagnosis,

- Anemia - Definition with Classification,
- Morphologic- Microcytic, Hypochromic, Macrocytic Anemia,
- Iron Deficiency Anemia,
- Hemolytic Anemia,
- Aplastic Anemia,
- Pernicious Anemia,
- Sideroblastic Anemia,
- Anemia of Chronic Renal Insufficiency,
- Hereditary Spherocytosis,
- Hereditary Elliptocytosis,
- Sickle Cell anemia,
- Hemolytic Disease of The Newborn.

b) Leukocyte Disorders with Its Laboratory Diagnosis,

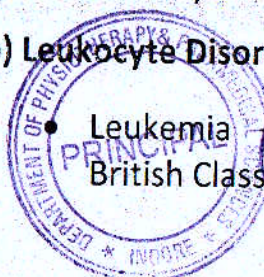
- Leukemia - Definition with Classification (FAB–French American British Classification)


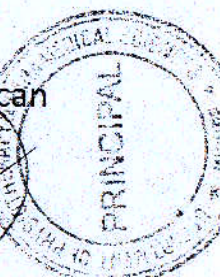

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c) Thrombocyte Disorder With Its Laboratory Diagnosis,

- Perpura's Disease,

d) Abnormal Haemoglobin and Related Disorders,

- Thalassemia,

e) Polycythemia.

Clinical Haematology Laboratory and Haematological Investigation,

a) The Haematology Laboratory,

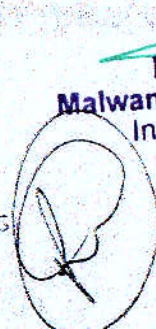
b) Basic Requirment and Glassware,

c) Collection and Handling Of Blood,

d) Anticoagulants,

e) Routine Haematological Investigation,

- Study Of Blood Smear for Differential Leukocyte Count, Staining Method and Cell Morphology,
- Determination Of Haemoglobin By Sahli's Method,
- Determination Of Haemoglobin by Cyanmethemoglobin Method,
- Total Blood Cell Count –TRBC, AEC, TLC, Total Platelet Count, Reticulocyte count,
- Differential Leukocyte Count – Normal and Abnormal Level With Clinical Significance,
- Study Of Blood films of Leukemia – CLL, ALL, AML, AL,
- Study of Morphology Of RBC – Normal, Abnormal And P.S. Comment,
- Determination Of ESR By Various Method,
- Determination Of PCV By Various method,
- Determination Of Erythrocyte indices,
- Blood Parasitic – Malaria Parasite,
- Determination Of Bleeding Time,
- Determination of Clotting Time,
- Determination Of PT,
- Determination Of Clot Retraction,
- Determination Of Blood Group And Rh Typing – Slide And Tube Method.



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f) Special Haematological Investigation,

- Screening of Sickle Cell Anemia,
- Determination of Fetal Haemoglobin,
- Determination of Osmotic Fragility of Red Blood Cell, NESTROF test (Naked Eye Single Tube Red Cell Osmotic Fragility Test),
- Coombs Test – Direct And Indirect Method,
- The Compatibility test (The Cross Matching) By Saline-Tube Method,
- Antiglobulin (Coomb's) Cross Matching,
- Quantitative Determination Of Anti-D Antibody titer,
- Collection Of Blood From The Donor,
- Determination Of Glucose-6-Phosphate Dehydrogenase.

Bone Marrow,

- Study of Normal Bone Marrow,
- Bone Marrow Aspiration Technique.

Hemostasis, Coagulation And Coagulation Study,

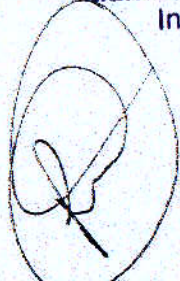
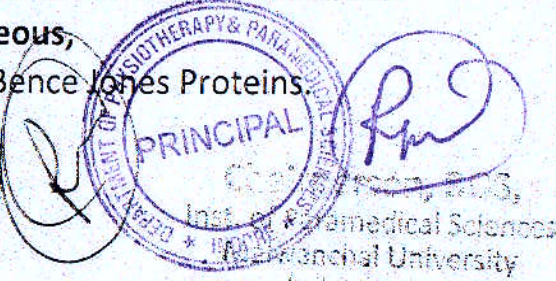
- General Consideration,
- Mechanism Of Coagulation,
- Inhibitors of Coagulation Factors,
- Blood Coagulation,
- Routine Coagulation Test,
- Congenital Deficiencies Of Hemostatic Factors,
- Other Clinical Condition Affecting Hemostasis (Liver Diseases),
- Diagnosis Of Bleeding Disorders,
- Routine Hemorrhagic Disorders Test,
- Disseminated Intravascular Coagulation (DIC),
- Liver Disease.

Immunohaematology and Blood Banking Technique,

- Introduction, History, Discovery To Blood Group System,
- Organization, Operation, And Administration Of Blood Bank,
- Types Of Glassware And cleaning Of Glassware Used In Blood Banking,
- Human Blood Group Systems,
- Inheritance Of Blood Group System Genetics,
- Donor Selection And Component Preparation,
- Antibody Detection And Identification,
- Blood Transfusion Reaction.

Miscellaneous,

- Bence Jones Proteins.



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SYLLABUS FOR MMLT-1ST YEAR

Branch:-Medical Haematology, Medical Histopathology, Medical Microbiology, Medical Biochemistry

**PAPER-II: MEDICAL HISTOPATHOLOGY
SCHEME OF EXAMINATION**

Time: 3.00 Hrs

Max. Marks: 100

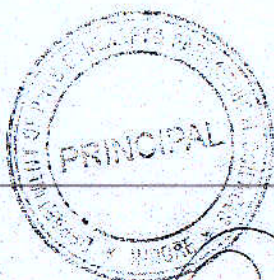
Subject	Max. Marks	Minimum Passing Marks
Medical Histology	200	100

INSTRUCTION FOR THE PAPER SETTER

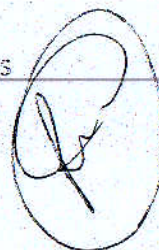
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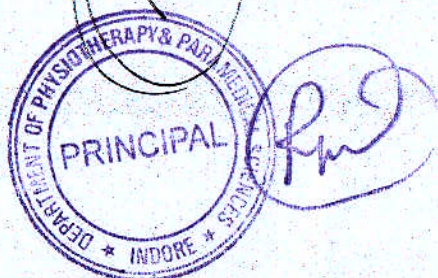
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MMLT – I Year

Paper - II

MEDICAL HISTOPATHOLOGY

(REVIEW OF THE INTRODUCTION AND BASIC ASPECTS)

Managing the Laboratory,

- Introduction,
- Risk management,
- Quality management.

Safety in the Laboratory,

- Risk management,
- Control of chemicals hazardous to health and the environment,
- Control of physical hazards from equipment,
- Hazards and handling of common histological chemicals.

Basic Histopathology Techniques and the Laboratory Requirements

- Histopathology and cytology techniques,
- Introduction,
- Laboratory requirements,
- Preparation of 70% (v/v) alcohol (200ml) from commercially available ethyl alcohol,
- Equipments and instruments,
- Histopathological techniques,
- Cell division ,
- Method of examination of tissues and cells,
- Various methods of preparation of tissue sections,
- Fixation,
- Reagents employed as fixatives,
- Various types of fixatives,

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- Decalcification,
 - Gross examination and fixation of the specimen,
 - Decalcification of the calcified tissue,
 - Processing of tissue by manual method,
 - Tissue processing by using an automatic tissue processor,
 - Sharpening of the microtome knife,
 - Section cutting of paraffin wax embedded tissue,
-
- To fix the sections on the slides.

Fixation and Fixatives,

- Introduction,
- Theoretical aspects of fixation,
- Main factors involved in fixation,
- Practical aspects of fixation.

Tissue Processing and Microtomy,

- Introduction,
- Principles of tissue processing,
- Dehydration,
- Clearing,
- Paraffin wax,
- Automated tissue processing,
- Manual tissue processing,
- Alternative embedding media,
- Microtomy,
- Paraffin section cutting.
-

Routine Staining Procedures and Frozen Section Techniques

- General consideration,
- Staining of tissue section by using hematoxylin and eosin staining method,
- Staining of the connective tissue,

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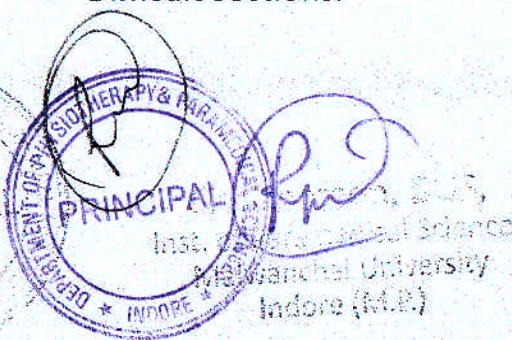
- Staining of the section for reticulin by silver nitrate method,
 - Staining of the section for elastic fibers,
 - Staining and identification of the various types of carbohydrates (polysaccharides and mucopolysaccharides),
 - Staining and identification of amyloids,
 - Staining of the sections for hemosiderin (a tissue pigment),
 - Staining of the section for calcium,
-
- Gram staining of bacteria,
 - Acid fast staining of bacteria,
 - Weak acid fast staining.

Theory of Staining and Its Practical Implications,

- Introduction,
- A general theory of staining,
- Some dyestuff properties,
- Problem avoidance and troubleshooting.

The Hematoxylin and Eosin,

- Introduction,
- Alum hematoxylin,
- Iron hematoxylin,
- Tungsten hematoxylin,
- Molybdenum hematoxylin,
- Lead hematoxylin,
- Hematoxylin without a mordant,
- Quality control in routine H & E staining,
- Staining H & E for photomicrography,
- Difficult sections.



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Bone,

- Normal bone,
- Bone techniques,
- Processing decalcified bone
- Preparation of mineralized bone,
- Morphometry of bone,
- Teeth.

Light Microscopy,

- Light and its properties,
- Image quality,
- The components of a microscope,
- Magnification and illumination,
- Phase contrast microscopy,
- Interference microscopy,
- Polarized light microscopy,
- Fluorescence microscopy,
- Use of the microscope,
- Setting up the microscope.

Cytological Techniques

- General consideration,
- Staining of the cellular components in smears of exfoliated cells by Papanicolaou method,
- Crysyl violet staining in exfoliative gynecologic cytology,
- Differentiation between normal and abnormal cells.

Diagnostic Cytopathology Specimen Collection and Preparations,

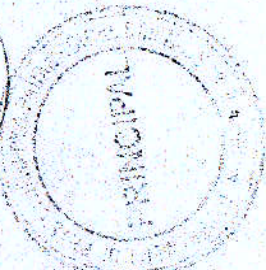
- Introduction,
- Cytological preparation,
- Cytological fixatives,
- Specimen preparation,
- Special techniques.

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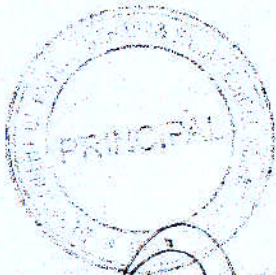


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Diagnostic Cytopathology Cell Appearances,

- Anatomy and Histology,
- Cytological smears,
- Satisfactory smears,
- Infection and Inflammation,
- Specific infections,
- Squamous Metaplasia, Cervical, Intraepithelial Neoplasia and Invasive Carcinoma,
- Borderline Nuclear Changes,
- Terminology and reporting,
- Non-Gynecological Cytology,
- Cerebrospinal Fluid.



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MALWANCHAL UNIVERSITY, INDORE-M.P.

SYLLABUS FOR MMLT-1ST YEAR

Branch:-Medical Haematology, Medical Histopathology, Medical Microbiology, Medical Biochemistry

**PAPER-III: MEDICAL MICROBIOLOGY
SCHEME OF EXAMINATION**

Time: 3.00 Hrs

Max. Marks: 100

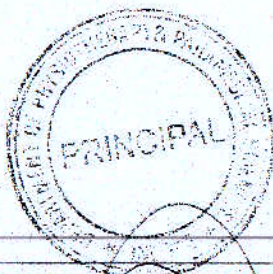
Subject	Max. Marks	Minimum Passing Marks
Medical Haematology	200	100

INSTRUCTION FOR THE PAPER SETTER

The pattern of theory examination will be as under for 80 Max. Marks.

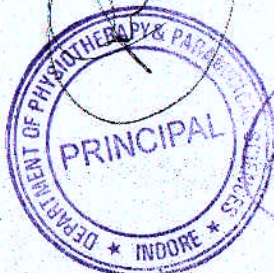
Type of Question	Marks for each question	Total Max. Marks
Essay Type	3 (Any 3 Out of 4)	20X3=60
Short Answer Type	4 (Any 4 Out of 5)	5X4=20

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MMLT -I Year

Paper – III

MEDICAL MICROBIOLOGY

(REVIEW OF THE INTRODUCTION AND BASIC ASPECTS)

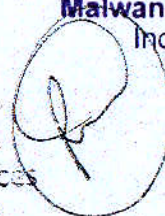
General

- Introduction and brief history of microbiology,
- Safety measures in microbiology,
- Care and maintenance of laboratory equipments,
- Handling and cleaning of glassware apparatus,
- Laboratory organization and management,
- Recording of results,
- Quality control in microbiology,
- Accreditation of laboratories,
- Principles of staining methods and preparation of reagents.
- Collection, Transportation and Specimen processing: i) Blood ii) sputum iii) throat swab iv) Nasopharyngeal swab v) swab (Pus-wound) vi) urine vii) genital discharges and swabs viii) CSF and other body fluids ix) Stool and rectal swab,
- Care and handling of laboratory animals,
- Principles and methods of sterilization,
- Uses and mode of action of antiseptics and disinfectants,
- Decontamination and disposal of contaminated material,
- Preparation, uses and standardization of culture media, aerobic and anaerobic culture methods,
- Principles and mode of action of antibiotics and chemotherapeutic agents for bacteria and fungi,
- Epidemiology of infectious diseases,
- Automation in Microbiology.

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Nosocomial infections:

- Introduction, common types of nosocomial infections, surveillance (Bacteriological) and control of nosocomial infection and sterility test,
- Toxin and antitoxin assays and pathogenicity tests.

Bacteriology:

- Introduction to medical bacteriology (General characteristics and classification of bacteria, growth, nutrition of microbes and identification of bacteria),
- **Lab. Diagnosis of common bacterial infections** (students should know the characteristic and morphology of causative organism) UTI, Diarrheal diseases, Meningitis, PUO, Whooping cough, Syphilis, Gonorrhoea, Tuberculosis, and Leprosy and other STD's diseases.

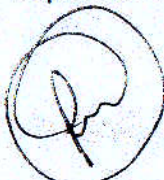
Serological tests:

- Widal,
- CRP,
- ASO,
- TPHA FTA,
- VDRL.

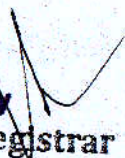
Virology:

- Introduction to Medical Virology,
- Nomenclature and classification of viruses,
- General characteristics of viruses,
- Physical, chemical and biological properties,
- Collection, transportation, processing and storage of sample for viral diagnosis, retrovirus (HIV), hepatitis virus, dengue and chicken pox.




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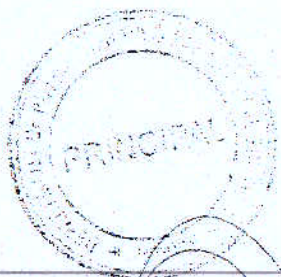

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Mycology:

- Introduction to Medical Mycology,
 - Characteristics and classification of fungus,
 - Collection and transportation of specimen,
 - Common culture media for fungus,
 - Identification of fungal isolates,
 - Lab. Diagnosis of fungal diseases.
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Parasitology:

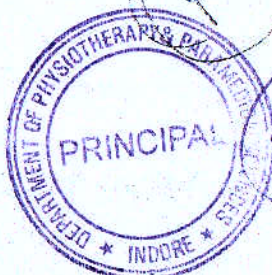
- Introduction to Medical Parasitology,
- Morphology, life cycle and pathogenesis of parasites listed (students should know the medical importance and Lab. Diagnosis methods):
 - i) Protozoa: Intestinal Amoebae, free-living pathogenic amoeba, intestinal and genital flagellates, haemo-flagellates, ciliates of medical importance and source,
 - ii) Malaria parasite,
 - iii) Helminthes: Nematodes:- Intestinal, tissue tramatodes infecting man, cestodes infecting man and larval infection in man.



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SYLLABUS FOR MMLT-1ST YEAR

Branch:-Medical Haematology, Medical Histopathology, Medical Microbiology, Medical Biochemistry

PAPER-IV: MEDICAL BIOCHEMISTRY
SCHEME OF EXAMINATION

Time: 3.00 Hrs

Max. Marks: 100

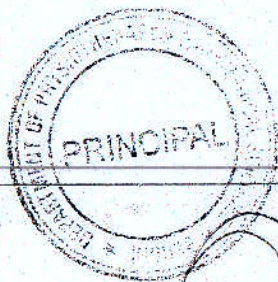
Subject	Max. Marks	Minimum Passing Marks
Medical Haematology	200	100

INSTRUCTION FOR THE PAPER SETTER

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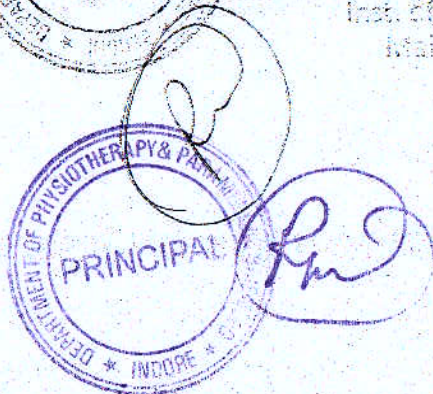
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MMLT – I Year

Paper - IV

MEDICAL BIOCHEMISTRY

(REVIEW OF THE INTRODUCTION AND BASIC ASPECTS)

Quality Control- Internal and External Quality Control,

Hazards in the Clinical Biochemistry,

Handling and Disposal of Infected and Dangerous Radioactive Materials,

Gas Transport ,pH Regulation ,Buffer System of Plasma,

Acid-Base Balances and Its Maintenance,

Laboratory Management,

- Preparation of Operating Budgets; general aspects of financial management of laboratories,
- Cost analysis (test and instruments); justification of providing new services or rejecting existing ones, lease and purchase decision analysis, delegation of budget responsibilities, work load statistics,
- Laboratory safety; fire, chemical, radiation and infection control, hazardous waste and transport of hazardous material,
- Maintenance of records; procedure policy manuals, ward manual, quality control programs, patient data retrieval.
- Personnel management; personnel policy manuals, job descriptions, labor, supervision relation, conducting job interviews, motivation, recognizing job distress syndrome, delegation to a laboratory manager,
- Hospital organization; interactions between the laboratory service and the rest of the hospital,
- Professional Ethics,
- Quality Assurance, Total Quality Management, Development and monitoring of performance indicators.

Chemistry and Metabolism of Carbohydrates

- General Consideration,
 - Important Function,
 - Classification,
 - Properties,
 - Digestion And Absorption,
 - Metabolic Fates.
-

Chemistry and Metabolism of Lipids,

- Definition,
- Importance,
- Classification,
- Properties,
- Digestion And Absorption,
- General Metabolism,
- Cholesterol,
- Lipoproteins.


Chemistry and Metabolism of Lipids,

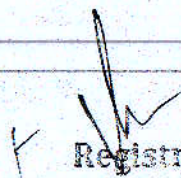
- Definition,
- Important Properties Of Protein And Amino Acids,
- General Metabolism Of Different Amino Acids.


Chemistry and Metabolism Nucleic Acids,

- Definition,
 - Importance,
 - Metabolism Of Purine And Pyrimidine.
-




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MALWANCHAL UNIVERSITY, INDORE-M.P.

SYLLABUS FOR MMLT-1ST YEAR

Branch:-Medical Haematology, Medical Histopathology, Medical Microbiology, Medical Biochemistry

PAPER-V: MOLECULAR BIOLOGY & APPLIED GENETICS
SCHEME OF EXAMINATION

Time: 3.00 Hrs

Max. Marks: 100

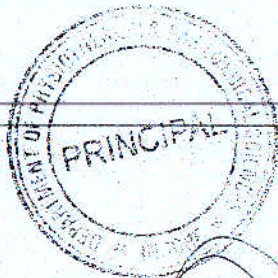
Subject	Max. Marks	Minimum Passing Marks
Medical Haematology	100	50

INSTRUCTION FOR THE PAPER SETTER

The pattern of theory examination will be as under for 80Max. Marks.

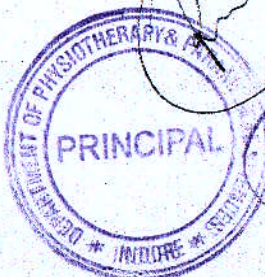
Type of Question	Marks for each question	Total Max. Marks
Essay Type	3 (Any 3Out of 4)	20X3=60
Short Answer Type	4 (Any 4Out of 5)	5X4=20

INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.



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MMLT – I Year

Paper - V

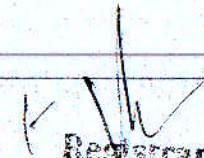
MOLECULAR BIOLOGY AND APPLIED GENETICS


DNA

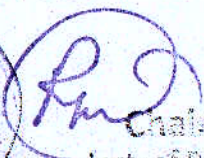
- Structure, Types,
- Coiling and Super coiling,
- Topoisomerase,
- Replication,
- Satellite DNA,
- Organization of Prokaryotic and Eukaryotic Genome,
- Chromosomes:-
 - Structure,
 - Number,
 - Sex Chromosomes,
 - Human Karyotype,
 - Method for Chromosomes Analysis,
 - Chromosomes Banding,
 - FISH, CGH,
 - Flow Cytometry,
 - Cell Cycle,
 - Mitosis and Meiosis.

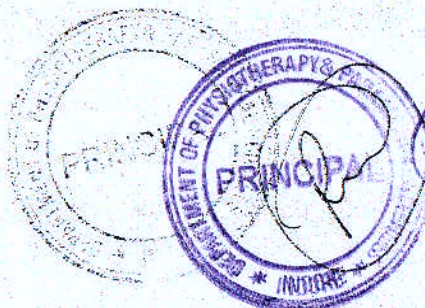
Transcription and Translation

- Factors Involved,
- RNA Processing,
- Types of RNA,
- Genetic Code,
- Lac Operon,
- Tryptophan Operon,
- Regulation in Eukaryotes,
- Gene Dosage and Gene Amplification,
- Generation of Antibody Diversity.


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Mutation

- Spontaneous Mutation,
- Induced Mutation,
- Silent Mutation,
- Frame Shift Mutation,
- Physical and Chemical Mutagens,
- Molecular Basis,
- Site Directed Mutagenesis,
- Significance of Mutagenesis,
- DNA Repair,
- Isolating Mutants,
- Ames Test.


Recombinant DNA Technology

- Necessary Elements,
- Enzymes and their Properties,
- DNA Ligase,
- DNA Modifying Enzymes,
- Cloning Vectors Plasmids,
- Cosmids
- Bacteriophages,
- Shuttle Vectors,
- Expression vectors,
- Construction of rDNA and Cloning Strategies- Various Method,
- Genomic Libraries(Using Phage Vectors),
- cDNA Libraries,
- Introduction of rDNA into Host Methods,
- Restriction Map and Sequencing.

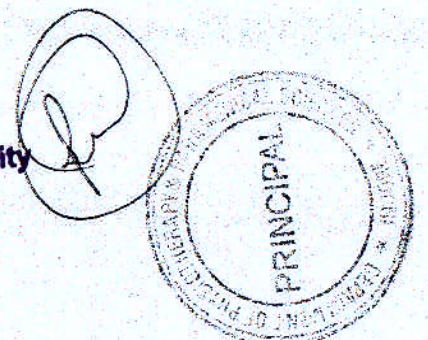

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Genetics in Medicine

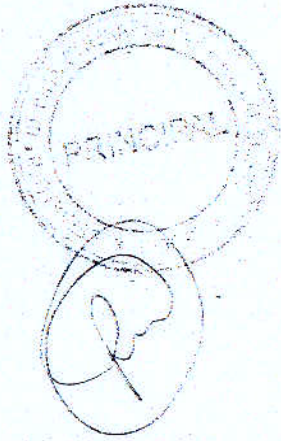
- Haemoglobin and Haemoglobinopathies,
- Phenylketonuria,
- Alkaptonuria,
- Homocystinuria,
- Lesch Nyhan Syndrome,
- Genetics of Cancer,
- Down's Syndrome,
- Di-George Syndrome,


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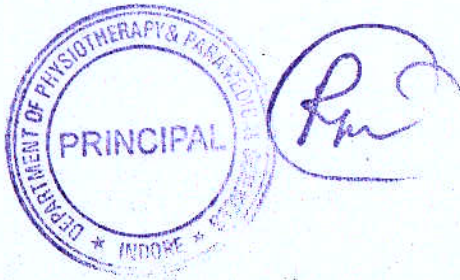


- Klinefelter's Syndrome,
 - Turner's Syndrome,
 - Hermaphroditism,
 - Cystic Fibrosis,
 - Haemophilia,
 - Prenatal Diagnosis of Genetic Disease,
 - Application of Recombinant DNA Technology in Medicine,
 - PCR, RFLP, DNA, Finger Printing,
 - Therapeutic Proteins,
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- Transgenic Organisms,
 - Gene Therapy,
 - Human Genome Project.



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MALWANCHAL UNIVERSITY, INDORE-M.P.

SYLLABUS FOR MMLT-1ST YEAR

Branch:-Medical Haematology, Medical Histopathology, Medical Microbiology, Medical Biochemistry

PAPER-VI: INSTRUMENTATION, BIOSTATICS & CLINICAL PATHOLOGY

INSTRUMENTATION
SCHEME OF EXAMINATION

Time: 3.00 Hrs

Max. Marks: 100

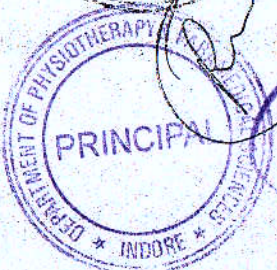
Subject	Max. Marks	Minimum Passing Marks
Medical Haematology	100	50

INSTRUCTION FOR THE PAPER SETTER

The pattern of theory examination will be as under for 80 Max. Marks.

Type of Question	Marks for each question	Total Max. Marks
Essay Type	3 (Any 3 Out of 4)	20X3=60
Short Answer Type	4 (Any 4 Out of 5)	5X4=20

INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.



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MMLT – I Year

Paper - VI

INSTRUMENTATION, BIOSTATICS AND CLINICAL PATHOLOGY

INSTRUMENTATION

Microscopy:

- Specimen preparation for microscopy,
- Micrometry,
- Simple microscopy,
- Phase contrast microscopy,
- Fluorescence microscopy, and
- Electron microscopy.

Chromatographic techniques: (General principles and introduction of)

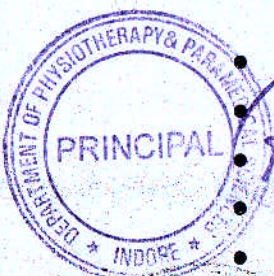
- Low-pressure column chromatography,
- High performance liquid chromatography (HPLC),
- Partition chromatography,
- Ion-exchange chromatography,
- Gasliquid chromatography (GLC),
- Thin layer chromatography (TLC),
- Paper chromatography, Affinity chromatography,
- Gel Filtration, and
- Fluorescence Spectroscopy.

Electrophoresis:

- Moving boundary and zone (paper, gel etc.),
- Electrophoretic techniques:
- General principles and introduction to Electrophoresis of proteins,
- Electrophoresis of nucleic acid.

Immunochemical techniques:

- Production of antibodies,
- Immuno diffusion (ID),
- Radio immunoassay (RIA),
- Enzyme-Linked immunoassay (ELISA),
- Fluorescent immunoassay (FIA).



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Molecular biology techniques:

- Isolation of nucleic acid,
- Physical analysis of DNA,
- Isolation of specific nucleic acid and sequences,
- Southern Blotting,
- Northern Blotting,
- Western Blotting,
- Recombinant DNA technology.

Centrifugation techniques:

- Basic principles of sedimentation,
- Centrifuges and their use,
- Ultra Centrifugation.

BIOSTATICS

Measures of central tendency:

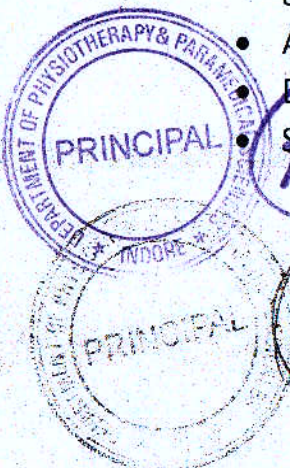
- Mean, mode and median,
- Concept of dispersion,
- Variants,
- Standard deviation,
- Coefficient of variation,
- Skewness and kurtosis,
- Correlation and regression for two variables.

Probability:

- Definition and uses of probability,
- Probability distribution: normal, binomial, and person for one variant.

Sampling Methods:

- Simple and random sampling without replacement,
- Test of significance based on small samples: chi-square test, T-test and F-test,
- Analysis of variants: one-way and two-way classifications, Data Presentation, Stastical Distribution.



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Fundamentals of computers:

- DOS commands,
- MS excel as a mean to calculate mean, mode, median, standard deviation, regression and plot curve fitting,
- Power Point Presentation.

CLINICAL PATHOLOGY

Collection, Transport, Preservation and Processing of various Clinical Specimens,

Urine Examination

- Physical Examination,
- Chemical Examination,
- Microscopic Examination,
- Urine analysis by Strip Method test for Haemosiderin Pigment.

Sputum Examination

- Physical Examination(Macroscopic),
- Microscopic-Examination- Gram's Stain, Ziehl Neelsen Stain for AFB.

Gastric Analysis


- Indication, Contra Indication,
- Method of Collection,
- Fasting Gastric Juice,
- Macroscopic Examination,
- Microscopic Examination,
- Fractional Test Meal,
- Augumented Histamin Test,
- Hollander'test.


Cerebrospinal Fluid Analysis

- Physical Examination (color and Turbidity),
- Microscopic Examination (Total Count, Differential Count).


Microscopic Examination

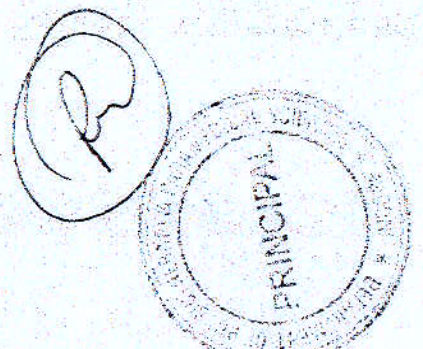
- Pleural Fluid,
- Pericardial Fluid,
- Synovial Fluid,
- Peritoneal Fluid.


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Pregnancy Test

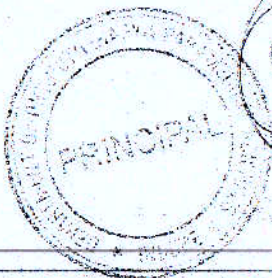
- Method,
- Interpretation, Advantages, Disadvantages,
- HCG.

Semen Analysis

- Liquefaction,
- Volume,
- Color,
- Reaction,
- pH,
- Motility,
- Sperm Count,
- Morphology of Sperm,
- Importance and Interpretation.

Stool Examination

- Macroscopic Inspection,
- Concentration Method, Flotation Method and Sedimentation,
- Microscopic Examination for Paracites,
- Strip Method,s
- Test for Occult Blood- Benzidine Test.



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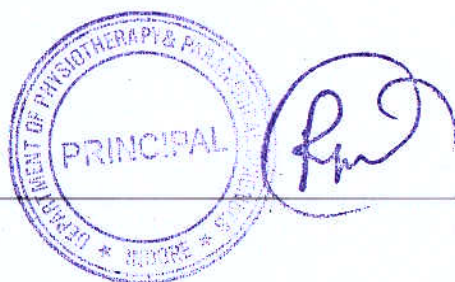


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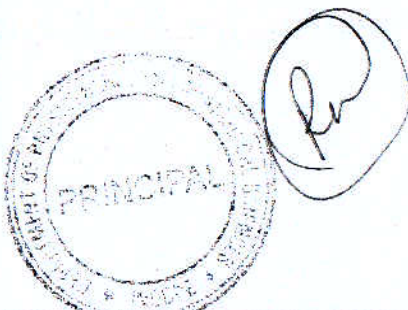
SYLLABUS & SCHEME OF EXAMINATION FOR

MMLT- 2nd YEAR



(ALL BRANCHES)

Medical Haematology, Medical Histopathology, Medical Microbiology,
Medical Biochemistry



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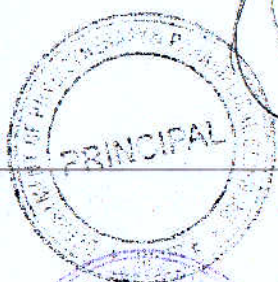
SYLLABUS & SCHEME OF EXAMINATION FOR MMLT 2ND /FINAL YEAR

Specialization-Medical Histopathology

Scheme of Examination

MMLT 2 ND /FINAL YEAR : UNIVERSITY EXAMINATION						
S.No.	Subject	Maximum Marks				
		Theory	Viva	Int. Ass.	Practical	Total
1.	Medical Histopathology-I*	80	40	20	60	200
2.	Medical Histopathology-II*	80	40	20	60	200
3.	Medical Histopathology-III*	80	40	20	60	200
4.	Practical Work/ Thesis	100			-	100
Total		240	120	60	180	700
		100				

- With Recent Advancements



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MMLT II YEAR

PAPER - I

MEDICAL HISTOPATHOLOGY – I

(With Recent Advancements)

An Overview of Quality Control,

- Introduction,
- Random selection audit,
- Histotechnology QC,
- New methods,
- Quality of performance of diagnostic histopathologists,
- Total review audit,
- Single subject audit,
- Diagnostic external quality assessment,
- Statistical analysis of diagnosis incidence,
- Quality of quantitative diagnosis : grading,
- Clinic-pathological meetings,
- Laboratory accreditation.

Frozen Section and Tissue Processing Techniques

- Frozen and related sections,
- Frozen sections and their uses,
- Freeze drying and freeze substitution,
- Frozen section substitution
- Preparation of frozen sections,
- Staining of fat.

Application of Microwave Technology to Histology,

- Introduction,
- Microwave staining,
- Microwave processing,
- Microwave fixation,
- Microwave antigen retrieval,
- Microwave immunohistochemistry.

Museum Techniques

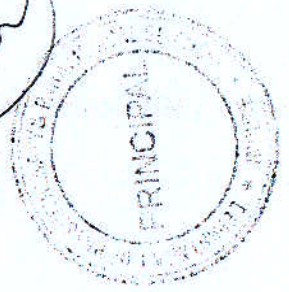
- Preparation of specimen,
- Storage of specimens,
- Mounting of museum specimen.


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Plastic Embedding Media and Techniques,

- Introduction,
- Ultrastructural studies,
- Extremely hard tissues and implants,
- High resolution light microscopy,
- Plastic Embedding Media,
- Application of Acrylic sections,
- Acrylic Resin Embedding- The Future.

Electron Microscopy: The Preparative Techniques,

- Components of the transmission electron microscope,
- Tissue preparation for transmission electron microscope,
- Aldehyde Fixatives,
- Osmium Tetraoxide,
- Dehydration,
- Embedding,
- Epoxy Resins,
- Acrylic Resins,
- Tissue processing schedules,
- Procedures for other tissue samples,
- Ultramicrotomy,
- Staining.

Transmission Electron Microscopy: Diagnostic Applications,

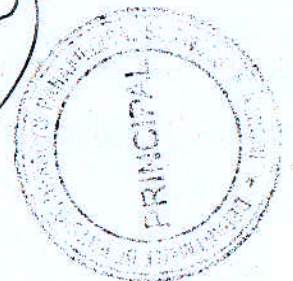
- Introduction,
- When to use TEM,
- Examples of diagnostic applications,
- Renal disease: The Kidney Glomerulus,
- Malignant Tumors,
- Non-Neoplastic diseases.

Quantitative Data from Microscopic Specimens

- Introduction,
- Traditional approaches,
- Image analysis,
- Image analysis processes,
- Image analysis software,
- Specimen analysis,
- Specimen preparation for image analysis.



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MMLT II YEAR
PAPER - II
MEDICAL HISTOPATHOLOGY – II
(With Recent Advancements)

Connective Tissues and Stains,

- Introduction,
- Formed or fibrous intercellular substances,
- Connective tissue cells,
- Connective tissues,
- Connective tissue stains.

Mucins,

- Introduction,
- Glycogen,
- Mucins,
- Fixation and section preparation,
- Glycogen demonstration techniques,
- Demonstration of mucins.

Lipids,

- Introduction,
- Histophysical methods,
- Histochemical methods,
- Combination techniques,
- Lipid immunohistochemistry,
- Application of lipid histochemistry in pathology.

Proteins and Nucleic Acids,

- Introduction,
- Simple proteins with demonstration,
- Nucleic acid with demonstration.

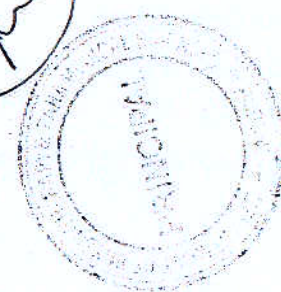
Pigments and Minerals,

- Introduction,
- Endogenous pigments,
- Artifact pigments,
- Exogenous pigments and minerals.



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Introduction,
Classification,
Ultrastructure,
Pathogenesis,
Diagnosis,
Demonstration,
Polarizing microscopy and congo red,
Methyl or crystal violet 'Metachromasis',
Miscellaneous methods,
Immunohistochemistry for amyloid,
Evaluation of methods.

Granules, Organelles and Neuroendocrine,

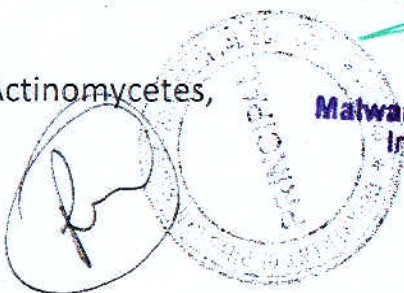
Bone marrow,
Mast cells,
Paneth cells,
Russell bodies,
Hair, Keratin and Keratohyaline,
Alcoholic hyaline,
Mitochondria,
Nucleolar organizer regions (NORs),
Lysosomes,
The Neuroendocrine System,
Cell biology,
The Distribution and function of regulatory peptides,
Pathology,
Technique for the demonstration of Neuroendocrine cells.

Organisms,

Introduction,
Detection and Identification,
The Gram stain,
Techniques for Mycobacteria,
Some important Bacteria,
Fungal Infection,
A selection of the more important Fungai and Actinomycetes,
The determination of Rickettsia,


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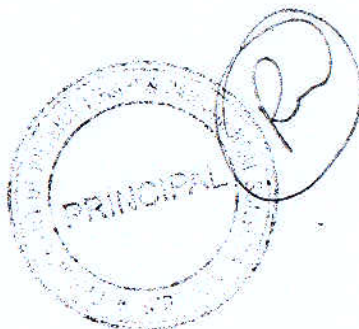



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- The detection and identification of Viruses,
- Some important viral infection,
- Prion disease,
- The demonstration of Protozoan and other organisms,
- Worms.

Techniques in Neuropathology,

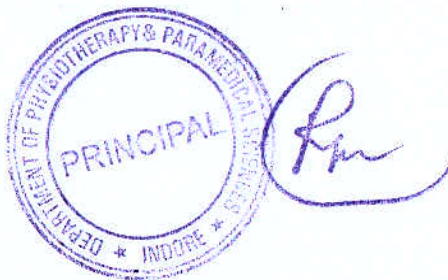
- Introduction,
- Silver impregnation,
- Staining of components of the Nervous system,
- Techniques for staining nervous,
- Myelin,
- Support cells The neuroglia,
- Histological investigation of Dementia,
- Neuropathology laboratory specimen handling.



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