

**THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY**

**No. 69, ANNA SALAI, GUINDY, CHENNAI – 600 032.**

**M.D. / M.S.**  
**POST GRADUATE DEGREE COURSES**



**SYLLABUS AND CURRICULUM**

**2021 - 2022**

**M.D. PATHOLOGY**

**THE TAMIL NADU Dr. M.G.R MEDICAL UNIVERSITY, CHENNAI**

**M.D. PATHOLOGY**

**1. GOAL**

The purpose of this program is to standardize Pathology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating suitable manpower with appropriate expertise.

**2. OBJECTIVES**

**(A) KNOWLEDGE**

A candidate upon successfully qualifying in the M.D. (Pathology) examination should be -

1. Capable of offering a high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc., for the purpose of diagnosis and overall wellbeing of the ill.
2. Able to teach and share his knowledge and competence with others. He / She should be imparted Training in teaching methods in the subject which may enable them to take up teaching assignments in Medical Colleges /Institutes.
3. Capable of pursuing clinical and laboratory based research. He /She should be introduced to basic research methodology so that they can conduct fundamental and applied research.

**(B) ATTITUDE**

**Cognitive Domain-**

1. Diagnose routine and complex clinical problems on the basis of Histopathology (Surgical Pathology) and Cytopathology specimens, Blood and Bone Marrow examination and various tests of Laboratory Medicine (Clinical Pathology, Clinical Biochemistry) and basics of Blood Banking (Transfusion Medicine).
2. Interpret and correlate clinical and laboratory data so that clinical manifestations of disease can be explained.
3. Advice on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case.
4. Correlate clinical and laboratory findings with pathologic findings of autopsy specimens submitted for study.
5. Should be able to teach Pathology to undergraduates, nursing and paramedical students at the appropriate level.

6. Plan, execute, analyse and present research work.
7. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time as per standard guidelines. Identify problems in the laboratory, offer solutions thereof & maintain a high order of quality control.
8. Capable to organize safe & effective disposal of laboratory waste.
9. Able to supervise and work with subordinates and colleagues in a laboratory.

### **(C) SKILLS**

Psychomotor Domain -

- 1) Able to perform most of the routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen sections, making smears, and staining.
- 2) Able to collect specimens by routinely performed non-invasive out-patient procedures such as venepuncture, finger-prick, fine needle aspiration of superficial lumps and bone-marrow aspirates, and provide appropriate help to colleagues performing an invasive procedure such as a biopsy or an imaging guided biopsy.
- 3) Be able to interpret gross and microscopic findings of specimens submitted to the pathology department, by the Forensic Medicine department.
- 4) Should be familiar with the function, handling and routine care of equipments in the laboratory.

### **3. COMPONENTS OF THE POSTGRADUATE CURRICULUM:**

#### **A) Theoretical Knowledge**

##### Post Graduate Training

Based on the available facilities, Department can prepare a list of postgraduate activities pertaining to basic and applied Pathology. Active learning should form the mainstay of postgraduate training. There should be lectures by postgraduates (at least 20 per year) along with seminars, symposia, group-discussions, Journal clubs. The postgraduate students should regularly interact with various clinical departments and learn cases of interest for discussion with the surgical, medical, super-speciality faculties. The postgraduate should actively involve in generating teaching resource material for U.G. and evolving of problem solving modules.

#### **B) Practical and Clinical Skills**

The following is a rough guideline to various teaching / learning activities that may be employed : -

- Collection of specimens including Fine needle aspiration of superficial lumps
- Grossing of specimens.
- Discussions during routine activities such as during signing out of cases.
- Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.

- Clinico-pathological conferences.
- Intradepartmental and interdepartmental conferences related to case discussions.
- Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- Journal Club.
- Research Presentation and review of research work.
- Guest and in-house lectures.
- Participation in workshops, conferences and presentation of papers, etc.
- Laboratory-work (Knowledge on technical aspect, Interpretation, Quality Control, Biomedical waste management and requirements of reagents and consumables).
- Use and maintenance of equipment – SOPs.
- Maintenance of records.
- Teaching undergraduates and paramedical staff.

#### **C) Writing Thesis/Research Articles:**

Thesis shall be submitted by each candidate at least 6 months before the date of commencement of the Theory examination.

#### **D) Attitudes including Communication Skills**

- 1) Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- 2) Develop communication skills to word reports and professional opinions with clarity as well as to interact with patients, relatives, peers and paramedical staff, & for effective teaching.

#### **E) Training in Research Methodology, Medical Ethics /Bioethics and Medicolegal aspects**

- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel & respect the rights of the patient including the right to information and second opinion.
- Should compulsorily attend the Research methodology workshop conducted by the University within first six months of M.D course.
- Are encouraged to attend Bio-ethics workshops/CMEs conducted by the University and other reputed Institutions.

### **4. THEORY SYLLABUS**

#### **Course Content :-**

The study of Pathologic Anatomy includes all aspects of Pathology as encompassed in the branches of General and Systemic Pathology. Only the broad outlines are provided.

**1) A)General Pathology:**

Normal cell and tissue structure and function. The changes in cellular structure and function in disease. Causes of disease and its pathogenesis. Reaction of cells, tissues, organ systems and the body as a whole to various sublethal and lethal injuries.

**B) Systemic Pathology:**

The study of normal structure and function of various organ systems and the aetiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease & functional correlation with clinical features.

**2) Haematology:**

The study of Haematology includes all aspects of the diseases of the blood and bone marrow. This would involve the study of the normal, and the causes of diseases and the changes thereof.

3) Laboratory Medicine (Clinical Biochemistry /Clinical Pathology including Parasitology).

4) Basics of Transfusion Medicine (Blood-Banking).

5) The student is expected to acquire a general acquaintance of techniques and principles and to interpret data :

- a) Immunopathology.
- b) Electron microscopy.
- c) Enzyme Histochemistry.
- d) Immunohistochemistry.
- e) Cytogenetics.
- f) Molecular Biology.
- g) Maintenance of records.
- h) Information retrieval, Computer, Internet in Medicine and Microphotography.

A postgraduate is supposed to acquire not only professional competence of a well-trained specialist but also academic maturity, a capacity to reason and critically analyse the scientific data as well as to keep himself/herself abreast of the latest developments in the field of the pathology and related sciences. A brief outline of what is expected to be learnt during the M.D. Course is given under each head.

**Surgical Pathology:-**

**Knowledge-**

- The student should be able to demonstrate an understanding of the histogenetic and patho-physiologic processes associated with various lesions.
- Should be able to identify problems in the laboratory and offer viable solutions.

**Autopsy Pathology :-**

**Knowledge –**

- Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.
- Correctly identify all morphological (gross and Microscopic) changes of the specimens submitted.
- Write correctly and systematically Provisional and Final Anatomic Diagnosis reports.

## **Cytopathology:-**

### **Knowledge -**

- Should possess the background necessary for the evaluation and reporting of Cytopathology specimens.
- Should possess knowledge of the following, keeping in mind the indication for the test:
  1. Choice of site from which smears may be taken(as in the case of vaginal smears).
  2. Type of samples.
  3. Method of obtaining various specimens (urine sample, gastric smear, colonic lavage, sputum, Squash cytology, FOB wash and brush etc.)
  4. Be conversant with the principles and preparation of stains.

## **Haematology :-**

### **Knowledge-**

- Should demonstrate the capability of utilizing the principles of the practice of Haematology for the planning of tests, interpretation and diagnosis of diseases of the blood and bone marrow.

Should be conversant with various equipments used in the Haematology laboratory.

Should have knowledge of automation and quality assurance in Haematology.

Correctly plan a strategy of investigating at least 90% of the cases referred for special investigations in the Haematology Clinic and give ample justification for each step in consideration of the relevant clinical data provided.

## **Laboratory Medicine :-**

### **Knowledge –**

Possess knowledge of the normal range of values of the chemical content of body fluids, significance of the altered values and its interpretation.

Possess knowledge of the principles of the relative utility and limitations and significance of the altered values:

- i. In Relevant Biochemical tests
  - Know the principles, advantages and disadvantages scope and limitation of Automation in laboratory.
  - Know the principles and methodology of quality control in laboratory.

## **Transfusion Medicine (Blood Banking) :-**

### **Knowledge -**

Students should possess knowledge of the following aspects of Transfusion Medicine:

- > Basic immunology.
- > ABO and Rh groups.
- > Clinical significance of other blood groups.

- > Transfusion therapy including the use of whole blood and RBC concentrates.
- > Blood component therapy.
- > Rationale of pre-transfusion testing.
- > Infections transmitted in blood

**a) Immunopathology:**

**Knowledge –**

- i. Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof.
  - ii. Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology :
    - (a) ELISA techniques.
    - (b) Radioimmuno assay.
    - (c) HLA typing.
- (bi) Interpret simple immunological tests used in diagnosis of diseases and in research procedures.
- a) Immunofluorescence techniques especially on kidney and skin biopsies.

**b) Electron Microscopy :**

**Knowledge –**

- (i) Demonstrate familiarity with Principles and Techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron Microscope: TEM and SEM).
- (ii) Recognise the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriate photographs).

**C) Enzyme Histochemistry :**

**Knowledge –**

Should be familiar with the principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, Chloroacetate Esterase).

**d) Immunohistochemistry : Knowledge –**

Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using both PAP (Peroxidase-Antiperoxidase) and AP-AAP (Alk. Phosphatase-anti Alk. Phosphatase) ABC (Avidin-Biotin Conjugate) Systems;

Employing monoclonal and polyclonal antibodies. Be aware of the limitations of immunohistochemistry.

**e) Molecular Biology:**

**Knowledge –**

Should understand the principles of Molecular Biology especially related to the understanding of disease processes and its use in various diagnostic tests.

Should be conversant with the principle & steps and interpretations of a Polymerase Chain Reaction (PCR Western Blot, Southern Blot, Northern Blot and Hybridisation procedures).

**f) Cytogenetics :**

**Knowledge –**

Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ

Hybridisation(FISH).

**g) Tissue Culture:**

**Knowledge –**

Demonstrate familiarity with methods of tissue culture.

**5. TEACHING LEARNING METHODS (including Clinical Study)**

**Surgical Pathology:-**

**Skills-**

- Given the clinical and operative data, the student should be able to identify, and
- systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly identify the lesions received from the surgical service of an average teaching hospital.
- A student should be able to demonstrate ability to perform a systematic gross
- examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies, nerve biopsies and skin biopsies to demonstrate the orientation of tissues in paraffin blocks.
- The student should be able to identify and systematically and accurately describe the chief histomorphological alterations in the tissue received in the surgical pathology service. He /She should also correctly interpret & correlate with the clinical data to help in the diagnosis of the routine surgical material received.



Be conversant with all the equipment in the Histopathology and the Clinico pathology lab and the principles of its running.

Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.

Stain paraffin sections with at least the following:

- (i) Haematoxylin and eosin.
- (ii) Stains for collagen, elastic fibers and reticulin, congo red
- (iii) Iron stain.
- (v) PASstain.
- (vi) Acid fast stains.
- (vii) GMS stains
- (viii) Any other stains needed for diagnosis – fungal stains.

Demonstrate understanding of the principles of:

- (i) Fixation of tissues.
- (ii) Processing of tissues for section cutting.
- (iii) Section cutting and maintenance of related equipment.
- (iv) Differential (Special) stains and their utility.

Cut a frozen section using freezing microtome /cryostat, stain and interpret the slide in correlation with the clinical data provided, and correctly diagnose at least 75 percent of the lesions within 15 minutes. Perform fat stain on frozen section.

- Perform and interpret the utility of various immunohistochemical stains especially in the diagnosis of tumour subtypes.

### **Cytopathology:-**

#### **Skills-**

- Independently prepare and stain good quality smears for cytopathologic examination.
- Be conversant with the techniques for concentration of specimens: i.e., various filters, centrifuge and cytocentrifuge.
- Independently be able to perform fine needle aspiration of palpable superficial lumps in patients; make good quality smears and be able to decide on the type of staining in a given case. Desirable to have a knowledge in image guided FNACs. Knowledge of preparation of Cell blocks, LBCs.

Given the relevant clinical data, he / she should be able to independently and correctly :

- i. Evaluate hormonal status in all cases as may be required.
- ii. Diagnose the status of malignancy or otherwise in at least 75% of the cases received in a routine laboratory and categorise them into negative, inconclusive and positive.
- iii. Demonstrate ability in the technique of screening and dotting the slides for suspicious cells.
- iv. Indicate correctly the type of tumour, if present, in at least 75% cases.
- v. Identify with reasonable accuracy the presence of organisms, fungi and parasites in at least 75% of cases.

## Haematology :-

### Skills-

- Observe and/or perform/interpret correctly and independently the following special tests, in addition to doing the routine blood counts:
  - i. Haemogram including Reticulocyte and Platelet counts, ESR, PCV, Osmotic fragility test
  - ii. Bone marrow staining including stain for iron.
  - iii. Blood smear staining ( thick and thin smear)
  - iv. Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP),PAS,Sudan Black, etc.
  - v. Hemolytic anaemia profile including HbF, Hb electrophoresis, etc.
  - vi. Coagulation profile including PT, APTT.FDP, Factors assay.
  - vii. BM aspiration and BM biopsy.
  
- Demonstrate familiarity with the principle and interpretation of results and utility in diagnosis of the following :
  - i. Cytogenetics – Karyotypes of Leukemia – CML, promyelocytic leukemia, common trisomy and monosomies like Downs, Turner's and Klinefelter syndromes.
  
- Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in non-neoplastic and neoplastic diseases and arriving at a correct diagnosis in at least 90% of the cases referred to the Haematology clinic, given the relevant clinical data.

## Laboratory Medicine :-

### Skills –

- Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; Be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.
  
- Demonstrate familiarity with and successfully perform.
  - i. Routine Urinalysis including Physical, Chemical and Microscopic, examination
  - ii. A complete examination; physical, chemical and cell content of Cerebrospinal fluid (C.S.F.), Pleural, synovial, pericardial and Peritoneal fluid.
  - iii. Semen analysis.
  - iv. Absolute Eosinophil Count
  - v. Examination of Peripheral Blood for the commonly occurring parasites along with QBC.
  - vi. Be familiar with the preparation of standard solution and chemicals relevant to Histopathology and clinicalpathology
  
- Explain the principle of Instrumentation, use and application of the instruments commonly used in the laboratories, eg., Photoelectric colorimeter, Electrophoresis, Centrifuge, Flow cytometer.

## d) Immunohistochemistry :

### Skills –

Be able to interpret panel of IHC markers appropriate for the condition and perform immunohistochemical staining using paraffin section with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAP method.

## 6. STRUCTURED TRAINING PROGRAMME

The three-year training programme for the M.D. degree may be arranged in the form of postings to different assignments / laboratories for specified periods as outlined below. The period of such assignments / postings is recommended for 35 months. Postings schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge & skill, extramural postings may be undertaken.

	<b><u>Section / Subject</u></b>	<b><u>Duration in Month</u></b>
(i)	Surgical Pathology	14
(ii)	Surgical Pathology Techniques	1
(iii)	Haematology	8
(iv)	Cytopathology	6
(v)	Laboratory Medicine including Clinical Biochemistry and clinical Immunology	2
(vi)	Transfusion Medicine /Blood Bank	1
(vii)	Ancillary Techniques including Immunopathology – Transplant immunology, HLA typing, Molecular Biology basics, Research Methodologies and Electrophoresis .	1
	Elective / Reorientation including research methodologies	2
	<b>Total</b>	<b>35 months</b>

During II<sup>nd</sup> year, the Students are encouraged to undergo special postings for learning new advanced techniques / procedure / skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department.

The training programme should be designed to enable the student to acquire a capacity to learn and investigate for himself / herself, to synthesize and integrate a set of facts and develop a faculty to reason. The curricular programmes and scheduling of postings must provide the student with opportunities to achieve the above broad objectives. Most of the learning is to be accomplished by the student himself. Interactive discussions are to be preferred over didactic sessions. The student must blend as an integral part of the activities of an academic Department that usually revolves around three equally important basic functions of teaching, research and service. As mentioned earlier the emphasis is recommended under a residency programme or learning while serving / working.

7. Evaluation of the candidates in both theory and practical aspects will help the candidate in improvement of his/her knowledge, skills and attitude.

8. **COMPETENCY ASSESSMENT:**

1. **OVERALL:**

- a) Communication / commitment / Contribution / Compassion towards patient and Innovation - 5 marks
- b) Implementation of newly learnt techniques/Skills

2. Number of cases presented in Clinical Meetings/ Journal Clubs/Seminars - 5 marks

3. Number of papers presented in conferences/Publications / Research Projects. - 5 marks

4. No. of Medals / Certificates won in the conference / Quiz competitions and other academic meetings with details. - 5 marks

-----  
20 Marks  
-----

**PG NON – CLINICAL COURSE**

VIVA including Competency Assessment - 60 Marks (40 + 20)  
Pedagogy - 40 marks

**ASSESSMENT SCHEDULE IS AS FOLLOWS**

Year of study	Period				Total Max.20 marks
I year	Upto Dec	10 marks	Upto June	10 marks	20 Marks
II year	Upto Dec	10 marks	Upto June	10 marks	20 Marks
III year	Upto Oct	10 marks	Upto Feb	10 marks	20 Marks
	<b>AVERAGE</b>				20 Marks

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

**Postgraduate Students Appraisal Form  
Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr.	PARTICULARS	Not Satisfactory			Satisfactory More Than			Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1	Journal based / recent advances learning										
2	Patient based /Laboratory or Skill based learning										
3	Self directed learning and teaching										
4	Departmental and interdepartmental learning activity										
5	External and Outreach Activities / CMEs										
6	Thesis / Research work										
7	Log Book Maintenance										

**Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.**

**9. DISSERTATION AND UNIVERSITY JOURNAL OF MEDICAL SCIENCES**

As per the 49<sup>th</sup> SAB Resolution under Point No. 2 and in the 52<sup>nd</sup> SAB it was reiterated regarding the topic for dissertation

The topic for the dissertation should be registered and sent to the University after Ethics Committee approval before 31<sup>st</sup> of December of the first Post Graduate Year. Only one change of topic with proper justification from the Head of the Department is permitted before 31<sup>st</sup> March of the first Post Graduate Year. The change of dissertation title will not be permitted after 31<sup>st</sup> March of the First Post Graduate Year. This modification in regulation will be scrupulously followed from the academic year 2015-16 admission onwards.

As per Medical Council of India Post Graduate Medical Education Regulations 2000 (amended upto 10th August 2016) clause 13.9 A Postgraduate student of a Postgraduate degree Course in broad specialties/Super Specialties would be required to present one poster presentation to read one paper at a National/State conference and to present one Research paper which should be published/accepted for publication/sent for publication during the period of his Postgraduate studies so as to make him eligible to appear at the Postgraduate Degree Examination.

As per MCI Clause 14 (4)(a), thesis shall be submitted atleast 6 Months before the Theory and Clinical/Practical Examination.

A candidate shall be allowed to appear for the Theory and Practical/Clinical Examination only after the acceptance of the Thesis by the Examiners.

The periodical evaluation of dissertation/log book should be done by the guide / HOD once in every six months. The HOD should ensure about the submission of dissertation within the stipulated time.

Regarding submission of articles to the University Journal of Medical Sciences for all the PG Degree/Diploma courses, it is mandatory that the students have to submit at-least one research paper. Case Reports are not considered as Research Paper

**10. THEORY EXAMINATION**

Theory : There shall be four theory papers

PATTERN OF EXAMINATION :-

FOUR PAPERS - 100 Marks each 3 Hours duration each

**Paper I:** General Pathology, Pathophysiology, Immunopathology and Cytopathology

Paper II: Systemic Pathology

Paper III: Haematology, Transfusion Medicine (Blood Banking) and Laboratory Medicine

Paper IV: Recent advances and applied aspects

Question Paper Pattern:

Structured Essay Questions - 2 x 15 Marks = 30 Marks Short

Notes - 10 x 5 Marks = 50 Marks

Reasoning out - 4 x 5 Marks = 20 Marks

-----  
100 Marks  
-----

**11. PRACTICAL EXAMINATION**

**PRACTICALS DAY 1  
FORENOON SESSION**

<b>HAEMATOLOGY / CLINICAL PATHOLOGY / BLOOD BANKING ( 2 HRS) (10 + 10 + 5 = 25 Marks)</b>	<b>25 MARKS</b>
<b>GROSSING /AUTOPSY /GROSS SPECIMEN FOR Dx&amp; DISCUSSION (1.5 H) 5+ 10+10 MARKS</b>	<b>25 MARKS</b>
<b>AFTERNOON SESSION</b>	
<b>HAEMATOLOGY + CYTOLOGY SLIDES &amp; DISCUSSION (5 Slides x 5 Marks) + (5 Slides x 5 Marks) (2 HRS) (10 SLIDES X 5 MARKS)</b>	<b>50 MARKS</b>
<b>DAY2</b>	
<b>FORENOON SESSION</b>	
	<b>80 MARKS</b>

<b>HISTOPATHOLOGY SLIDES &amp; DISCUSSION 2.5 HOURS) (16 SLIDES X 5 MARKS)</b>	
<b>OSPE (5X4 marks)</b>	<b>20 MARKS</b>
<b>AFTERNOON SESSION – 2 Hours</b>	
<b>PEDOGOGY</b>	<b>40 MARKS</b>
<b>VIVA</b>	<b>60 MARKS</b>
<b>LOG BOOK</b>	
<b>AGGREGATE (CLINICAL + VIVA) TOTAL</b>	<b>300 MARKS</b>
<b>MINIMUM REQUIRED FOR PASS (50%)</b>	<b>150 MARKS</b>
<b>DISSERTATION</b>	<b>APPROVED /NOT APPROVED</b>

The practical examination shall consist of the following and should be spread over two days.

<b>Clinical Case discussion (10 marks):</b>	:	Discussion of a clinical case history. <input type="checkbox"/> Plan relevant investigations of the above case and interpret the biochemistry findings. <input type="checkbox"/> Two investigations should be performed including at least one biochemistry exercise/clinical pathology exercise like CSF, pleural tap etc. analysis and complete urinalysis.
<b>Haematology &amp; Blood Banking (10+5 =15marks)</b>	:	Discuss haematology cases given the relevant history. Plan relevant investigations <input type="checkbox"/> Perform complete hemogram and at least two tests preferably including one coagulation exercise <input type="checkbox"/> Identify electrophoresis strips, osmotic fragility charts etc. Interpretation of data from autoanalysers, HPLC and flow cytometry.
<b>A. Histopathology (80 Marks) &amp; Cytopathology (25 marks)</b>	:	Examine report and discuss sixteen histopathology and Five Cytopathology cases given in the relevant history and slides. To be familiar with MGG, PAP and other special stains, H&E on cytology smear, IHC on cell block. Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section. Should be conversant with histopathology techniques including cryostat.

<b>B. Hematology slides (25 marks):</b>	:	Examine, report and discuss around ten cases given the history and relevant blood smears and/or bone marrow aspirate smears and bone marrow biopsy interpretation.
<b>Structured Autopsy (10 Marks)</b>	:	Given a case history and relevant organs. Give a list of anatomical diagnosis in an autopsy case.
<b>Gross Pathology (10+5=15 marks)</b>	:	Perform grossing of one gross specimen. Describe findings of another gross specimen, give diagnosis and identify the sections to be processed.
<b>Basic Sciences (OSPE – 5x4 = 20 marks)</b>	:	Identify Electronmicrographs, osmotic fragility tests, Electrophoretic strips, Flow cytometry pictures, Sequencing, Karyotyping and FISH pictures Identify gels, results of PCR, immunological tests including staining for direct / indirect immuno fluorescence. Identify histochemical and immunohistochemistry stains.

All practical exercises are to be evaluated jointly by all the examiners. An oral question-answer section should be conducted at the end of each exercise.

## 12. LOG BOOK

- (a) Every Post-graduate candidate shall maintain a record of skills he/she has acquired during the training period certified by the various Heads of Departments where he / she has undergone training including outside the institution.
- (b) The candidate should also be required to participate in the teaching and training programme of post-graduate and intern-students.
- (c) In addition, the Head of the Department shall involve their postgraduate candidates in Seminars, Journal Clubs, Group Discussions and participation in clinical, clinico-pathological conferences.
- (d) Every Post-graduate candidate should be encouraged to present short title papers in conferences and improve on it and submit them for publication in reputed medical journals. Motivation by the Heads of Departments is essential in this area to sharpen the research skills of the post-graduate candidates.
- (e) Periodic review of Log book and Dissertation have to be done in the Department by guide/HOD once in every 6 months.
- (f) At the end of the course, the candidate should summarise the contents and get the Log Book certified by the Head of the Department.
- (g) The Log Book should be submitted at the time of practical examination for the scrutiny of the Board of Examiners.

## 13. VIVA (including Competency Assessment) – (60 Marks (40 + 20))

An unstructured viva will be carried out by the examiners. VIVA including Competency Assessment for PG Non – Clinical courses



14. PEDAGOGY:

( 8 minutes Presentation and 2 Minutes Q & Ans)

- |  |      |
|--|------|
| • Demeanour  | - 10 |
| • Audio visual Aids usage, voice modulation and Attitude | - 10 |
| • Subject Content  | - 10 |
| • Q & Ans /Interaction                                   | - 10 |

Total

-----  
40 Marks  
-----

15. OSCE / OSPE:

OSPE containing five charts each carrying 4 marks (5x4 = 20 marks)

**Charts may have these topics**

- > Electronmicrographs
- > Osmotic fragility tests
- > Electrophoretic strips
- > Flow cytometry pictures
- > Gene Sequencing
- > Karyotyping
- > FISH pictures
- > Identify gels, results of PCR
- > Immunological tests including staining for direct / indirect immuno fluorescence.
- > Identify and interpret histochemical and immunohistochemistry stains

**Electron Microscopy**

11 years male presented with proximal muscle weakness, hypotonia and delayed motor developments.

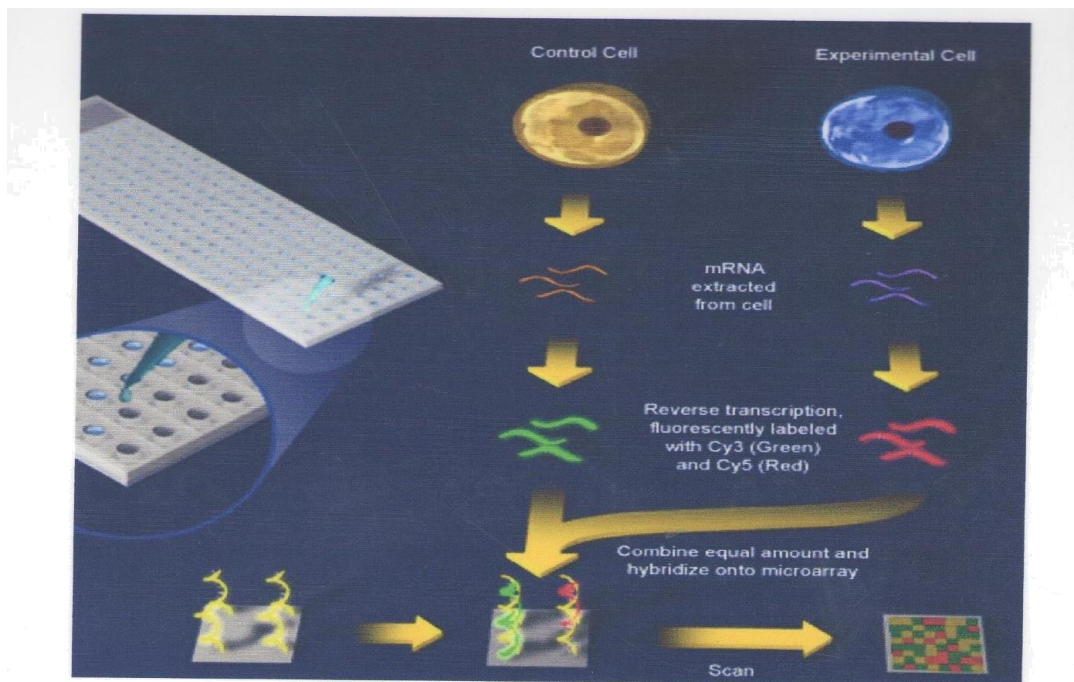
Muscle biopsy was done and sent for HPE and Electron Microscopy

**Questions :**

1. Write your diagnosis
2. Write the Electron Microscopy findings



1. WHAT IS THE DIAGNOSTIC TOOL ILLUSTRATED HERE ?
2. WHAT ARE THE OTHER NAMES FOR THIS DIAGNOSTIC TOOL ?
3. WHAT ARE THE STEPS INVOLVED IN THIS PROCEDURE ?
4. WHAT ARE ITS APPLICATIONS ?
5. WHAT IS PROTEOMICS ?



### IMMUNOHISTOCHEMISTRY – V

5) 46 years old male patient presented with a huge mass lesion in the left thigh. Biopsy was taken. HPE diagnosis was epithelioid sarcoma.

Biopsy was taken.

IHC markers were used for diagnosis.

CK

EMA

CD 31

CD 34

UEA 1

Vimentin

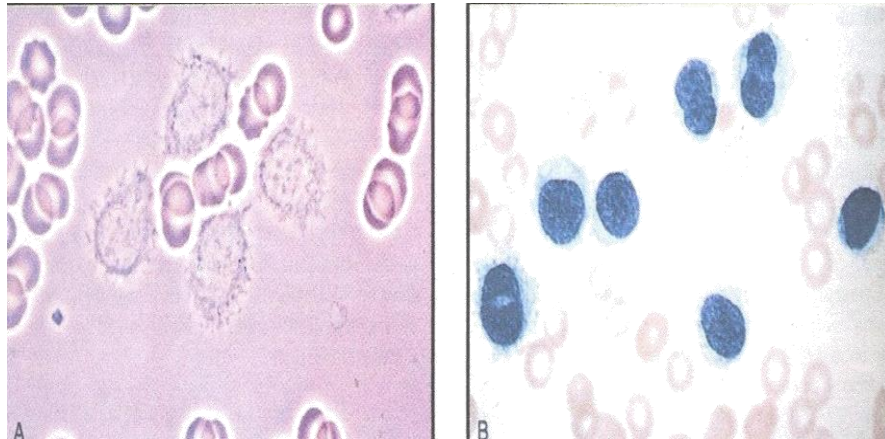
S 100

**QUESTIONS :-**

1. What is your diagnosis ?
2. What are your differential diagnosis ?
3. How did you rule them out with this panel of antibodies ?
4. What are the other investigations which can be done to confirm your diagnosis ?

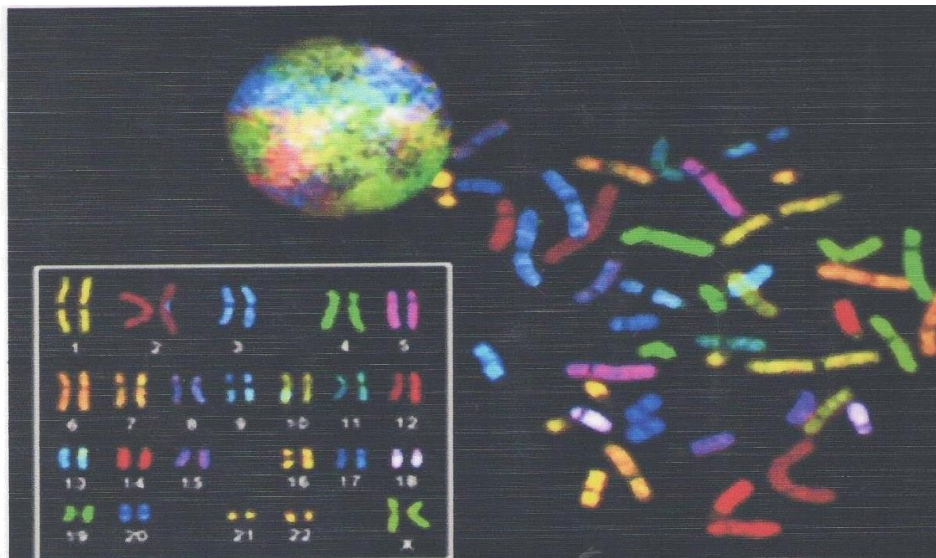
**HAEMATOLOGY**

7) 35 years old male presented with massive splenomegaly and pancytopenia. Identify the following pictures and given your diagnosis.



**QUESTIONS :-**

1. What is your diagnosis ?
2. What are the other tests to confirm your diagnosis ?
3. What are the immunohistochemical markers expressed by these cells ?
4. What is the enzyme histochemical marker available for confirmation ?



- 1) WHAT IS THE MOLECULAR DIAGNOSTIC PROCEDURE SHOWN HERE ?
- 2) WHAT ARE THE STEPS INVOLVED IN THIS PROCEDURE ?
- 3) WHAT ARE THE APPLICATIONS OF THIS MOLECULAR DIAGNOSTIC TOOL ?
- 4) WHAT IS THE ADVANTAGE OF THIS DIAGNOSTIC TOOL ?
- 5) WHAT ARE MARKER CHROMOSOMES ?

## REFERENCE BOOKS

### I. ESSENTIAL READING :-

- 1) Robbins Pathologic basic of disease – 7th edn Elsevier
- 2) Diagnostic Surgical Pathology – Sternberg.
- 3) Ackerman's Surgical Pathology – Juan Rosai – 9th edn Mosby
- 4) Diagnostic Histopathology of Tumours – Fletcher – 2nd edn Churchill Livingston.
- 5) Soft Tissue Tumours – Enzinger & Weiss
- 6) Manual and Atlas of fine needle aspiration cytology – Orell 2nd edn 2005 elsevier.
- 7) Diagnostic exfoliative Cytology – Koss 5th edn 2006 Lippincott.
- 8) AFIP fascicles on various tumours.
- 9) WHO fascicles.
- 10) Wintrobe's Haematology, 2004
- 11) Practical Haematology, Dacie ELBS edn.
- 12) Theory & Practice of Histological techniques - & staining – Bancroft & Stevens.
- 13) Recent Advances in Pathology Churchill Livingston
- 14) Handbook of autopsy practice Ludwig Humana press

## II. EXTENDED READING :-

- 1) Pathology of Liver – Macsween
- 2) Breast pathology by Rosen Lippincott 2001
- 3) Gastrointestinal pathology – Morson & Dawson Blackwell 2003.
- 4) Practical pulmonary pathology Leslie & Wick Churchill Livingston 2005
- 5) Iochim's Lymph node pathology Iochim & Ratech Lippincott William Wilkins
- 6) Blaustein's Pathology of female genital tract Springer 2002
- 7) Atlas of orthopedic pathology – Wold, Adleer, Sim, Unni 2003
- 8) Histopathology of Skin – Lever.
- 9) Pathology of Skin – Mckee, Calonje Elsevier Mosby 2005
- 10) Bone Marrow pathology – Bain Claud Lampert Wilkins 2001
- 11) Ophthalmic pathology – Spencer WB Saunders latest edn.
- 12) Biopsy interpretation series
- 13) Paediatric Pathology – Stocker & Dehner William & Wilkins 2001
- 14) Surgical pathology of nervous system and its coverings – Burger, Scheithaur, Vogel Churchill Livingston 2002.

**\*\* Note : The editions are as applicable and the latest editions shall be the part of the syllabi.**

## 17. JOURNALS

1. ACTA CYTOLOGICA
2. ADVANCES IN ANATOMIC PATHOLOGY
3. AMERICAN JOURNAL OF CLINICAL PATHOLOGY
4. AMERICAN JOURNAL OF PATHOLOGY
5. AMERICAN JOURNAL OF SURGICAL PATHOLOGY
6. ARCHIVES OF PATHOLOGY & LABORATORY MEDICINE
7. BRAIN TUMOR PATHOLOGY
8. DIAGNOSTIC CYTOPATHOLOGY
9. INDIAN JOURNAL OF PATHOLOGY AND MICROBIOLOGY
10. INTERNATIONAL JOURNAL OF GYNECOLOGICAL PATHOLOGY
11. INTERNATIONAL JOURNAL OF SURGICAL PATHOLOGY
12. JOURNAL OF CLINICAL PATHOLOGY
13. MODERN PATHOLOGY
14. JOURNAL OF ORAL PATHOLOGY & MEDICINE
15. ENDOCRINE PATHOLOGY

\*\*\*\*\*