PATHOLOGY — M D

1. BROAD GOALS

The goals of MD Pathology course is to produce a specialist who is competent to provide laboratory-based diagnosis of illness, is able to teach undergraduates and to a certain extent postgraduates, and should have an idea regarding the rudiments of research. He or she should on successfully completing the training and examination be:

1.1. 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.

> 1.1.A. *It must be emphasised that with the development of newer specialised areas such as Molecular Biology and Laboratory Medicine, the MD (Pathology) may not be sufficient to train and equip candidates to be equally versatile in these specialties which may have been partly under the realm of Pathology. Therefore appropriate expectations need to be drawn from time to time. For example, it is likely that in future, Hematology as is practiced by Pathologists in this country today, maybe the subject of the super-specialist Hematologist. It is however to be expected that the MD (Pathology) course of Indian Universities should provide sufficient training, competence and confidence in practice and diagnosis related to Histopathology (Surgical Pathology), Cytopathology, Hematology & Blood-Banking and Laboratory Medicine. Wherever possible the course should provide an opportunity to give some knowledge of the newer diagnostic specialties so that the candidate on qualifying in MD (Pathology) should be able to pursue further specialisation and training in these fields.*

1.2 able to teach and share his knowledge and competence with others

> 1.2.A. *Pathology forms the basis of understanding, diagnosis and hence the treatment of diseases. It is therefore an essential subject in the training and curriculum of various undergraduate and postgraduate courses of medicine and allied disciplines such as nursing etc. The MD (Pathology) course should therefore provide an opportunity to candidates to teach colleagues and students. There is a dearth of inspiring teachers and hence the course should attempt to bring out the best of such talents in these candidates so that, when given*

an opportunity, the successful candidate is equipped to take this responsibility in an academic institution. It is also expected that this aspect of the training of the candidate will enhance the capacity of expression and ability to explain scientific data in simple and unambiguous terms.

1.3 capable of pursuing clinical and laboratory based research.

1.3.A. *The training should include means by which the student can pursue research either independently or as a part of a team. This would inculcate a spirit of enquiry and also make it possible to accurately record observations, analyse rationally and arrive at an unbiased conclusion of problems. This entire facet is essential to the overall practice of Pathology. It is recommended that a Thesis or Dissertation be included as a part of partial fulfillment to the award of the degree of MD (Pathology).*

2. BROAD OBJECTIVES (AT THE END OF THE COURSE)

2.1. Cognitive Domain

2.1.1. Diagnose routine and complex clinical problems on the basis of Histopathology (Surgical Pathology) and Cytopathology specimens, Blood and Bone Marrow examination and various tests under the domain of Laboratory Medicine (Clinical Pathology, Clinical Biochemistry/Chemical Pathology) as well as Blood Banking (Transfusion Medicine).

2.1.2. Interpret clinical and laboratory data with reasonable accuracy.

2.1.3. Able to correlate clinical and pathology data so that various clinical signs, symptoms and manifestations of disease can be correlated and explained.

2.1.4. Advice on the nature of appropriate specimens and the tests necessary to arrive at a diagnosis in a difficult or problematic case.

2.1.5. To be able to correlate clinical and laboratory findings with pathology findings at autopsy, identify discorrelations and the causes of death due to diseases (apart from purely metabolic causes).

2.1.6. Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.

2.1.7. Carry out research.

2.1.8. Maintain accurate records of tests and their results for reasonable periods of time so that these may be retrieved as and when necessary.

2.1.9. Make and record observations systematically that is of use for archival purposes and for furthering the knowledge of Pathology.

2.1.10. Able to systematically write a paper and publish in a journal.

2.1.11. Able to present a paper in a conference through an oral presentation and poster presentation.

2.1.12. Should be able to identify problems in the laboratory and offer solutions thereof so that a high order of quality control is maintained.

2.1.13. Should be capable of effectively disposing laboratory waste to ensure minimisation of risk to infection and accidents to laboratory personnel.

2.1.14. Able to supervise and work with subordinates and colleagues in a laboratory.

2.1.15. Subject himself/herself to continuing education and constantly update his/her knowledge of recent advances in Pathology and allied subjects.

2.2. Psychomotor Domain

2.2.1. Able to perform most of the routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin sections making smears, making frozen-sections and staining.

2.2.2. Able to collect specimens by routinely performed non-invasive out-patient procedures such as venepuncture, finger-prick, fine needle aspiration biopsy of superficial lumps and bone-marrow aspirates. It is implied that that the complications of these procedures and handling of complications are apparent. Further, whenever necessary must be able to provide appropriate help to colleagues performing an invasive procedure such as a biopsy or an imaging guided biopsy.

2.2.3. Perform an autopsy, dissect various organ complexes and display the gross findings.

2.2.4. Should be familiar with the function, handling and routine care of equipment in the laboratory.

2.3. Affective Domain

2.3.1. Should be able to function as a part of a team that is essential for the diagnosis and management of a patient. He/she should therefore develop an attitude of cooperation with his/her colleagues so necessary for this purpose. It is implied that he/she will whenever necessary interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2.3.2. Always adopt ethical principles and maintain proper etiquette in his/her dealings with patients, relatives and other health personnel.

2.3.3. Respect the rights of the patient including the right to information and second opinion.

2.3.4. Should seek and give second opinion only where necessary.

2.3.5. Provide leadership and inspire members of the team with whom he/she is involved with in the fields of diagnostic pathology, teaching and research.

2.3.6. Develop communication skills not only to word reports and professional opinions but also to interact with patients, relatives, peers and paramedical staff.

3. COURSE DESCRIPTION

3.1. Duration of Course

It is recommended that the course of Doctor of Medicine (Pathology) or M.D. (Pathology) be of THREE YEARS duration in the form of a Residency Programme that is FULL TIME.

Eligibility

3.2.1. The essential qualification shall be MBBS Degree of any Indian University/ Deemed University/Autonomous Institutions etc., as recognised by the Medical Council of India (MCI).

3.2.2. Postgraduate Diploma in Clinical Pathology (DCP) may be taken as an added qualification for the eligibility of a candidate only if such a clause is recognised by the rules and

regulations of any particular university/ deemed university/autonomous institution etc.

3.2.3. Any other qualification of a foreign university that is recognised by the MCI and the concerned university as equivalent to the MBBS Degree.

3.2.3.A.*The guidelines in such situations are obviously beyond the scope of this curriculum and can be provided by the competent authorities only.*

3.3. Selection

It is recommended that the selection be made on the basis of an entrance examination with Multiple Choice Questions of the level of MBBS, including all subjects of the MCI recognised MBBS course and preferably with atleast 10% of questions testing cognition in Pathology. A separate additional paper in Pathology (predominantly MBBS level with 10% questions testing higher levels) would be ideal.

3.3.A. *It is appreciated that individual universities or equivalent bodies/institutions will have their own methods of selection.*

4. SCOPE OF TRAINING

While professional training in all branches is equally important, since they are inter-dependent and competitive, a balance of emphasis is desirable, as a guideline to the student. It must be appreciated that within the time period of the Training Programme which covers a wide range of subjects and subspecialties, it is difficult, if not impossible, to achieve full proficiency in all the technological methods and available theoretical knowledge. The following categorization is recommended.

4.1. High Degree of Professional Competence

In the following fields in which a high degree of professional competence and theoretical knowledge is expected. The candidate is expected to know both the theoretical as well as practical aspects especially related to diagnosis of appropriate diseases.

4.1.1. Pathologic Anatomy (Surgical Pathology and Cytopathology)

The study of Pathologic Anatomy includes all aspects of Pathology as encompassed in the branches of General Pathology and Systemic Pathology. Therefore only the broad outlines are provided and a compendium of chapters as available in standard books is avoided.

4.1.1.1. 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 injury.

4.1.1.1.A. *The scope of General Pathology is vast and the above is a guideline that in essence covers all aspects.*

4.1.1.2. Systemic Pathology:

The study of normal structure and function of various organ systems and the aetiopathogenesis, gross and microscopic alterations of structure and function of these organ systems in disease.

4.1.1.2.A. *All organ systems are to be studied. This forms the basis of Histopathology (Surgical Pathology), Cytopathology, Autopsy Pathology and clinico-pathological correlation.*

4.1.2. 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.

4.2. Reasonable working knowledge

In the following fields the student is expected to achieve reasonable working knowledge and diagnostic skill, and be able to run independently a routine service in a teaching hospital, and if necessary, at some future date, with some additional effort acquire the level of competence as in **4.1.** Some centers have separate degrees/diplomas/postgraduate courses for some of these subjects. However, current practice of pathology, both institutional or otherwise demands a reasonable working knowledge of these subjects and therefore until such time as the situation demands, these subjects should be an integral part of post-graduate training in pathology.

4.2.1. Laboratory Medicine (Clinical Chemistry/Clinical Biochemistry/Chemical Pathology and Microscopy/Clinical Pathology including Parasitology).

4.2.2. Transfusion Medicine (Blood–Banking).

4.3. General Acquaintance

Following are the fields in which the student is expected to acquire a general acquaintance of techniques and principles and competence to understand and interpret data without being called upon to achieve technologic proficiency.

4.3.1. Immunopathology

4.3.2. Electron microscopy

4.3.3. Histochemistry

4.3.4. Immunohistochemistry

4.3.5. Use of radioisotopes

4.3.6. Cytogenetics

4.3.7. Tissue culture

4.3.8. Medical statistics

4.3.9. Molecular Biology

4.3.10. Maintainence of records

4.3.11. Information retrieval, Computer, Internet in medicine.

4.3.A. *It is expected that the level of proficiency that is to be expected may vary. Therefore the level of competence in Immunopathology assumes importance in the interpretation of Renal Diseases. Similarly the findings on Immunohistochemistry may be as important as the findings on light microscopy in a particular case.*

5. COURSE CONTENT

Unlike the undergraduate syllabus, it is difficult to give a precise outline of the Course Content for postgraduate training. A postgraduate appearing for the MD degree is supposed to have acquired not only professional competence expected of a well-trained specialist but also academic maturity, a capacity to reason and critically analyse a set of scientific data. He is supposed to keep himself *au courant* with the latest developments in the field of the pathology and related sciences. A brief outline of what is expected to have learnt during each of the postings in the different sections/laboratories during the MD Course will be given under each head.

5.1. Surgical Pathology

5.1.1. Knowledge

5.1.1.1. The student should be able to demonstrate understanding of the histogenetic and patho-physiologic processes associated with various lesions during discussions with colleagues, clinicians, students and patients.

5.1.1.2. Should be able to identify problems in the laboratory and offer viable solutions.

5.1.2. Skills

5.1.2.1. 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 diagnose at least 80 percent of the lesions received on an average day from the surgical service of an average teaching hospital.

5.1.2.2. A student will 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 and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.

5.1.2.3. Given the relevant clinical, operative and radiological data, 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 and as far as possible, correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day. He/she should be able to diagnose at least 75% of the classical lesions being commonly encountered in the surgical pathology service without the aid of the clinical data.

5.1.2.4. Start the automatic tissue-processing machine and verbally demonstrate his understanding of the principles of its running.

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

5.1.2.6. Stain paraffin sections with at least the following:

(i) Haematoxylin and eosin

(ii) Stains for collagen, elastic fibers and reticulin

(iii) Iron stain

(iv) PAS stain

5.1.2.7. 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

5.1.2.8. Cut a frozen section of tissues received from the operating room for quick diagnosis, stain and interpret the slide in correlation with the clinical data provided, and correctly diagnose at least 75 per cent of the lesions within 15 minutes.

5.1.2.9. Demonstrate the understanding of the utility of various immunohistochemical stains especially in the diagnosis of tumour subtypes.

5.2. Autopsy Pathology

5.2.1. Knowledge

5.2.1.1. Should be aware of the technique of autopsy.

5.2.1.2. Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.

5.2.2. Skills

5.2.2.1. Demonstrate ability to perform a complete autopsy independently with some physical assistance, correctly following the prescribed instructions. Correctly identify all major lesions which have caused, or contributed to, the patient's death on macroscopic examination alone in at least 90% of the autopsies in an average teaching hospital. In exceptional circumstances, help of a frozen section may be obtained.

> 5.2.2.1.A. *In places where non-medicolegal autopsies are not available each student/candidate should be made to dissect organs from atleast five medico-legal autopsies.*

5.2.2.2. Identify and correctly diagnose at least 90% of the microscopic lesions found in most autopsies, and be able to correlate the pathologic changes with the patient's clinical history and events of a few days preceding death.

5.2.2.3. Write correctly and systematically Provisional and Final Anatomic Diagnosis reports (on gross and microscopy respectively), the major findings at autopsy, and the Autopsy Protocol as per prescribed instructions, of a standard fit for an international journal.

5.3. Cytopathology

5.3.1. Knowledge

5.3.1.1. Should posses the background necessary for the evaluation and reporting of Cytopathology specimens.

5.3.1.2. Demonstrate verbal familiarity with, and guide the clinical residents in the following, keeping in view the special requirements of each case (Cyto-hormonal status, malignancy, infection, etc.)

(i) Choice of site from which smears may be taken (as in the case of vaginal smears)

(ii) Type of smear (morning specimen, after specimen, pre-menstrual specimen, etc.)

(iii) Method of obtaining various specimens (urine sample, gastric smear, colonic lavage etc.)

5.3.2. Skills

5.3.2.1. Independently prepare and stain good quality smears for cytopathologic examination and be conversant with the principles and preparation of solutions of stains.

5.3.2.2. Demonstrate conversance with the techniques for concentration of specimens: i.e. various filters and cytocentrifuge.

5.3.2.3. 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.

5.3.2.4. 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 categorize 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 atleast 75% of cases.

5.4. Haematology

5.4.1. Knowledge

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

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

5.4.1.3. Should have knowledge of automation and quality assurance in Haematology.

5.4.2. Skills

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

5.4.2.2. Correctly and independently perform the following special tests, in addition to doing the routine blood counts:

(i) Haemogram including Reticulocyte and Platelet counts.

(ii) Bone marrow staining including stain for iron

(iii) Blood smear staining

(iv) Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, Oil Red O, Acid Phosphatase (including Tartarate resistant) and Non-specific esterase

(v) Osmotic fragility

(vi) Fetal Haemoglobin

(vii) Sickling phenomenon

(viii) Bleeding time

(ix) Clotting time

(x) Prothrombin time (PT)

(xi) Activated partial thromboplastin time (APTT)

(xii) Haemoglobin electrophoresis, paper electrophoresis

(xiii) Coombs Test

(xiv) Clot Solubility Test

5.4.2.3. Demonstrate familiarity with the principle and utility in diagnosis of the following:

(i) Red cell indices

(ii) Plasma haemoglobin

(iii) Haemosiderin in urine

(iv) Presumptive tests for complete antibodies

(v) Ham's Acid test

(vi) Sugar water test

(vii) Serum electrophoresis

(viii) Platelet function tests including platelet aggregation and adhesion and PF3 release

(ix) Russell's viper venom time (RVVT)

(x) Coagulation Factor assays

(xi) Screening for coagulation factor inhibitors

(xii) Fibrin Degradation Products (FDP), D-Dimers

(xiii) Monitoring of anticoagulant therapy

(xiv) Tests for thrombosis: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein s (Pr S), Antithrombin III (AT III)

(xv) Serum ferritin

(xvi) Serum iron and total iron binding capacity

(xvii) Immunophoretic typing

(xviii) Cytogenetics

5.4.2.2. Demonstrate verbally and in writing, his/her under- standing of the principles of the above tests their utility in diagnosis and interpretation of results.

5.4.2.3. Perform a successful bone marrow aspiration/iliac crest biopsy and stain the peripheral and bone marrow smears with Romanowsky stains.

5.4.2.4 Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least 90% of the cases referred to the Haematology clinic, given the relevant clinical data.

5.4.2.5. Posses working knowledge of the following:

(i) Bone marrow transplantation

(ii) Prenatal diagnosis of genetic haematological diseases

(iii) Molecular biology of haematological diseases

5.5. Laboratory Medicine

5.5.1. Knowledge

5.5.1.1. Demonstrate familiarity with the normal range of values of the chemical content of body fluids, significance of the altered values and interpretation thereof.

5.5.1.2. Possess knowledge of the principles of following specialized organ function tests and the relative utility and limitations of each and significance of the altered values.

(i) Renal function test

(ii) Liver function test

(iii) Gastric and Pancreatic function

(iv) Endocrine function test

(v) Tests for malabsorption

5.5.1.3. Explain the biochemical principles involved in the above estimations.

5.5.1.4. Know the principles, advantages and disadvantages scope and limitation of Automation in laboratory.

5.5.1.5. Learn the principles and methodology of quality control in laboratory.

5.5.2. Skills

5.5.2.1. 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. He should be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.

5.5.2.2 Demonstrate familiarity with and successfully perform a routine Urinalysis including Physical, Chemical and Microscopic, examination of the sediment.

5.5.2.3 Demonstrate familiarity with and successfully perform the macroscopic and microscopic examination of Faeces and identify the ova and cysts of common parasites.

5.5.2.4. Independently and successfully perform a complete examination; physical, chemical and cell content of Cerebrospinal Fluid (C.S.F). , Pleural and Peritoneal fluid.

5.5.2.5. Successfully perform an examination of Peripheral Blood for the commonly occurring parasites.

5.5.2.6. Independently perform a Semen analysis.

5.5.2.7. Independently and correctly perform at least the following Quantitative Estimations by Manual Techniques and/or Automated Techniques.

(i) Blood urea

(ii) Blood sugar

(iii) Serum Proteins total & fractional

(iv) Serum BiIirubin total & fractional

(v) Serum amylase

5.5.2.8. Demonstrate familiarity with the following Quantitative Estimations by Automated Techniques.

(i) Serum cholesterol*

(ii) Uric acid

(iii) Serum Transaminases (ALT and AST/SGOT and SGPT)

(iv) Serum Alkaline Phosphatase

(v) Creatinine*

(vi) Serum calcium and phosphorous

(vii) Serum Electrolyte (Na+ and K+)

5.5.2.8.A. **Must also be familiar with the manual method*

5.5.2.9. Demonstrate familiarity with:

(i) Determination of bicarbonates

(ii) Blood gas analysis.

5.5.2.10. Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution and Buffers.

5.5.2.11. Explain the principle of Instrumentation, use and application of the following instruments.

(i) Photoelectric colorimeter

(ii) Spectrophotometer

(iii) pH meter

(iv) Flame photometer

(v) Centrifuge

(vi) Analytical balance

(vii) Electrophoresis apparatus

(viii) Light Microscope

(ix) Blood gas analyser

5.6. Transfusion Medicine (Blood Banking)

5.6.1. Knowledge

It is expected that students should possess knowledge of the following aspects of Transfusion Medicine.

5.6.1.1. Basic immunology

5.6.1.2. ABO and Rh groups

5.6.1.3. Clinical significance of other blood groups

5.6.1.4. Transfusion therapy including the use of whole blood and RBC concentrates.

5.6.1.5. Blood component therapy.

5.6.1.6. Rationale of pre-transfusion testing.

5.6.1.7. Infections transmitted in blood.

5.6.1.8. Adverse reactions to transfusion of blood and components

5.6.1.9. Quality control in blood bank

5.6.2. Skills

It is expected that the student shall correctly and independently perform the following.

5.6.2.1. Selection and bleeding of donors

5.6.2.2. Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.

5.6.2.3. ABO and Rh grouping.

5.6.2.4. Resolving ABO grouping problems by secretor status in saliva and expanded panel.

5.6.2.5. Demonstrate familiarity with Antibody screening by

(i) LISS (Low-ionic salt solution)

(ii) Enzymes

(iii) AHG (Anti-Human Globulin)

5.6.2.6. Steps to be taken if the above are positive.

5.6.2.7. Demonstrate familiarity with Crossmatching by

(i) LISS (Low-ionic salt solution)

(ii) Enzymes

(iii) AHG (Anti-Human Globulin)

5.6.2.6. Steps to be taken if there is incompatibility.

5.6.2.7. Demonstrate familiarity with Antenatal and Neonatal work

(i) Direct antiglobulin test

(ii) Antibody screening and titre

(iii) Selection of blood for exchange transfusion

5.6.2.8. Demonstrate familiarity with principle and procedures involved in

(i) Resolving ABO grouping problems.

(ii) Identification of RBC antibody.

(iii) Investigation of transfusion reaction.

(iv) Testing of blood for presence of

(a) HBV (Hepatitis B Virus Markers).

(b) HCV (Hepatitis C Virus Markers)

(c) HIV (Human Immunodeficiency Virus Testing)

(d) VDRL

5.7. Basic Sciences (in relation to Pathology)

5.7.1. Immunopathology

5.7.1.1. 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

5.7.1.2. Skills

(i) Perform and interpret simple immunological tests used in diagnosis of diseases and in research procedures.

(a) Immunoelectrophoresis

(b) Immunofluorescence techniques especially on kidney and skin biopsies

(c) Countercurrent electrophoresis for demonstration of antigen

(d) Latex agglutination

(ii) Perform and interpret:

(a) Anti-nuclear Factor (ANF)

(b) Anti-neutrophil cytoplasmic antibody (ANCA)

5.7.2. Electron Microscopy

5.7.2.1. 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)

5.7.2.2. Skills

(i) Perform proper fixation, processing and staining of tissues for electron microscopy.

(ii) Recognise the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriate photographs).

5.7.3. Enzyme Histochemistry

5.7.3.1. Knowledge

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

5.7.3.2. Skills

(i) Operate the cryostat, and demonstrate familiarity with the principles of its working and be able to stain tissue sections for some cell constituents.

(ii) Demonstrate familiarity with the commonly used enzyme histochemical procedures.

5.7.4. Immunohistochemistry

5.7.4.1. Knowledge

Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using both PAP (Peroxidase-Antiperoxidase) and ABC (Avidin-Biotin Conjugate) Systems; employing monoclonal and polyclonal antibodies.

5.7.4.2. Skills

Be able to perform immunohistochemical staining using paraffin section with at least one of the commonly used antibodies (*Cytokeratin or LCA*) using PAP method.

5.7.5. Molecular Biology

5.7.5.1. Knowledge

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

5.7.5.2. Skills

Should be conversant with the steps of a Polymerase Chain Reaction (PCR) and should demonstrate understanding of the steps and principles of interpretation of Western Blot, Southern Blot, Northern Blot and Hybridisation procedures.

5.7.6. Principles Of Medical Statistics

5.7.6.1. Knowledge

Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies e.g., correlation coefficients, expected versus observed, etc. and their interpretation.

5.7.6.2. Skills

Calculate means, standard deviation and standard error from the given experimental data

5.7.7. Radio Isotope and Autoradiography

5.7.7.1. Knowledge

Demonstrate familiarity with the principles of the commonly used radioisotopes in medicine and autoradiography, and the instruments used to measure radioactivity.

5.7.8. Tissue Culture

5.7.8.1. Knowledge

Demonstrate familiarity with methods of tissue culture.

5.7.9. Cytogenetics

5.7.9.1. Knowledge

Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridisation (FISH).

5.A.	Important Note
(i)	It is appreciated that the facilities in Institutions vary and this is more likely in the case of Basic Sciences Training. All efforts must be made so that the student gets an opportunity to be familiar with all the aspects of expected training that have been mentioned. If necessary extra-mural postings may be considered to take care of any likely shortcomings in the training. It must be emphasised that the training for the degree of MD (Pathology) is not merely to produce a diagnostic pathologist well versed with routine diagnosis but also to ensure all-round development of the student who will be an asset to the society as a responsible teacher and scientist.
(ii)	Development of knowledge and skills in fields not mentioned explicitly should be encouraged. Thus knowledge in imaging techniques and their interpretation would be an asset while interpreting diseases of bones and joints. Knowledge regarding the nature of therapy for various diseases would be helpful not only in identifying iatrogenic diseases but also in actively participating in the diagnosis and management of patients. The relevance of every report of a patient thus becomes more easily understood. No branch of medicine is today restricted or isolated to it. The overall well being of the sick is a team-effort. The student must learn that working, as a team is essential today.
(iii)	It should be the endeavor of every training programme to emphasise on quality control and also on the limitations of each and every test.

6. RESEARCH

All effort must be made so that research methodology is apparent at the end of the course. It is recommended that students submit a Thesis or Dissertation six months prior to examinations as a partial fulfillment to the award of the degree of MD (Pathology). Students should be encouraged to present papers in conferences and publish papers in peer reviewed journals. Due emphasis must be laid on the

importance of obtaining ethical clearance from appropriate committees for both animal and human studies.

A separate course for training in research methodology may not be necessary. Skills will be acquired largely depending on the topic of research. The following points are guidelines to what may be expected of the student at the end of the course.

6.1. Recognise a research problem – basic or applied

6.2. Clearly state the objectives in terms of what is expected to be achieved in the end.

6.3. Plan rational approaches with appropriate controls with full awareness of the statistical validity of the size of experimental material.

6.4. Carry out most of the technical procedures required for the study.

6.5. Accurately and objectively record on systematic lines the results and observations made.

6.6. Analyse the data with the aid of an appropriate statistical analysis, if necessary.

6.7. Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.

6.8. Take photomicrographs, of a quality fit for publication in an international journal

6.9. Write the thesis or a scientific paper in accordance with the prescribed instructions, as expected of international standards.

> 6.A. *It should be appreciated that a clear definition of the goals and precise objectives before starting a research project is as essential as stating one's destination before starting for the journey. These must be stated in clear, unambiguous terms as ultimate results of the study and not as the methods of approach to the problem.*

7. TRAINING METHODS

Human pathology consists of two fundamentally inter-related disciplines: the function of the cell, an integration and correlation of the structural and functional alterations undergone by it and the organ and body as a whole in disease. The superstructure is constituted by diagnostic pathology concerned with the application of the above knowledge, and that of the investigative procedures in the recognition and quantitation of disease. In the training of a pathologist, acquisition of both these disciplines is essential. Eventually, the primary role of the pathologist is to apply the basic understanding of the disease processes to patient care, with the intellectual rigor and careful delineation of problems, characteristic of the research investigator. The training programme should be designed to enable the student to acquire a capacity to learn and investigate for himself, 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 embrace the above broad objectives. *Much 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. The following is a rough guideline to various teaching/learning activities that may be employed.

7.1. Collection of specimens including Fine needle aspiration of superficial lumps.

7.2. Grossing of specimens.

7.3. Performing autopsies.

7.4. Discussions during routine activities such as during signing out of cases.

7.5. Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.

7.6. Clinico-pathological conferences.

7.7. Intradepartmental and interdepartmental conferences related to case discussions.

7.8. Conferences, Seminars, Continuing Medical Education (CME) Programmes.

7.9. Journal Club.

7.10. Research Presentation and review of research work.

7.11. Guest and in-house lectures.

7.12. Participation in workshops, conferences and presentation of papers etc.

7.13. Laboratory-work.

7.14. Use and mantainence of equipment.

7.15. Mantainence of records.

7.16. Teaching undergraduates and paramedical staff.

7.A. *For the purpose of thesis/dissertation, as far as possible, each individual must be given the freedom of choice of his/her own subjects he would like to study. He/she should be given an opportunity to apprise himself/herself with topics of current research interests of each member of the faculty. In case the student does not have a preference of his/her own, topics are to be suggested by the faculty who ensure that there is generally an equitable distribution of the postgraduates among the faculty. It is obvious that the thesis or dissertation will be on a topic on which there is general interest, expertise and facilities with the faculty. Interdepartmental collaboration should be encouraged to widen the scope and outlook of the research proposal and training.*

8. STRUCTURED TRAINING PROGRAMME

A structured scheme of training is recommended so that every student is exposed to different aspects of the subject and acquires sufficient knowledge and skill as expected from the course. The method by which this is done may vary from institution to institution. However, it is suggested that one senior member of the faculty be given the chief responsibility for organising and coordinating this programme and any enquiries may be made or assistance taken, if necessary, from him/her. 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. Posting schedules may be modified depending on needs, feasibility and exigencies. It is appreciated that individual institutions may find it convenient to follow a different pattern of posting.

	Section/Subject	**Duration in months**
(i)	Surgical Pathology and Autopsy	12
(ii)	Surgical Pathology Techniques	1
(iii)	Haematology	5

(iv)	Cytopathology	4
(vi)	Thesis/Dissertation Work	4
(vii)	Laboratory Medicine	4
(viii)	Transfusion Medicine/Blood Bank	2
(ix)	Basic Sciences including Immunopathology, Electronmicroscopy, Molecular Biology, Research Techniques etc.	2
(x)	Elective/reorientation	1
	Total	**35**

8.A.*Extramural postings to reputed institutions or to other institutions to learn techniques not available in the parent institution and also to acquire knowledge and skill in some aspects of the course may be encouraged.*

9. EVALUATION

A standardised scheme of evaluation is necessary to train candidates in any teaching programme. Both formative and summative evaluations are therefore mandatory.

9.1. Internal (Formative) Assessment

Internal Assessment should in reality be done everyday to assess the training and to identify the weakness as well as the strength of the candidate. Thus appropriate corrective methods can be adopted at the right time so that a well-trained and competent pathologist worthy of a postgraduate degree is available for the society. However a formal assessment can be recorded at the end of every posting and reviewed every six months.

9.1.1. A logbook should be maintained recording the duration of posting, the period of absence, if any, skills performed, and remarks if any by the teacher/faculty member. The logbook should also record journal clubs, seminars attended and partaken as well as undergraduate teaching activities the candidate has participated.

9.1.2. Research work should be assessed or reviewed every six months. The protocol and the final results should be presented to the entire department.

9.1.3. Evaluation sheets may be incorporated for the purpose of assessment. The following points may be considered in the scheme for evaluation of presentations such as seminars and journal clubs:

(i) Choice of article/topic (unless specifically allotted)

(ii) Completeness of presentation

(iii) Clarity and cogency of presentation

(iv) Understanding of the subject and ability to convey the same

(v) Whether relevant references have been consulted

(vi) Ability to convey points in favour and against the subject under discussion

(vii) Use of audio-visual aids

(viii) Ability to answer questions

(ix) Time scheduling

(x) Overall performance

In the case of specific postings similar points may be assessed with regard to knowledge and skills. It is also recommended that the candidate be assessed with regard to the following:

- Ability to get along with colleagues
- Conduct with patients and staff

9.1.4. Grading may be done in one of the following ways:

(i) Awarding actual marks

(ii) Awarding scores:
0 = Poor
1 = Below average
2 = Average
3 = Above average
4 = Good

(iii) Awarding grades
A+ = 90% - 100%
A = 80% - 89%
A- = 75% - 79%
B+ = 70% - 74%
B = 60% - 69%
B- = 50% - 59%
C = < 50%

9.1.4.1. The grades must be endorsed by more than one faculty member or an average obtained by pooling the grades of different faculty members. This must be conveyed to the candidate periodically (atleast once in every six months) so that the candidate knows where he or she stands.

9.1.A. *It must be understood that different institutions may have different schemes of internal assessment (including periodical tests). The above scheme is a suggestion that can be modified according to convenience and improved upon. Please see Appendices on page 31 for a sample of some of the Scoring/ Grading schemes.*

9.2. University (Summative) Assessment

The university or summative examination shall be held at the end of three years of the training programme. This would include assessment of the thesis or dissertation and a formal examination on the theoretical and practical aspects of the speciality of Pathology.

9.2.1. The thesis/dissertation should be evaluated by atleast two external examiners well-versed in the topic studied. It is therefore recommended that thesis/dissertation be submitted for evaluation six months prior to the theory and practical examinations. The results of the evaluation should be available prior to the practical examinations. If necessary grades may be awarded as given under 9.1.4.

9.2.2. For the formal examinations there should be two external and two internal examiners.

9.2.3. The Theory Papers shall be set preferably by the external examiner suitably moderated by the internal examiners.

9.2.4. There shall be four theory papers:

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

Paper II: Systemic Pathology

Paper III: General Pathology, Pathophysiology, Immunopathology & Cytopathology

Paper IV: Recent advances & applied aspects

9.2.5. Each paper should have ten short answer questions (SAQ) or one long answer question (LAQ) and six short answer questions (SAQ).

9.2.6. Practical Examination should be conducted over a minimum period of two days.

The following is a guideline of the aspects to be covered:

(i)	Clinical Pathology:	Discussion of a clinical case history Plan relevant investigations of the above case Two investigations should be performed Complete urinalysis
(ii)	Haematology:	Discuss haematology cases given the relevant history Plan relevant investigations Perform atleast two tests preferably including coagulation exercise Identify electrophoresis strips, osmotic fragility charts etc. Examine, report and discuss ten cases given the history and relevant blood smears and/ or bone marrow aspirate smears
(iii)	Transfusion: Medicine	Perform blood grouping Perform the necessary exercise given a relevant history
(iv)	Histopathology: Cytopathology	Examine, report and discuss ten to twelve histopathology and three to five cytopathology cases given the relevant history and slides Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section Report on a frozen section
(v)	Autopsy:	Given a case history and relevant organs (with or without slides) give a list of anatomical diagnosis in a autopsy case.
(vi)	Gross Pathology:	Describe findings of gross specimens, give diagnosis and identify the sections to be processed
(vii)	Basic Sciences:	Identify electronmicrographs Identify gels, results of PCR, immunological tests including staining for direct/indirect immunofluorescence Identify histochemical and immunohistochemistry stains

9.2.7. *Viva-voce* is expected to be conducted at every stage of the practical examination. Additionally a formal "grand" viva-voce may be held at the end of the practical examination. Questions on the thesis/dissertation may be asked at this time.

9.2.8. Marking may be done by any of the methods suggested in 9.1.4. Grading rather than actual marking is to be preferred because in a post-graduate examination, which is currently subjective to a large extent, it may be extremely difficult to differentiate performance differences within ranges of 1% to 5%.

9.2.A. *The above are guidelines only. It is appreciated that individual universities/ institutions may have well-laid out and time-tested methods of examinations. It is recommended that attempts be made to ensure that examinations be as objective as possible. The introduction of structured short answers, multiple choice questions and objective-structured practical examinations (OSPE) may be considered. Never5thless the value of long answer questions in evaluating a candidate's ability to comprehend and systematically explain scientific literature cannot be undermined. Similarly viva-voce, though subjective allows an in-depth examination of the candidate's strengths and weaknesses in the subject.*

10. CRITERIA FOR DEPARTMENTS TRAINING STUDENTS

It is recommended that any department that wishes to train a candidate leading to the award of the post-graduate degree in MD (Pathology) should fulfil the following criteria.

10.1. The department should be part of a teaching hospital attached or affiliated to a Medical College and/or University or should be a deemed university or autonomous institution recognised by appropriate authorities including the Medical Council of India.

10.2. The institution should have various departments encompassing different medical (includes all aspects of medical sciences and not merely the subject of medicine) specialties and super-specialties so that there is no dearth of clinical material, there is adequate scope of interaction with different departments and overall training of the candidate as given earlier.

10.3. The department should be of minimum three years standing performing all routine activities as is necessary to fulfil the training requirements of MD (Pathology).

10.4. For the first candidate, there should be a minimum of three faculty members of which one has a minimum of five years and the other two a minimum of three years teaching experience after MD (Pathology) or any such degree recognised by the Medical Council of India.

10.5. It is recommended that a maximum of two candidates be admitted for every Professor, three for every two Additional Professors/ Readers/Associate Professors and one for every Assistant Professor/ Lecturer (with three years experience after the requisite qualification). In case there is only one Additional Professor/ Reader/Associate Professor then two candidates may be selected. It must be emphasised that this is a guideline for the calculation of total MD (Pathology) students at any given time in a department.

10.6. It is expected that all the Faculty members are full-time employees of the institution concerned.

10.7. Every thesis/dissertation shall have one Guide/Supervisor and atleast one Co-guide/Co-supervisor from the department. Co-guides/Co-supervisors from other departments may be opted as necessary. In the event of the Guide/Supervisor leaving or retiring, the senior-most Co-guide/ Co-Supervisor from the department shall take over as the Guide/Supervisor. Institutional/

University guidelines are to be followed regarding the appointment of Guides/Supervisors. It is recommended that at any given time one Faculty member should not be the Guide/Supervisor for more than five candidates. No such limit can be applied to Co-guides/Co-supervisors.

10.A. *It must be emphasised that the above are only guidelines and it is necessary to apply the rules and regulations as approved by the Medical Council of India, concerned Universities and the institution.*

11. READING MATERIAL

A complete list of reading material is extremely difficult to provide for the postgraduate student in Pathology. In any postgraduate course reading should not be limited only to the subject of specialisation. One is expected to acquire as much theoretical and practical knowledge as possible. There can be no set guidelines in this regard. Students must be encouraged to utilise the Internet and similar information technologies to further their knowledge and to supplement conventional reading.

The following is an incomplete list of reading material that may b helpful to a postgraduate student of Pathology. The habit of referring to current literature and the method of searching for literature must be made a mandatory component of the training.

11.1 Journals and Periodicals

- Acta Cytologica
- The American Journal of Pathology
- The American Journal of Surgical Pathology
- The American Journal of Hematology
- The American Journal of Clinical Pathology
- Archives of Pathology and Laboratory Medicine
- British Journal of Haematology
- Blood
- Diagnostic Cytopathology
- Histopathology
- Human Pathology
- Indian Journal of Cytology
- Indian Journal of Pathology and Microbiology
- Journal of Pathology
- Journal of Clinical Pathology
- Laboratory Investigation
- Modern Pathology
- Pathology
- Seminars in Hematology
- Seminars in Diagnostic Pathology

- Virchows Archives
- Year Book Series
- Recent Advances Series

The list of journals is incomplete. It is also expected that the students make it a habit to read other journals because pathology is not confined to pathology journals alone. Specialty journals such as those related to oncology (Cancer, British Journal of Cancer, International Journal of Cancer, Cancer Research, Journal of National Cancer Institute, Journal of Surgical Oncology etc.) are excellent sources of information regarding the pathology of tumours. Similarly journals related to Cardiology, Chest Diseases, Dermatology, Endocrinology, Gynecology, Gastroenterology, Hepatology, Nephrology, Neurology, Neurosurgery, etc. are invaluable sources of material on the appropriate pathology. Further Journals such as Lancet, New England Journal of Medicine, Nature and Science are a must for every postgraduate student who wishes to keep abreast with what is new in medical science and therefore in pathology.

11.2. Books

- Histology for Pathologists. *Stephen S. Sternberg (Ed*), Raven Press, New York.
- General Pathology *JB Walter, MS Israel*. Churchill Livingstone, Edinburgh
- Robbin's Pathologic Basis of Disease *Ramzi S.Cotran, Vinay Kumar, Stanley L Robbins* WB Saunders Co., Philadelphia.
- Pathology *Emanuel Rubin, John L Farber.* JB Lippincott Co., Philadelphia
- Anderson's Pathology. *John M Kissane (Ed)*. The CV Mosby Co., St. Louis
- Ackerman's Surgical Pathology. *Juan Rosai* Mosby. St. Louis
- Diagnostic Surgical Pathology. *Stephen S Sternberg*. Lippincott, William Wilkins. Philadelphia
- Systemic Pathology. *W St. C Symmers (Series Ed)* Churchill Livingstone, Edinburgh
- Diagnostic Histopthology of Tumours. *Christopher DM Fletcher (Ed)*. Churchill Livingstone. Edinburgh.
- Soft Tissue Tumors. *Franz M Enzinger, Sharon W Weiss*. Mosby, St. Louis
- Cardiovascular Pathology *Malcolm D Silver* Churchill Livingstone New York.
- Pathology of Pulmonary Diseases *Mario J Saldhana*. JB Lippincott Co., Philadelphia
- Spencer's Pathology of the Lung. *PS Hasleton*. Mc Graw-Hill, New York.
- Dahlin's Bone Tumors. *K Krishnan Unni*. Lippincott-Raven Publishers, Philadelphia, New York
- Bone Tumours *Andrew G Huvos* WB Saunders Co. Philadelphia
- Greenfield's Neuropathology. *J Hume Adams (Ed)* Edward Arnold, London.
- Russell & Rubeinstein's Pathology of the Tumours of the Nervous System. *Darrell D Bigna. Roger E Mc Lendon, Janet M Bruner (Eds.),* Arnold, London
- Rosen's Breast Pathology. *Paul Peter Rosen*. Lippincott-Raven Publishers, Philadelphia, New York.
- Pathology of the Gastrointestinal Tract. *S-I Chun Ming. Harvey Goldman (Eds.)* Williams & Wilkins, Baltimore.

- Haynes and Taylor Obstetrical & Gynaecological Pathology. *H Fox, M Wells*. Churchill Livingstone New York.
- Heptinstall's Pathology of the Kidney. *J Charles Jenette, Jean L Olson, Melvin M Schwartz, Fred G Silva (Eds.)*. Lippincott-Raven Publishers, Philadelphia, New York.
- Potter's Pathology of the Fetus & Infant. *Enid Gilbert-Barnes (Ed)*. Mosby, St. Louis
- Lever's Histopathology of the Skin, *David Elder (Ed)*, Lippincott-Raven Publishers, Philadelphia, New York
- Theory and Practice of Histological Techniques, *Bancroft JD, Stevens A, Turner DR*, Churchill Livingstone, Edinburgh
- Histotechnology – A Self Instructional Text, *Carson FL*, American Society of Clinical Pathologists, Chicago
- Histochemistry Theoretical and Applied. *AG Everson Pearse*. Churchill Livingstone, Edinburgh
- Manual & Atlas of Fine Needle Aspiration Cytology. *Svante R Orell, Gregory F Sterrett, Max N-I. Walters, Darrel Whitaker.* Churchill Livingstone, London
- Cytopathology. *Zuher M Naib*. Little Brown and Company, Boston.
- Diagnostic Cytology and its Histopathologic Basis, *Koss LG*, J.B. Lippincott, Philadelphia
- Comprehensive Cytopathology, *Bibbo M*, W.B. Saunders Co., Philadelphia
- William's Hematology *Beutler E, Lichtmann MA, Coller BS, Kipps TJ,* McGraw Hill, New York
- Postgraduate Hematology *Hoffbrand AV, Lewis SM, Tuddenham EGD,* Butterworth Heinemann, Oxford
- Wintrobe's Clinical Hematology, *Lee GR, Foerster J, Lupeus J, Paraskevas F, Gveer JP, Rodgers GN,* Williams & Wilkins, Baltimore
- Practical Haematology, *Dacie JV, Lewis SM*, Churchill Livingstone, Edinburgh
- Bone Marrow Pathology, *Bain BJ, Clark DM, Lampert IA*, Blackwell Science, Oxford
- Leukemia Diagnosis- A guide to the FAB Classification, *Bain BJ*, J.B. Lippincott, Philadelphia
- Clinical Diagnosis and Management by Laboratory Methods, *Henry JB,* WB Saunders.(Indian Edition, Eastern Press, Bangalore).

12. APPENDICES

SAMPLE OF SCORING/GRADING SCHEMES

Awarding actual marks : Maximum marks = 100%
Distinction marks = Optional
Class = First / Second / Pass Class (Optional)
Pass marks = 50%

Awarding scores : 0 = Poor
1 = Below average
2 = Average
3 = Above average
4 = Good

Awarding grades : A+ = 90% - 100%
A = 80% - 89%
A– = 75% - 79%
B+ = 70% - 74%
B = 60% - 69%
B- = 50% - 59%
C = < 50%

: A+ = Excellent
A = Very Good
B+ = Good
B = Average
B– = Below Average
C = Poor

SAMPLE SHEET FROM LOG BOOK

Posting: Surgical Pathology **Dates From:** 01.01.2000 **To:** 31.01.2000
Dates on Leave: Nil **Total Days Absent:** Nil

Record of Tests/Procedures Performed

Sl No	*Test/Procedure*	*No*	*Remarks*	*Sl No*	*Test/Procedure*	*No*	*Remarks*
01	Frozen Section	10		06			
02	Oil Red O Stain	01		07			
03	PAS Stain	01		08			
04	VVG	01		09			
05				10			

Record of Academic Activities Attended

Sl No	*Activity*	*Date*	*Remarks*	*Sl No*	*Activity*	*Date*	*Remarks*
01	Journal Club			06	Dermatopath Conf		
02	Slide Seminar			07	Case Study		
03	Cytopath Conf			08	Lab Med Conf		
04	Hemat Conf			09			
05	Combined Rounds			10			

Remarks by Faculty: Has worked satisfactorily. Needs more practice to improve the speed of preparing frozen sections. Grossing and observation of microscopy are good.

Date: _____ Signature of Faculty Member

Record of Undergraduate Teaching Attended

Sl No	*System*	*Date*	*Theory*	*Practical*	*Tutorial*	*Faculty Signature*
01	Inflammation	1-10 Jan 00	02	01	Nil	
02	Respiratory System	11-28 Jan 00	06	03	01	
03	Renal System	29/01/00-14/02/ 00	04	03	02	

Similar records may be obtained for other postings, academic activities, leave etc.

MODEL EVALUATION SHET FOR ACADEMIC ACTIVITIES/ PRESENTATIONS

Journal Club/Seminar

Name: Topic: Date:

Sl No	*Points to be considered*	*Score of Faculty Members*				
		01	*02*	*04*	*04*	*05*
01	Choice of article (Journal Club) or topic of seminar (if not allotted)					
02	Understanding of the subject					
03	Whether relevant cross-references and articles have been consulted					
04	Overall preparation					
05	Whether strengths, weaknesses & controversies have been presented					
06	Cogency of presentation					
07	Use of audio-visual aids					
08	Response to questions					
09	Time scheduling					
10	Overall Performance					

MEAN SCORE

Guidance to the scoring scheme that is to be adopted may be incorporated and separate sheets may be circulated to individual Faculty Members that can be compiled subsequently. Signatures of the Faculty Members should be obtained in the appropriate sheets.

MODEL ASSESSMENT RECORD

Name:			**Date of Admission**: 01 Jan 2000 **Assessment Period:** Jan-Jun 2000		
Posting/Characteristic		**Score**	**Posting/Characteristic**		**Score**
Posting	Surgical Pathology		**Academic**	Journal Club/Seminar	
	Cytopathology		**Research**	Aptitude	
	Haematology			Competence	
	Transfusion Medicine			Overall Performance	
	Laboratory Medicine		**Service**	Aptitude	
	Autopsy			Performance	
	Others (Please Specify)		Attitude towards patients/colleagues		
Attendance	Regularity & Punctuality		Responsibilities towards duties		

Special Remarks if any:

OVERALL GRADING*: ☐

Date: Signature of Head/ Faculty-in-charge

- ***Grading may be done from A+(Excellent) to C (Poor) as in Page 31 or in another predetermined scheme.***
- ***One form is to be filled for each candidate by each Faculty Member and the results consolidated.***
- ***If a student is not posted in a particular branch during the period under review then this must b noted.***
- ***All Grades especially those indicative of "Below average" or "Poor" performance must be communicated to the student/candidate.***