MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
Grade 'A' Accredited by NAAC

Sector-01, Kamothe, Navi Mumbai -410 209
Tel 022-27432471, 022-27432994, Fax 022 -27431094
E-mail: registrar@mgmuhs.com; Website :www.mgmuhs.com

COMPETENCY BASED MEDICAL EDUCATION

(CBME)

(with effect from 2020-2021 Batches)

Curriculum for Doctor of Medicine Pathology

Amended upto AC-42/2022, Dated 26/04/2022

Amended History

1. Approved as per AC - 41/2021, [Resolution No.4.22], [Resolution No. 4.23]; Dated 27/08/2021.
2. Amended upto AC-42/2022, [Resolution No. 3.27], Dated 26/04/2022. (Incorporated at the end of syllabus).

MD IN PATHOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

This programme is meant to standardize Pathology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in teaching and resultantly creating suitable manpower with appropriate expertise. The post graduate student should be trained in handling and processing histopathology, clinical pathology, microbiology, biochemistry and transfusion medicine samples with a knowledge of general principles and methodology.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment.This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading“competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The learning objectives in the cognitive, psychomotor and affective domains are:

A. CognitiveDomain

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) as well as Blood Banking (TransfusionMedicine).
2. Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can beexplained.
3. Advise on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematiccase.
4. Correlate clinical and laboratory findings with pathology findings at autopsy, identify miscorrelations and the causes of death due to diseases (apart from purely metaboliccauses).
5. Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratorypersonnel.

6. Plan, execute, analyse and present researchwork.
7. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of qualitycontrol.
8. Capable of safe and effective disposal of laboratorywaste.
9. Able to supervise and work with subordinates and colleagues in alaboratory.

B. AffectiveDomain

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. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and secondopinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. PsychomotorDomain

1. Able to perform routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen sections, making smears, andstaining.
2. Able to collect specimens by routinely performing non-invasive out-patient procedures such as venipuncture, 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 guidedbiopsy.
3. Perform an autopsy, dissect various organ complexes and display the gross findings.
4. Should be familiar with the function, handling and routine care of equipments in thelaboratory.

SUBJECT SPEIFIC COMPETENCIES

A. Cognitivedomain

A post graduate student upon successfully qualifying in the MD (Pathology) examination should have acquired the following broad theoretical competencies and 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 theill.
2. Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in MedicalColleges/Institutes.
3. Capable of pursuing clinical and laboratory based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and appliedresearch.

B. Affectivedomain

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professionaldevelopment.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informedconsent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender anddisabilities.

C. Psychomotordomain

At the end of the course, the student should have acquired skills, as described below:

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 diagnose at least 80% of the lesions received on an average day from the surgical service of an average teachinghospital.
- 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 and nerve biopsies, demonstrate the orientation of tissues in paraffinblocks.
- The student should be able to identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpretand

correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day.

- Be conversant with automatic tissue processing machine and the principles of itsrunning.
- Process a tissue, make a paraffin block and cut sections of good quality on a rotarymicrotome.
- Stain paraffin sections with at least thefollowing:

    (i) Haematoxylin andeosin
    (ii) Stains for collagen, elastic fibers andreticulin
    (iii) Ironstain
    (iv) PASstain
    (v) Acid faststains
    (vi) Any other stains needed fordiagnosis.

- Demonstrate understanding of the principlesof:
    (i) Fixation oftissues
    (ii) Processing of tissues for sectioncutting
    (iii) Section cutting and maintenance of relatedequipment
    (iv) Differential (special) stains and theirutility
- Cut a frozen section using cryostat, stain and interpret the slide in correlation with the clinical dataprovided.
- Demonstrate the understanding of the utility of various immuno-histochemical stains especially in the diagnosis of tumoursubtypes.

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 andcytocentrifuge.
- Independently be able to perform fine needle aspiration of all lumps in patients; make good quality smears, and be able to decide on the types of staining in a givencase.
- Given the relevant clinical data, he/she should be able to independently andcorrectly:

    (i) Diagnose at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive andpositive.

(ii) Demonstrate ability in the technique of screening and dotting the slides for suspiciouscells.

(iii) Indicate correctly the type of tumour, ifpresent

(iv) Identify with reasonable accuracy the presence of organisms, fungi andparasites

Haematology

Skills

- Correctly and independently perform the following special tests, in addition to doing the routine bloodcounts:

  (i) Haemogram including reticulocyte and plateletcounts.

  (ii) Bone marrow staining including stain foriron

  (iii) Blood smearstaining

  (iv) Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black,etc.

  (v) Hemolytic anemia profile including HPLC, Hb electrophoresisetc.

  (vi) Coagulation profile including PT, APTT,FDP.

  (vii) BM aspiration and BMbiopsy

- Demonstrate familiarity with the principle and interpretation of results and the utility in diagnosis of thefollowing:

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

  (ii) Thrombophilia profile: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (ATIII)

  (iii) Immunophenotyping of leukaemia

  (iv) Cytogenetics

  (v) Moleculardiagnostics.

- 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 clinicaldata.

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 adiagnosis.
- Demonstrate familiarity with and successfullyperform:
  - i) routine urinalysis including physical, chemical and microscopic, examination of thesediment.
  - ii) macroscopic and microscopic examination of faeces and identify the ova and cysts of commonparasites.
  - iii) a complete examination: physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritonealfluid.
  - iv) semenanalysis.
  - v) examination of peripheral blood for commonly occurring parasites.
- Independently and correctly perform at least the followingquantitative estimations by manual techniques and/or automated techniques.
  - (i) Bloodurea
  - (ii) Bloodsugar
  - (iii) Serum proteins (total andfractional)
  - (iv) Serum biIirubin (total andfractional)
- Demonstrate familiarity with the following quantitative estimations of blood/ serum by AutomatedTechniques:
  Serum cholesterol, Uric acid, Serum Transaminases (ALT and AST/SGOT and SGPT), etc.
- Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution andbuffers.
- Explain the principles of Instrumentation, use and application of the instruments commonly used in the labs eg. Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, flow cytometer, PCR,chemiluminiscence.
- *Pathogenesis of COVID-19, Cytokine storm, Laboratory Markers, Hematological indices, Coagulation Profile

Transfusion Medicine

Skills

The student should be able to correctly and independently perform the following:

- Selection and bleeding ofdonors
- Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red BloodCell concentrates.

- ABO and Rhgrouping.
- Demonstrate familiarity with Antenatal and Neonatal workup.
    (i) Direct antiglobulintest
    (ii) Antibody screening andtitre
    (iii) Selection of blood for exchange transfusion
- Demonstrate familiarity with principle and procedures involvedin:

    (i) Resolving ABO groupingproblems.
    (ii) Identification of RBCantibody.
    (iii) Investigation of transfusionreaction.
    (iv) Testing of blood for presenceof:
        (a) HBV (Hepatitis B Virus Markers).
        (b) HCV (Hepatitis C Virus Markers)
        (c) HIV (Human Immunodeficiency Virus Testing)
        (d) VDRL
        (e) Malaria

Immunohistochemistry

Skills (desirable)

- Be able to perform immuno-histochemical staining using paraffinsection with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAPmethod.

Syllabus

Course contents:

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.

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 and functional correlation with clinical features.

C) 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.

1. Laboratory Medicine (Clinical Biochemistry/Clinical Pathology including Parasitology).
2. Transfusion Medicine (Blood Banking).
3. The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the followingfields.

    a) Immunopathology
    b) Electronmicroscopy
    c) Histochemistry
    d) Immunohistochemistry
    e) Cytogenetics
    f) MolecularBiology
    g) Maintenance ofrecords
    h) Information retrieval, use of Computer and Internet inmedicine.
    i) Quality control, wastedisposal

It is difficult to give a precise outline of the Course Contents for post graduate training. A post graduate is supposed to acquire not only the professional competence of a well-trained specialist but also academic maturity, a capacity to reason and critically analyse scientific data as well as to keep himself abreast of the latest developments in the field of Pathology and related sciences. A brief outline of what is expected to be learnt during the MD 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 variouslesions.
- Should be able to identify problems in the laboratory and offer viable solutions.

Autopsy Pathology

Knowledge

- Should be aware of the technique ofautopsy.
- Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can bemade.
- 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 and on microscopy in at least 90% of the autopsies in an average teaching hospital.**

- In places where non-medico-legal autopsies are not available each student should be made to observe at least five medico-legalautopsies.
- Write correctly and systematically Provisional and Final Anatomic Diagnosis reports.

Cytopathology

Knowledge

- Should possess the background necessary for the evaluation and reporting of cytopathologyspecimens.
- Demonstrate familiarity with the following, keeping in mind the indication for thetest.

(i) Choice of site from which smears may betaken
(ii) Type ofsamples
(iii) Method of obtaining various specimens (urine sample, gastric smear, colonic lavageetc.)
(iv) Be conversant with the principles and preparation of solutions of stains

Haematology

Knowledge

- 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 bonemarrow.
- Should be conversant with various equipments used in the Haematology laboratory.
- Should have knowledge of automation and quality assurance inHaematology.
- Correctly plan a strategy of investigating at least 90% of the cases referred for special investigations in the Hematology Clinic and give ample justification for each step in consideration of the relevant clinical dataprovided.

Laboratory Medicine

Knowledge

- Possess knowledge of the normal range of values of the chemical content of body fluids, significance of the altered values and itsinterpretation.
- Possess knowledge of the principles of following specialized organ function tests and the relative utility and limitations of each and significance of the alteredvalues.

(i) Renal functiontests

(ii) Liver functiontests

(iii) Pancreatic functiontests

(iv) Endocrine functiontests

(v) Tests formalabsorption

- Knowtheprinciples,advantagesanddisadvantages,scopeandlimitationof **a**utomation in the laboratory.
- Know the principles and methodology of quality control in thelaboratory.

Transfusion Medicine (Blood Banking)

Knowledge

The student should possess knowledge of the following aspects of Transfusion Medicine.

- Basicimmunology
- ABO and Rhgroups
- Clinical significance of other bloodgroups
- Transfusion therapy including the use of whole blood and RBCconcentrates
- Blood componenttherapy
- Rationale of pre-transfusiontesting.
- Infections transmitted inblood.
- Adverse reactions to transfusion of blood andcomponents
- Quality control in bloodbank

Basic Sciences (in relation to Pathology)

a) Immunopathology

Knowledge

- Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanismsthereof.
- Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating toimmunology.
  (a) ELISAtechniques
  (b) Radioimmunoassay
  (c) HLAtyping
- Interpret simple immunological tests used in diagnosis of diseases and in researchprocedures.
  (i) Immunoelectrophoresis
  (ii) Immunofluorescence techniques especially on kidney and skin biopsies
  (iii) Anti-nuclear antibody(ANA)
  (iv) Anti-neutrophil cytoplasmic antibody(ANCA)

b) ElectronMicroscopy

Knowledge

- Demonstrate familiarity with the principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscope: TEM andSEM)
- Recognise the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriatephotographs).

c) Enzyme Histochemistry

Knowledge

- Should be familiar with the principles, use and interpretation ofcommon 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-anti-peroxidase) and AP-AAP (Alk. Phosphatase-anti-Alk. Phosphatase) ABC (Avidin-Biotin Conjugate) systems; employing monoclonal and polyclonal antibodies.
- Be aware of the limitations ofimmuno-histochemistry.

e) MolecularBiology

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 and steps and interpretation of 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 tissueculture.

h) Principles of Medical Statistics

Knowledge

- Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimentalstudies.

TEACHING AND LEARNINGMETHODS

Post Graduate Training

Teaching methodology

Based on the available facilities, the Department can prepare a list of post graduate experiments pertaining to basic and applied Pathology. Active learning should form the mainstay of post graduate training; there should be lectures for post graduates (at least 20 per year), along with seminars, symposia, group-discussions and Journal clubs. The post graduate students should regularly do the ward rounds of various clinical departments and learn cases of interest for discussion with the clinical faculty. Each college should have a Medical Education Unit to generate teaching resource material for undergraduates and evolving of problem solving modules. Department should encourage e-learningactivities.

Rotation:

Postings to laboratories/assignments

Thethree-yrtrainingprogrammefortheMDdegreemaybearrangedintheformof 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. For facilities not availablein the parent institution as well as for additional knowledge and skill, extramural postings may beundertaken.

Section/Subject		Duration inmonths
(i)	Surgical Pathology and Autopsy andPathologyTechniques	12
(ii)	Haematology andLaboratoryMedicine	10
(iii)	Cytopathology	08
(iv)	TransfusionMedicine/BloodBank	02
(v)	Museum techniques andrecordmanagement	01
(vi)	Basic Sciencesincluding Immunopathology, Electron microscopy, MolecularBiology, Research Techniques andcytogenetics etc	02
	Total	**35**

The training programme should be designed to enable the student to acquire a capacity to learn and investigate, 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. 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 recommended under a PG training programme is of learning whileserving/working.

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

- Collection of specimens including Fine Needle Aspiration oflumps.
- Grossing ofspecimens.
- Performingautopsies.
- Discussion during routine activities such as during signing out ofcases.
- Presentation and work-up of cases including the identification of special stains and ancillary proceduresneeded.
- Clinico-pathologicalconferences.
- Intradepartmental and interdepartmental conferences related to casediscussions.
- Conferences, Seminars, Continuing Medical Education (CME)Programmes.
- JournalClub.
- Research Presentation and review of researchwork.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities 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 degreeexamination.
- Participation in workshops, conferences and presentation of papersetc.
- Laboratorywork.
- Use and maintenance ofequipment.
- Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting thetraining.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students andinterns.
- Department should encourage e-learningactivities.

During the training programme, patient safety is of paramount importance; therefore,skillsaretobelearntinitiallyonthemodels,latertobeperformedunder

supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinicalexamination.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advanceslearning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self directed learning andteaching**
4. **Departmental and interdepartmental learningactivity**
5. **External and Outreach Activities /CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in
POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

Post Graduate Examination

The Post Graduate examination shall be in three parts:-

1. **Thesis:**

   Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis,

acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory**:

The examinations shall be organised on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall bemandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's trainingperiod.

There shall be four theory papers:

PaperI:	General Pathology, Pathophysiology, Immunopathologyand Cytopathology
PaperII:	SystemicPathology
PaperIII:	Haematology, Transfusion Medicine (Blood Banking)and LaboratoryMedicine
PaperIV:	Recent advances and appliedaspects

3. Practicals/Clinical and Oral/viva voce Examination:

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

I. ClinicalPathology:

- Discussion of a clinical casehistory.
- Plan relevant investigations of the above case and interpret the biochemistryfindings.
- Two investigations should be performed including at least one biochemistry exercise/clinical pathology exercise like CSF, pleural tap etc. analysis and completeurinalysis.

II. Haematology:

- Discuss haematology cases given the relevant history. Plan relevant investigations
- Perform complete hemogram and at least two tests preferably including one coagulationexercise
- Identify electrophoresis strips, osmotic fragility charts etc. Interpretation of data from autoanalysers, HPLC and flowcytometry.

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.

III. TransfusionMedicine:

- Perform bloodgrouping
- Perform the necessary exercise like crossmatching.
- Coomb's test, gel cardsinterpretation.

IV. Histopathology:

- Examine, report and discuss 12-15 cases histopathology and 5-8 cytopathology cases, given the relevant history andslides.
- Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section. Should be conversant with histopathology techniques includingcryostat.

V. Autopsy:

- Given a case history and relevant organs (with or without slides), give a list of anatomical diagnosis in a autopsycase.

VI. GrossPathology

- Describe findings of gross specimens, give diagnosis and identify the sections to be processed. The post graduate student should perform grossing in front of the examiners forevaluation.

VII. Basic Sciences:

- 10-15 spots based on basic sciences be included
- Identify electronmicrographs
- Identify gels, results of PCR, immunological testsincluding interpretation of Immunofluroscencepictures.
- Identify histochemical and immuno-histochemistrystains
- Teaching exercise 10min

All practical exercises are to be evaluated jointly by all the examiners.

An oral question-answer session should be conducted at the end of each exercise.

(a) Viva on dissertation and research methodology

(b) General Viva-Voce

Resolution No 4.22 of AC-41/2021

Item 10: To include COVID-19 related topics in Pathology curriculum for PG (MD) programme from admission batch 2020 onwards:

COVID Related Topics in PG Curriculum

	Programme level	**Post graduate** **MD Pathology**
Theory	**Teaching hours**	2 hour
	SLO	Define & describe pathogenesis & Pathology of COVID-19 disease.
	uggested Teaching Method	Seminar/ Case- Based Discussion
	Topics	• Pathogenesis of COVID-19 • Cytokine storm • Laboratory Markers • Hematological indices Coagulation Profile
	Assessment Method	Theory & Viva-voce Covered under Infectious Pathology PAPER-II

Format of Internal Examination Evaluation for MD Pathology

A] First Year MD Pathology Internal Evaluation Examination

Paper I: Theory {Syllabus: General Pathology including general Neoplasia, Immuno- Pathology and Cytopathology } (100 Marks)

Q. Brief Answer Questions (**Ten** outof Eleven) 10x10 = **100 Marks**

1. Practical (100 Marks) {Syllabus: Basic Histopathology, Cytology and Haematology}

Sr. No.	Exercises	Distribution of Marks (Slide: Identification-1 mark, Description- 2 marks, Viva-2 marks)	Total Marks
1.	Histopathology Slides	5 Slide each of 5 marks	25
2.	Cytology Slides	3 Slide each of 5 marks	15
3.	Haematology Slides	2 Slide each of 5 marks	10
4.	Gross Pathology/ Autopsy	3 specimen each of 5 marks	15
5.	Clinical Case	Haematology- 5 marks, Clinical Pathology- 5 marks,	10
6.	Grand Viva	-	25
	Total Marks	-	**100**

B] Second Year MD Pathology Internal Evaluation Examination

1. Theory (200 Marks)

PAPER- II (Syllabus: Systemic Pathology & Cytology) (100 Marks)

Q. Brief Answer Questions (Ten out of Eleven) 10x10 = **100 Marks**

PAPER- III (Syllabus: Haematology, Transfusion Medicine, Immuno-Haematology including Recent Advances) (100 Marks)

Q. Brief Answer Questions (Ten out of Eleven) 10x10 = **100 Marks**

2. Practical (200 Marks)

Sr. No.	Exercises	Distribution of Marks (Slide: Identification-1 mark, Description- 2 marks, Viva - 2 marks)	Total Marks
1.	Histopathology Slides	10 Slide each of 5 marks	50
2.	Cytology Slides	6 Slide each of 5 marks	30
3.	Haematology Slides	4 Slide each of 5 marks	20
4.	Gross athology/ Autopsy	5 specimen each of 5 marks	25
5.	Clinical Case	Haematology- 13 marks, Clinical Pathology- 12 marks,	25
6.	Grand Viva & Histotechniques	-	50
	Total Marks	-	**200**

C] Preliminary Examination and Summative Exam (University Exam) MD Pathology Pattern

1. Theory (400 Marks)

PAPER- I (Syllabus: General Pathology including general Neoplasia, Immuno- Pathology and Cytopathology) (100 Marks)

Q. Brief Answer Questions (Ten out of Eleven) 10x10 = **100 Marks**

PAPER- II (Syllabus: Systemic Pathology including Systemic Neoplasia) (100 Marks)

Q. Brief Answer Questions (Ten out of Eleven) 10x10 = **100 Marks**

PAPER- III (Syllabus: Haematology, Transfusion Medicine, Immuno Haematology including Recent Advances) (100 Marks)

Q. Brief Answer Questions (Ten out of Eleven) 10x10 = **100 Marks**

PAPER- IV (Syllabus: Clinical Pathology, Chemical Pathology, Pathology and Infectious diseases and Recent Advances) (100 Marks)

Q. Brief Answer Questions (Ten out of Eleven)10x10 = **100 Marks**

2. Practical (400 Marks)

Sr. No.	Exercises	Distribution of Marks	Total Marks
1.	Clinical Pathology	A. Clinical Case (10 Marks) B. Urine Analysis (15 Marks) C. Biochemistry Exercise (10 Marks)	35
2.	Haematology	A. Haematology cases (10 Marks) B. Complete Haemogram (25 Marks) C. Haematology Slides (40 Marks)	75
3.	Transfusion Medicine		15
4.	Histopathology	A. Histopathology (15 x 5 marks) B. Cytopathology slides (7x5) C. Histo-techniques: H&E/ Special staining (15 marks)	125
5.	Autopsy		20
6.	Gross Pathology		20
7.	Basic Sciences	OSPE (30 Marks) Pedagogy (20 Marks)	50
			400

Recommended Reading:

Books (latest edition)

1. Rosai and Ackerman's SurgicalPathology
2. Atlas and Text of Haematology by TejinderSingh
3. Orell's Atlas of AspirationCytology
4. Lever'sDermatopathology
5. Novak's Gynecologic and Obstetric Pathology with Clinical and Endocrine Relations by Edmund R. Novak
6. Bone Pathology by H.Jaffe
7. MacSween's Pathology of theliver
8. Iochim's Lymph NodePathology
9. Text Book on Breast Pathology byTavasoli
10. Text Book on Thyroid Pathology by GeethaJayaram
11. Theory and Practice of Histological Techniques byBancroft
12. Gray's Diagnostic Cytopathology
13. Sternberg's Diagnostic SurgicalPathology
14. Dacie's PracticalHaematology
15. Wintrobe'sHaematology
16. Heptinstall's Pathology of theKidney
17. Enzinger's Soft TissueTumours

Annexure 1

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

NameoftheDepartment/Unit :

NameofthePGStudent :

PeriodofTraining :FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journalbased/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/Researchwork				
7.	Log Book Maintenance				

Publications Yes/No

Remarks* _____
_____
_____

***REMARKS:Anysignificantpositiveornegativeattributesofapostgraduatestudenttobementioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduatestudentisstronglyrecommended.**

SIGNATURE of ASSESSEE SIGNATURE OF CONSULTANT SIGNATURE OF HOD

Resolution No. 3.27 of Academic Council (AC-42/2022): Resolved to approve the following changes in allied posting rotation in MD Pathology as duration of posting in Microbiology department will be increased from 15 days to one month and duration of posting in Biochemistry department will be increased from 15 days to one month program of MD Pathology during three years posting with effect from batch admitted in 2021-22. [ANNEXURE-21]

Annex-21 of AC-42/2022

h) Principles of Medical Statistics

Knowledge

- Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies.

TEACHING AND LEARNING METHODS

Post Graduate Training

Teaching methodology

Based on the available facilities, the Department can prepare a list of post graduate experiments pertaining to basic and applied Pathology. Active learning should form the mainstay of post graduate training; there should be lectures for post graduates (at least 20 per year), along with seminars, symposia, group-discussions and Journal clubs. The post graduate students should regularly do the ward rounds of various clinical departments and learn cases of interest for discussion with the clinical faculty. Each college should have a Medical Education Unit to generate teaching resource material for undergraduates and evolving of problem solving modules. Department should encourage e-learning activities.

Rotation:

Postings to laboratories/assignments

The three-year training programme for the MD 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. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken.

Section/Subject		Duration in months
(i)	Surgical Pathology and Autopsy and Pathology Techniques	12
(ii)	Haematology and Laboratory Medicine	10
(iii)	Cytopathology	08
(iv)	Transfusion Medicine/Blood Bank	02
(v)	Museum techniques and record management	01
(vi)	Basic Sciencesincluding Immunopathology, Electron microscopy, Molecular Biology, Research Techniques and cytogenetics etc	02
	Total	35

identify all major lesions which have **caused, or contributed to the patient's death, on macroscopic examination alone and on microscopy in at least 90% of the autopsies in an average teaching hospital.**

- In places where non-medico-legal autopsies are not available each student should be made to observe at least five medico-legal autopsies.
- 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.
- Demonstrate familiarity with the following, keeping in mind the indication for the test.

  (i) Choice of site from which smears may be taken
  (ii) Type of samples
  (iii) Method of obtaining various specimens (urine sample, gastric smear, colonic lavage etc.)
  (iv) Be conversant with the principles and preparation of solutions of stains

Haematology

Knowledge

- 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.
- 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 Hematology 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 following specialized organ function tests and the relative utility and limitations of each and significance of the altered values.

  (i) Renal function tests

(ii) Liver function tests
(iii) Pancreatic function tests
(iv) Endocrine function tests
(v) Tests for malabsorption

- Know the principles, advantages and disadvantages, scope and limitation of automation in the laboratory.
- Know the principles and methodology of quality control in the laboratory.

Transfusion Medicine (Blood Banking)

Knowledge

The student 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.
- Adverse reactions to transfusion of blood and components
- Quality control in blood bank

Basic Sciences (in relation to Pathology)

a) Immunopathology

Knowledge

- Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof.
- 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) Radioimmunoassay
  (c) HLA typing
- Interpret simple immunological tests used in diagnosis of diseases and in research procedures.
  (i) Immunoelectrophoresis
  (ii) Immunofluorescence techniques especially on kidney and skin biopsies
  (iii) Anti-nuclear antibody (ANA)
  (iv) Anti-neutrophil cytoplasmic antibody (ANCA)

MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

Sector-01, Kamothe, Navi Mumbai - 410209

Tel 022-27432471, 022-27432994, Fax 022-27431094

E-mail- registrar@mgmuhs.com Website : www.mgmuhs.com