



## **MGM INSTITUTE OF HEALTH SCIENCES**

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

**Grade 'A' Accredited by NAAC**

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### **MGM 32 Diploma in Clinical Pathology**

#### **PROGRAMME OUTCOME**

#### ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

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

##### **A. Cognitive Domain**

1. Diagnose routine 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 (Transfusion Medicine).
2. Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.
3. Should be able to teach Pathology to nurses and paramedical staff including laboratory personnel.
4. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time.

5. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.
6. Capable of safe and effective disposal of laboratory waste.

### **B. Affective Domain**

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 second opinion.
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. Psychomotor Domain**

1. Able to perform most of the routine tests in a Pathology Laboratory including grossing of simple specimens, processing, cutting of paraffin and frozen sections,, making smears, and staining.
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 provide appropriate help to colleagues performing an invasive procedure such as a biopsy or an imaging guided biopsy.
3. Should be familiar with the function, handling and routine care of equipment in the laboratory.

## ***SUBJECT SPECIFIC COMPETENCIES***

**A post graduate student upon successfully qualifying in the Diploma (Clinical Pathology) examination should have acquired the following broad theoretical competencies and should be:**

### **A. Cognitive Domain**

1. Capable of offering a high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis and overall wellbeing of the ill.
2. Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in medical colleges/Institutes.

3. Capable of pursuing clinical and laboratory based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.

## **B. Affective domain**

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

## **C. Psychomotor domain**

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

### **General**

- Principles of sample collection for Hematology and Clinical Pathology
- Histopathology and cytology specimens: collection & evaluation
- Urine analysis: analysis and interpretation of results
- Stool examination: analysis and interpretation of results
- Pregnancy tests: analysis and interpretation of results
- Semen analysis: Collection, analysis and interpretation of results
- Microbiological tests: methods of collection, analysis and interpretation of results
- Biochemical tests: methods of collection, analysis and interpretation of results
- Sample collection for blood banking
- Waste disposal and universal precautions

### **Cytology**

1. Fine needle aspiration cytology - Staining and interpretation
2. Cytology of body fluids including Pap smear - Staining and Interpretation

### **Histopathology**

1. Histopathologic techniques including section cutting.
2. Haematoxylin and Eosin stain and necessary special stains like AFB and iron stain etc.

## **Hematology**

1. Anticoagulants.
2. Preparation of Romanowsky's stain and reagents for blood counts.
3. Hands on experience in different methods of Haemoglobin estimation, RBC, WBC, Platelets and Reticulocyte counts, AEC, PCV, ESR and absolute indices and Coagulation tests.
4. Preparation and interpretation of peripheral smear and bone marrow.
5. Comprehensive work up of Haemolytic Anaemias.
6. Cytochemistry - Peroxidase/Sudan Black B, PAS, LAP, NSE and Perl's stain
7. Quality control and use of automated cell counters.
8. Cleaning of Glassware.

## **Blood Bank**

1. Blood grouping and typing
2. Cross matching
3. Coombs' test
4. Donor screening and blood collection
5. Testing for STD, HIV, Hepatitis B and C.
6. Rh antibody titration
7. Cold agglutinin titre
8. Quality control

## **Microbiology**

1. Perform, interpret and report
  - a) Gram's stain
  - b) Ziehl-Neelsen
  - c) Hanging drop
  - d) KoH/ Lactophenol preparation for fungi
2. Sterilization and disinfection techniques.
3. Bacteriological Evaluation of clinical specimens including microscopic examination, inoculation in proper media, morphological evaluation of the growth and performance of appropriate diagnostic tests and antibiotic sensitivity.

## **Clinical Biochemistry**

1. Basic Biochemistry applied to biochemical investigations:  
Appropriate use of Photocolorimeter, Spectrophotometer, pH meter, Flame photometer, Semi-Autoanalyser and Autoanalyser, Electrophoresis apparatus.
2. Perform biochemical investigations like blood sugar, urea, creatinine, proteins, bilirubin, SGOT, SGPT, Alkaline Phosphatase etc.

## **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.
- A student should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections.
- Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.
- Stain paraffin sections with at least the following:
  - (i) Haematoxylin and eosin
  - (ii) Iron stain
  - (iii) Acid fast stains
- Demonstrate understanding of the principles of:
  - (i) Fixation of tissues
  - (ii) Processing of tissues for section cutting
  - (iii) Section cutting and maintenance of related equipment

#### **Cytopathology: Skills**

- Independently prepare and stain with Geimsa and Pap stains for cytopathologic examination.

#### **Haematology: Skills**

- 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) Hemolytic anemia profile including High Performance Liquid Chromatography, Hb electrophoresis etc.
  - (v) Coagulation profile including PT, APTT (activated partial thromboplastin time), FDP.

Describe prominent morphologic findings in the peripheral smears.

#### **Laboratory Medicine: Skills**

- Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.
- Demonstrate familiarity with and successfully perform:

- i) routine urinalysis including physical, chemical and microscopic, examination of the sediment.
  - ii) macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.
  - iii) a complete examination; physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluids.
  - iv) Semen analysis.
  - v) Examination of peripheral blood for commonly occurring parasites.
- 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 and fractional)
    - (iv) Serum Bilirubin (total and fractional)
  - Demonstrate familiarity with the following quantitative estimations of blood/serum by Automated Techniques:
    - (i) Serum cholesterol
    - (ii) Uric acid
    - (iii) 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 and Buffers.

**Explain the principles of Instrumentation, use and application of the instruments commonly used in the laboratories eg., Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, and semi-automated analyzers.**

#### **Transfusion Medicine: Skills**

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

- Selection and bleeding of donors.
- ABO and Rh grouping.
- Demonstrate familiarity with principle and procedures involved in testing of blood for presence of:
  - (i) HBV (Hepatitis B Virus Markers).
  - (ii) HCV (Hepatitis C Virus Markers)
  - (iii) HIV (Human Immunodeficiency Virus Testing)
  - (iv) VDRL
  - (v) Malaria
  - (vi) Coomb's test

## ***COURSE OUTCOME***

### ***Syllabus***

#### **Course contents:**

##### **A) Pathology:**

###### **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.

###### **2. Systemic Pathology:**

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

###### **3. Haematology**

- Broad outline of blood and bone marrow changes and coagulation changes in various haematologic disorders.

###### **4. Record keeping:** In the following fields, the student is expected to acquire a general acquaintance of techniques and principles and to interpret data.

- Maintenance of records.
- Information retrieval, Computer, Internet in medicine.
- Quality control, waste disposal.

##### **B) Microbiology:**

- Acquire knowledge of the following:
  - Stool examination
  - AFB staining of sputum
  - Bacterial culture

##### **C) Clinical Biochemistry:**

###### **Knowledge**

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

- (i) Renal function tests
- (ii) Liver function tests
- (iii) Sugar estimation in blood and urine

- Know the principles and methodology of quality control in laboratory.

#### **D) Transfusion Medicine (Blood Banking)**

##### **Knowledge**

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

- Basic immunology
- ABO and Rh groups
- Blood component therapy
- Infections transmitted in blood
- Adverse reactions to transfusion of blood and components



**Dr. Rajesh B. Goel**  
Registrar

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