GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR DIPLOMA IN CLINICAL 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.

The **goal** of this programme is to standardize Pathology teaching at Diploma level throughout the country so that it will benefit in achieving uniformity in teaching as well and resultantly creating suitable manpower with appropriate expertise. The Diploma 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. 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.

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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 Liqid 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 **e**stimations by manual techniques and/or automated techniques.
  (i) Blood urea
  (ii) Blood sugar
  (iii) Serum Proteins (total and fractional)
  (iv) Serum BiIirubin (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

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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.

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(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

TEACHING AND LEARNING METHODS

Teaching Methodology:

The two year training programme for Diploma in Clinical Pathology 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 23 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.

Rotation to laboratories/assignments

Postings:	Total Duration:	23 Months
Histopathology:		4 months
Cytopathology including FNAC		3 months
Hematology and Blood Banking		4 months
Clinical laboratory		3 months
Blood banking		2 months
Microbiology		3 months
Biochemistry		4 months

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

- Collection of specimens including Fine Needle Aspiration of lumps.
- Grossing of specimens.
- Performing autopsies.
- Discussion during routine activities such as during signing out of cases.
- Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.
- Clinico-pathological conferences.
- Intradepartmental and interdepartmental conferences related to case discussions.
- Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- Journal Club.
- 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 degree examination.
- Participation in workshops, conferences and presentation of papers etc.
- Laboratory work.
- Use and maintenance of equipment.
- 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 the training.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under 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.

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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/clinical examination.

Quarterly assessment during the Diploma training should be based on:

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

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 two parts:

1. **Theory:**

   The examinations shall be organised on the basis of 'Grading'or 'Marking system' to evaluate and to certify the 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 be mandatory for passing examination as a whole. The examination for Diploma shall be held at the end of 2nd academic year. An academic term shall mean six month's training period.

   There shall be three theory papers.

   Paper I: Basic Medical Sciences: General Pathology and Microbiology including Parasitology

   Paper II : Systemic Pathology, Cytology and Haematology

   Paper III: Clinical Pathology, Clinical Biochemistry and Blood Banking

2. **Practical/Clinical and Oral/viva voce Examination:**

   Practicals

DAY 1

1. Microbiology exercise (including reporting on day 2)
2. Clinical case examination / discussion

   Hematology exercise, Blood Banking

   Biochemistry exercise

   Urine Analysis, clinical Pathology exercise - semen analysis/stool examination, CSF/Pleural tap.

DAY 2

1. Reporting on Microbiology exercises
2. Histopathology and cytology techniques - H and E, Pap, Geimsa staining, Iron staining, AFB staining

   Histipathology slides: 5-6

   Cytology slides: 4-6

   Hematology slides: 5-6

Oral/viva voce Examination:

The oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the speciality, which shall from a part of the examination.

Recommended Reading:

Books (latest edition)

1. Todd and Stanford's Clinical Diagnosis and Lab Management.
2. Atlas and Text of Haematology by Tejinder Singh
3. Text Book on Thyroid Pathology by Geetha Jayaram
4. Robbins Pathology
5. Text Book of Microbiology by C.P. Baveja
6. Harper's Text book of Biochemistry

Journals:

03-05 international Journals and 02 national (all indexed) journals

~~1. Journal of Clinical Pathology~~

~~2. Indian journal of Pathology and Microbiology~~

~~3. Indian Journal of Microbiology~~

~~4. Indian Journal of Biochemistry~~

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Annexure 1

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based / recent advances learning				
2.	Patient based /Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities / CMEs				
6.	Thesis / Research work				
7.	Log Book Maintenance				

Publications **Yes/ No**

Remarks* _____
_____
_____
_____

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

SIGNATURE OF ASSESSEE SIGNATURE OF CONSULTANT SIGNATURE OF HOD

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