



Rawalpindi Medical University

Study Guide

Diploma in Clinical Pathology

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1. University Mission & Vision Statement

1. Mission Statement

To impart evidence based research oriented health professional education in order to provide best possible patient care and inculcate the values of mutual respect, ethical practice of healthcare and social accountability.

2. Vision and Values

Highly recognized and accredited centre of excellence in Medical Education, using evidence-based training techniques for development of highly competent health professionals, who are lifelong experiential learner and are socially accountable.

2. Aims of DCP Program:

- To provide high quality diagnostic services in health care.
- To strengthen the pathological diagnosis through research & training.
- To enhance effective collaboration between the pathologist and the treating physician.
- To standardize Pathology teaching at Diploma level so that it will aid in achieving uniformity in teaching and training suitable specialists with appropriate expertise.
- To effectively administer and run the labs at primary and secondary health care centers.

3. Specific Learning Outcomes

At the end of the 2-year training program student should be able to:

- Independently organize, administer and run the labs at DHQ & THQ health services maintaining appropriate quality control.
- Select alternate techniques, manual procedures and reagents if required for imparting the lab services in resource limited situations.
- Execute trouble shooting in the lab.
- Train lab staff and teach basic pathology to undergraduates at affiliated teaching institutes.
- Impart ethical Pathology services.

4. Subject Specific Learning Objectives

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

1. Cognitive Domain

- Diagnose routine clinical problems on the basis of histopathology (Surgical Pathology) and cytopathology specimens, various tests of Laboratory Medicine (Clinical Pathology, Clinical Biochemistry) bone marrow examination and various tests of Hematology.
- Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained. Should be able to teach Pathology to nurses and paramedical staff including laboratory personnel.
- 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 quality control. Capable of safe and effective disposal of laboratory waste.
- 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.
- 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.
- 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.

2. Affective Domain

- 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. 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.

- 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.
- Show integrity, accountability, respect, compassion and dedicated patient care.
- Demonstrate a commitment to excellence and continuous professional development.
- Demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
- Show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

3. Psychomotor Domain

- 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.
- 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.
- Should be familiar with the function, handling and routine care of equipment in the laboratory.
- Identify, and systematically describe the chief gross anatomic alterations in the surgically removed specimens.
- 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

Independently perform the following special tests, in addition to doing the routine blood counts:

- Haemogram including Reticulocyte and Platelet counts.
 - Bone marrow staining including stain for iron.
 - Blood smear staining.
 - Hemolytic anemia profile Hb electrophoresis etc.
 - Coagulation profile including PT, APTT (activated partial thromboplastin time), FDP.
 - Describe prominent morphologic findings in the peripheral smears.
- A.** 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;
- B.** 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:

1.

- routine urinalysis including physical, chemical and microscopic, examination of the sediment.
- macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.
- a complete examination; physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluids.
- Semen analysis.
- 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.

1. Blood urea
2. Blood sugar
3. Serum Proteins (total and fractional)
4. Serum Bilirubin (total and fractional)

Demonstrate familiarity with the following quantitative estimations of blood/ serum by Automated Techniques:

- a. Serum cholesterol
- b. Uric acid
- c. Serum Transaminases (ALT and AST/SGOT and SGPT), etc.

5. General Statutes and Regulations:

1. Documents Required for Admission:

- Completed DCP application form.
- Copy of MBBS degree with mark sheets of Professional examinations.
- Copy of PMDC registration certificate.
- Three latest passport size photographs.
- Certificates of completion of required experience.

2. Eligibility Criteria:

- Every candidate must be a medical graduate possessing the degree of MBBS or equivalent recognized by PMDC.
- Candidate must be registered with PMDC.
- In case of foreign candidate, the doctor must be registered with the medical registration authority of that country. If the candidate has received training in Pakistan then he must be registered with PMDC.
- Candidate must have completed one-year house job.

- In addition to the above preference will be given to the candidate having:
- At least six months experience in Pathology as demonstrator in a recognized teaching institution or
 - At least six months experience of working in a reputable accredited Pathology Lab.

SPECIALREQUIREMENTS

1. Securing pass percentage in the entry test as determined by RMU.
2. Qualifying the interview successfully
3. Having up to the mark credentials as per RMU rules.

Registration & Enrolment

1. Up to 5 trainees can be registered with one supervisor.
2. Total number of students enrolled for the course must not exceed 8 per section/unit.
3. The university will approve supervisors for the program.
4. Criteria for supervisors MCPS, MPhil, FCPS, PhD or equivalent with at least 2 years of experience after acquiring postgraduate degree.
5. The candidates selected for the course shall be registered with the university as per prescribed registration regulations.

Outline of Training Program

1. The course shall consist of instructions and training in clinical pathology lasting for two years.
2. The examination shall be held twice a year at the end of the 1st and 2nd year training period.
3. The training and oral and practical parts of the examination shall be held in the Department of Pathology, RMU and Allied Hospitals, Rawalpindi.

3. The candidates of DCP shall be working in the different disciplines of Pathology as per following schedule:

	Section	Total Duration	Round 1 (First Year)	Round 2 (Second Year)
A.	Hematology / blood banking	6 months	3 months	3 months
B.	Chemical Pathology	6 months	3 months	3 months
C.	Microbiology	6 months	3 months	3 months
D.	Histopathology	6 months	3 months	months

6. COURSE CONTENT:-

The following subjects and topics shall be taught in the course:-

1st Year Syllabus:

1. General Pathology

Cell Injury and adaptation

- Reversible and Irreversible Injury
- Fatty change, Pigmentation, Pathologic calcification
- Necrosis and Gangrene

Cellular adaptation

- Atrophy, Hypertrophy,
- Hyperplasia, Metaplasia, Aplasia

Inflammation

- Acute inflammation --- Vascular changes, Chemotaxis, Opsonization and Phagocytosis
- Enlist the cellular components and chemical mediators of acute inflammation
- Differentiate between exudates and transudate
- Chronic inflammation
- Etiological factors, Granuloma

Cell repair and wound healing

- Regeneration and Repair
- Healing---steps of wound healing by first and second intention
- Factors affecting healing
- complications of wound healing

GENERAL MICROBIOLOGY

- Introduction to microbiology
- Role of microbes in various human diseases
- Sources of infection
- Classification of microorganisms.
- Morphology and identification of bacteria.
- Nosocomial infections.
- Sterilization and disinfection. Definition, use of physical and chemical disinfectants and their practical utility in clinical practice.

SPECIAL MICROBIOLOGY

- Gram positive bacteria ; Gram negative bacteria
- Spirochetes
- Acid fast Bacilli
- Anaerobic infections
- Diagnosis of infections by body systems
- Upper and lower respiratory tract infections
- Urinary tract infections
- Sexually transmitted Diseases
- Gastro in test inaltract infections
- Meningitis

PARASITOLOGY

General parasitology: definitions; classification, source of infection, pathogen city

Protozoology

Entamoeba histolytica; lifecycle; amoebicdy sentery, complications and diagnosis

Flagelates:

Intestinal oral and genital flagelates; giardia; trichomonas;

OSCE & VIVA

Station 1 Identification of culture media and its uses.

Station 2 Performance of Catalase test / Slide identification under microscope/ Coagulase test.

Station 3 Constitution of LJ media / Blood agar / MacConkey agar/ CLED agar

Station 4 Inoculation techniques.

HISTOPATHOLOGY

- Sample collection & transportation collection of cytology specimen.
- FNAC techniques and application
- Tissue processing I, II
- Fixatives.
- Stains in histopathology techniques.
- Cell block preparation
- Special staining techniques.
- Electron Microscopy.
- Frozen section.
- Liquid Based cytology.
- Immunohistochemistry (introduction)
- Fixatives.
- Intro to FISH.

TOPIC OF PRACTICALS/OSCE

- FNAC TECHNIQUES Performance / preparation / indications
- GROSS Techniques (Appendix, Gall bladder, small biopsy, prostatic chips, MRM, uterus)
- Staining procedure only H & E
- Different laboratory chemicals identification and uses.
- How to stain slides for FNAC and histopathology section.

TOPICS OF PRACTICAL'S

Haematology

Topics of theory

- Haemopoiesis
- Site & regulation of haemopoiesis
- Haematopoietic growth factor, transcriptional factors & signals transduction
- Cellcycle → apoptosis
- Erythropoiesis and general aspects of anemia.
- Overview of classification of anemia
- Hypochromic anemia.
 - Iron deficiency anemia
 - Anemia of chronic disease
 - Sideroblastic anemia
 - Lead poisoning
- Megaloblastic anemia and other macrocytic anemia
- Aplastic anemia & bone marrow failure.
- Genetic disorders of hemoglobin
 - α & β Thalassaemia
 - Sickle cell disease.
- Hemolytic anemias
- Blood Transfusion.
 - Blood group antigens & antibodies
 - ABO blood group system
 - Minor blood group system
 - Combs test
 - Blood transfusion reactions
 - Hemolytic disease of newborn

Topics of practical

- Peripheral film making & staining.

- Coagulation profile performance of PT, APTT, BT.

- Bone marrow examination
 - Slide making
 - Staining & Giemsa stain, Sudan Black stain.
- Identification of hemoparasites.
- Peripheral film reporting of anemia (microcytic hypochromic, macrocytic, normocytic & hemolytic anemia)

CHEMICAL PATHOLOGY EXAM SYLLABUS 1ST YEAR

- Units in Chemical Pathology
- Chemical Pathology of Kidneys
 - Reduced GFR with normal tubular function
 - Reduced tubular with normal glomerular function
 - Renal tubular defects
 - Clinical syndromes of renal disease
 - Acute and chronic renal failure
 - Renal Function Tests and their interpretation
 - Glomerular function tests
 - Biochemical Principles of treatment of renal disease.
 - Renal calculi
- Sodium & water metabolism
 - Distribution of sodium & water in the body
 - Plasma osmotic pressure, osmolarity & osmolality
 - Control; renin-angiotensin-aldosterone mechanism
 - Disturbances of sodium & water metabolism
 - Clinical significance of hypo & hyper natremia
 - Biochemical basis of treatment of sodium & water disturbances
- Potassium metabolism & Diuretic therapy
 - Factors effecting plasma potassium concentration
 - Hypokalemia and hyperkalemia
 - Relation of potassium and hydrogen ion and diuretics
 - Diuretic therapy
 - Treatment of potassium disturbances
 - Investigations of renal water and electrolyte disorders
- Hydrogen ion homeostasis: Blood gas levels
 - Control systems
 - Disturbances of hydrogen ion homeostasis

- Investigation of hydrogen ion homeostasis
- Hypothalamus & Pituitary gland
 - Hypo and Hyperpituitarism, Investigation protocol.
- Adrenal cortex
 - Disorders of adrenal cortex and congenital adrenal hyperplasia
- Calcium, Phosphate & Magnesium metabolism:
 - Normal control mechanism, interrelation of parathyroid hormone and Vit. D
 - Clinical effects of hypercalcemia and hypocalcemia,
 - Biochemical aspects of osteoporosis
- Male & female reproductive system
 - Hypogonadism
 - Delayed puberty
 - Hirsutism
 - Pregnancy
 - Menopause
- Thyroid gland
 - Test of thyroid function
 - Disorder of thyroid
 - Hyper & hypo thyroidism
 - Thyroiditis
 - Thyroid hormone resistance
- **Topic of practical/OSCE**
 - Performance of spectrometry
 - Loading samples on the Centrifuge
 - Order of draw of samples performance
 - Use of Pipettes
 - ABGs analyzer (Principle, maintenance, usage)
 - Electrolyte analyzer (Principle, maintenance, usage)

2nd Year Exam Syllabus

General Pathology

Haemodynamic disorders

- Define and classify the terms Edema, Haemorrhage, Thrombosis, Embolism, Infarction & Hyperaemia
- Define and classify Shock with causes of each.
- Describe the compensatory mechanisms involved in shock
- Describe the pathogenesis and possible consequences of thrombosis
- Describe the difference between arterial and venous emboli

Neoplasia

- Dysplasia and Neoplasia
- Differences between benign and malignant neoplasms
- Enlist the common etiological factors for neoplasia
- Define and discuss the different modes of metastasis
- TNM staging system and tumor grade

Immunity and Hypersensitivity

Humoral and cell mediated immunity and types of Hypersensitivity with examples

GENERAL MICROBIOLOGY

- Infection and immunity pathogenicity, pathology of infection, resistance and natural immunity, antigens and antibodies.
- Common bacterial and viral diseases of man.
- Yeast and fungi, classification, identification.
- Important viruses.
- Handling of clinical samples in laboratory including sputum, urine, stool, cerebrospinal fluid (CSF), pus, aspirates, blood cultures.

SPECIAL MICROBIOLOGY

- Vectorborne infections
- Diagnosis of infection and host defense mechanism
- Antimicrobial agents

PARASITOLOGY

Protozoology

BLOOD AND TISSUE FLAGELLATES;

- Leishmania; trypanosoma

SPOROZOA:

- malarial parasite; its lifecycle, lab diagnosis; complications

Helminthology

- introduction;
- Cestodes' classification, echinococcus granulosis; lifecycle, diagnosis
- Trematodes
- Nematodes
- Diagnostic procedures in parasitology

OSCE & VIVA (Each station have 5 min time & every station have 10 marks)

Station 1 Performance of biochemical reaction and interpretation

Station 2 Performance of Coagulase test /Oxidase test

Station 3 Gram staining / ZN Staining

Station 4 Perform antibiotic sensitivity test and read antibiotic sensitivity plate

LONG CASE & SHORT CASE

LONG CASE

1. Process the culture sample and interpret your results.
2. Identification of the Hepatitis B surface Antigen through performance by ELISA / Gene xpert technique

SHORT CASE

1. Antibigram
2. Interpretation of lab reports
3. Immuno chromatographic Technique Performance
4. Slide identification under microscope

HISTOPATHOLOGY

- Electron Microscopy.
- Special Staining Techniques.
- Biosafety.
- Gross techniques basic 1
- Gross techniques advanced 2
- Quality control in histopathology
- Record keeping Histopathology
- Archive method
- Immunohistochemistry techniques

Topic of Practical/OSCE

- Grossing Techniques. Advanced Specimen
- Performance of Giemsa Stain, PAS Stain
- Performance of IHC Techniques
- Preparation of Cytology Specimen
- Preparation of museum samples.

Long Case

- Perform gross sectioning of the given sample and process it upto slide preparation
- Perform FNAC on the patient and prepare slide. Record your findings.

Short Case

- Identification Of Basic Pathology slides. (Appendicitis, Cholecystitis, Leiomyoma, Fibroadenoma, Lipoma, EIC, MNG).
- Identification of GROSS specimens.

Haematology

- Acute myeloid leukemia
- Chronic myeloid leukemia.
- Myeloproliferative neoplasm
- Myelodysplastic syndromes.
- Acute lymphoblastic leukemia
- Chronic lymphocytic anemia.
- Hodgkin lymphoma
- Non-Hodgkin lymphoma
- Multiple myeloma
- Platelets, blood coagulation & Homeostasis.
- Bleeding disorders caused by vascular and platelet abnormalities.
- Coagulation disorders.
- Thrombosis pathogenesis & disorders..
- Pregnancy & neonatal hematology

Topic of Practical/OSCE

- Manual Performance of Coagulation Profile
- Reporting of bone marrow aspiration
- Slide Making And Staining
- Performance of Hb Electrophoresis
- Performance of Blood Grouping, Cross Match, Comb's Test

LONG CASE

- Bone Marrow biopsy performance (Aspiration & trephine biopsy)
- Bone Marrow Reporting

SHORT CASE

- Peripheral Film Reporting (RBCs & Platelets)
- Peripheral Film Reporting (Abnormal WBCs Identification)
- Identification of Hemoparasites

THEORY TOPICS

- GIT
 - Pancreas & related disorders
 - Celiac disease
 - Liver
 - Cirrhosis
 - Conjugated & Unconjugated Hyperbilirubinemia
 - Alcoholic fatty liver disease
 - Non-Alcoholic fatty liver disease
 - Acute & Chronic Hepatitis
- Inborn errors of metabolism
 - G6PD deficiency
 - Galactosemia
 - Cystic fibrosis
- Carbohydrate metabolism
 - Diabetes Mellitus, its latest classification and criteria according to American Diabetes Association and WHO
 - Metabolic complications
 - Investigation protocol, GTT
 - Hypoglycemia, investigation protocol and management
- Lipids and Lipoproteins
 - Physiology and disorders of lipid metabolism,
 - Primary disorders
 - Risk factor for coronary heart disease
 - Principles of treatment, use of statins and other cholesterol lowering agents
 - Investigation of suspected hyperlipidemia, proper sample collection
- Bones & joints
 - Rickets & osteomalacia
 - Paget' disease
 - Gout & hyperuricemia

PRACTICAL TOPICS/OSCE

- Automated Chemistry Analyser
 - Perform endpoint & kinetic tests
 - Programming of analytes
 - Troubleshooting
 - Blood glucose
 - Cholesterol
 - Triglyceride
 - Alkaline phosphatase
 - Serum Billirubin level
- } Performance & biochemical principal

LONG CASE

Process the given sample and run it on the automated Chemistry analyser after programming it. Record and interpret your result.

SHORT CASE

- QADIS stations
- Interpretation of Laboratory reports
- QC interpretation

2. The DCP course Director shall assign each candidate a short research project in any chosen specialty approved by the incharge of that specialty in first month of training and he/she shall complete and submit one research paper in a HEC category Y or above medical journal at the end of first year.
3. First year Summative examination (CE & OSCE) will be held at the end of 1 year and Final Comprehensive Exam (CE & OSCE) will be held at the end of 2nd Year.

7. TEACHING AND LEARNING METHODS

Teaching Methodology: The two-year training program for Diploma in Clinical Pathology may be arranged in the form of postings to different assignments/laboratories/sections for specified periods.

Posting schedules may be modified depending on needs, feasibility and exigencies. For additional knowledge and skill, extramural postings may be undertaken. RMU has signed an MOU with NIH, COMSATS, KRL and Quaid-e-Azam University.

During the training program, 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.

METHODS OF INSTRUCTION/COURSE CONDUCTION

As a policy, active participation of students at all levels will be encouraged.

Following teaching modalities will be employed:

1. Lectures
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. Grand Rounds
5. Clinico-pathological conferences
6. SEQ as assignments on the content areas

7. Assigning routine lab work
8. Slide sessions on multi headed microscope(Haematology and microbiology)
9. Self study and use of internet

In addition to the conventional teaching methodologies following interactive strategies will also be introduced to improve both communication and clinical skills in the upcoming consultants:

1.1. Monthly Student Meetings

- a. Journal Club Meeting
- b. Core Curriculum Meetings
- c. Skill Development

JOURNAL CLUB MEETING

Two hours per month will be allocated to the presentation and discussion of a recent journal article related to Pathology. The article should be critically evaluated and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the relevant department of each medical college. Students of different medical colleges may be given an opportunity to share all such interesting articles with each other.

Core Curriculum Meetings/ Departmental Review Board Meeting

All the core research topics of DCP will be thoroughly discussed during these sessions. The duration of each session should be at least two hours.

Also it will be an opportunity to brainstorm all topics included in the course and to generate new ideas regarding the improvement of the course structure

A. Laboratory Skill Development

4 hours a day will be assigned for learning and practicing laboratory procedures and performing diagnostic work.

List of Lab Procedures to be learnt during these sessions is as follows:

- Stains, routine and special (Grams, ZN, Haematoxylin -Eosin, PAS, KOH preparation)
- Microscopic examination of fluids (urine, CSF, body fluid aspirates).
- Stool examination for parasites.
- Culture/Sensitivity of clinical specimen on routine aerobic media and anaerobic cultures.
- TB culture on LJ media.
- Hepatitis screening with Device methods for HBV and HCV and for HIV.
- Serology for Rheumatoid factor, Pregnancy test, Widal test
- Monospot test; Mantoux test.
- CBC on automated hematology analysers and manually, DLC , Bloodsmear reading for identifying atypical cells for referral to consultant haematologist.
- Manual conduction of PT/ APTT and INR calculation
- ESR determination by Westergren method.
- Thick and thin blood films for Malarial parasite.
- Routine chemistry tests as Renal function tests, Liver function tests
- Blood sugar estimation, Uric acid estimation
- Cardiac enzymes, Lipid profile, Calcium, Phosphate, LDH on semi automated and fully automated analyzers.
- Electrolyte analysis on Flame photometer and ion–selective electrode(ISE)
- To observe Grossing techniques, tissue processing, paraffin block preparation, block cutting on rotary microtome and routine Haematoxylin - Eosinstaining

,exposure to cryostat operation and frozen section preparation.

- For acquisition of general skills as communication skills, presentation skills, Research methodologies and scientific writing skills, the student should avail during Group discussions and Seminars

8. Log Book:

The trainees must maintain a log book and get it signed regularly by the supervisor. A complete and duly certified log book will be mandatory to sit for the final DCP examination. Log book should include diagnostic procedures, case presentations in JCMs and CPCs.

Proposed format of log book is as follows:

Candidate Name:

Roll No.

Procedures Performed: (150 per section)

SR.	Date	Name of Patient, Age, Sex and Admission number	Provisional Diagnosis	Procedure performed	Supervisor's Signature

Case Presentations: Weekly

SR.	Date	Name of Patient, Age, Sex and Admission number	Case Presented	Supervisor's Signature

9. Assessment

a. Formative Assessment, ie., during the training Formative assessment will be continual and will assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system. A term exam will be conducted at the end of every 3 months.

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 (After every 3 months) assessment during the Diploma training will 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**

b. Summative Assessment, i.e., assessment at the end of Year 1 and Year 2 training:

- a. There shall be a total of two theory papers over 2 days, comprising of 100 MCQs each.
- b. The duration of each paper shall be 2 hours.
- c. The practical and oral examination shall be conducted separately in each of the four subjects.

10. Outline of the examination shall be as follows:-

Theory	MCQs Paper 1	Paper 2	Total Marks	Duration
	100	100	200	2 hours each
Practical	OSCE & Viva		Total Marks	Duration
	15 Interactive stations (10 marks each) 4 (Chemical Pathology) 4 (Hematology) 4 (Microbiology and Clinical Pathology) 3 (Histopathology)		150	Upto 3 hours

Total=350 marks

TOS for Theory Exam: End of First Year Exam**PAPER-1**

Topic/Subject	Number of MCQs
General Pathology (Year 1)	10
Parasitology (Year 1)	20
General Microbiology (Year 1)	30
Virology (Year 1)	10
Special Microbiology (Year 1)	30
Total	100

PAPER-2

Topic/Subject	Number of MCQs
Chemical Pathology (Year 1)	40
Hematology (Year 1)	40
Histopathology (Year 1)	20
Total	100

OSCE End of First Year Exam

Topics/Subject	Stations OSCE
Chemical Pathology	4
Microbiology	4
Hematology	4
Histopathology	3
Total	15

End of Second Year Exam

PAPER-1

Topic/Subject	Number of MCQs
General Pathology (Year 2)	10
Parasitology (Year 2)	20
General Microbiology (Year 2)	30
Virology (Year 2)	10
Special Microbiology (Year 2)	30
Total	100

PAPER-2

Topic:	Number of MCQs
Chemical Pathology (Year 2)	40
Hematology (Year 2)	40
Histopathology (Year 2)	20
Total	100

OSCE End of Second Year Exam

Topics/Subjects	Stations OSCE
Chemical Pathology	4
Microbiology	4
Hematology	4
Histopathology	3
Long Case	1
Short Cases	4
Total	20

11. Regulations Regarding Examination:

Examiners

External examiners will be nominated for moderation and compilation of the final summative theory examination Year 1 and 2 by the Examination Department of RMU.

External examiners of the relevant field will be appointed by the Examination Department of RMU for the practical examination on each station who will award the marks for viva voce and interactive stations independently.

Passing Criteria:

- Pass marks shall be 50% for written exams and 50% for OSCE.
- Candidates failing in any one component will have to resit in the failed component.
- A maximum of 3 attempts to sit for the examination will be allowed to be availed within 3 calendar years of the first attempt.
- Re-admission in DCP course is not permissible under any circumstances.

Pre-Requisite For Appearing In Final Summative Exam

A candidate shall enter the examination on the production of the following documents signed by the Dean.

- a. That he/she has attended at the minimum 75% of the DCP course.
- b. That he/she has performed procedures and tests in each of the disciplines of Clinical Pathology to the satisfaction of his/her Supervisor and Head of the Pathology Department as specified in the schedule and log book.
- c. That he/she has completed a short research project allotted to him/ her by the Supervisor / Head of the Department in any one of the four sub-specialties and submitted the research paper in a HEC category Y or above medical journal.

12. Fee Structure:

Registration fee: Rs.10,000

Total course fee (2 years) = Rs. 75,000/-(to be paid at the start of the course)

Admission Call:

During fall of every year through advertisement in 2 leading newspapers (English and Urdu).

13. **Recommended Books and Journals**

Books of Histopathology

- a. Robbins Pathological basis of disease. By RamziS.Cortan. Vinay Kumar Stanley L. Robbins.
- b. General Pathology. J.B. Watter, M.S Israel
- c. Text book of histopathology :Maximow and Bloom

Journals of Histopathology

1. American Journal of Surgical Pathology.
2. Achieves of Pathology.
3. International Journal of Cancer.

Books of Haematology

1. Practical Hematology: Dacie, J.V
2. Clinical Hematology: Wintrobe M. Authors. Lee,Boggs, Bithe Athens.
3. Postgraduate Hematology: A.V. Hoffbrand
4. Blood: Authors, James, H Jandi
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