



PRAVARA INSTITUTE OF MEDICAL SCIENCES (DEEMED TO BE UNIVERSITY)

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NAAC Re-accredited with 'A' Grade

SYLLABUS

PG Programme- DIPLOMA (CLINICAL PATHOLOGY) (DCP) (As per MCI Regulations Governing PG Programme 2000 Amended up to May, 2018)

1. GOAL:

The goal of postgraduate medical education shall be to produce competent specialist.

- (i) Who shall recognize the health needs of the community and carry out professional obligation ethically and in keeping with the objectives of the national health policy;
- (ii) Who shall have mastered most of the competencies pertaining to the speciality that is required to be practiced at the secondary and tertiary levels of the healthcare delivery system.
- (iii) Who shall be aware of contemporary advances and developments in the discipline concerned.
- (iv) Who shall be able to organize and establish clinical laboratory.
- (v) They are expected to be able to conduct diagnostic procedures, interpret and offer expert opinion/recommendation where required independently.
- (vi) They must be able to oversee the technical staff and ensure that recommended procedures are followed in collection of samples, registering, processing, reading and interpreting diagnostic tests performed.

2. OBJECTIVES:

The target is to develop Cognitive domain, Psychomotor domain and Affective domain related to disease process and diagnosis.

So that at the end of the course a candidate must be able to

Cognitive Domain:

- i) Understand and explain about the factors in causation of disease.
- ii) Understand and explain about Patho-physiology of disease.
- iii) Understand processes involved in the gross and microscopic changes of organs and tissues and explain these changes.
- iv) Understand and explain the basis of evolution of clinical signs and symptoms.
- v) Understand the complication and prognosis of the disease process.
- vi) 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). Should be able to accurately interpret the representative materials obtained from the patients in order to arrive at a correct diagnosis of common diseases.
- vii) Should be able to interpret morphological changes in cells, tissues and organs & diagnose the disease.
- viii) Plan and teach pathology for medical and laboratory technology students. Should be 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.

- ix) Capable to 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.
- x) To understand quality assurance, to obtain and retain accreditation
- xi) Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time.
- xii) Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.
- xiii) To organize and supervise diagnostic laboratory
- xiv) Identify problems in the laboratory, offer solutions thereof & maintain a high order of quality control.
- xv) Capable of safe and effective disposal of laboratory waste.

Psychomotor Domain:

- i) Able to collect specimens for routinely performed procedures such as vene puncture, finger prick fine needle aspiration of super facial lumps and bone-marrow aspirates.
- ii) Should be familiar with the function, handling and routine care of equipment in the laboratory.
- iii) Able to perform most of the routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen section, making smears, and staining.
- iv) Should be able to recognize and report morphological changes in cells, tissues and organs.
- v) Perform an autopsy, dissect various organ complexes and display the gross findings.
- vi) Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control
- vii) Capable of safe & effective disposal of laboratory waste.
- viii) To organize and supervise diagnostic laboratory

Affective Domain:

- i) Should be able to function as 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.
- ii) The student will show integrity, accountability, respect, compassion and dedicated patient care. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
- iii) Always adopt ethical principles and maintain proper etiquette in dealings with patient, relatives and other health personnel and to respect the right of the patient including the right to information and second opinion.
- iv) Develop communication skills to word reports and professional opinions as well as to interact with patients, relatives, peers and paramedical staff, & for effective teaching.
- v) Able to supervise and work with subordinates and colleagues in a laboratory.

3. COURSE CONTENTS:

Duration of course: 2 years

A. Theory and practical:

1. General Pathology
2. Basic sciences pertaining to Pathology
 - a. Immunopathology
 - b. Serology
 - c. Enzyme histochemistry
 - d. Immunohistochemistry
 - e. Electroimmunoassay
 - f. Molecular biology
 - g. Cytogenetics
 - h. Tissue culture
 - i. Principles of Medical Statistics
3. Systemic pathology
4. Laboratory methods including – Sample collection, process of the sample and quality control.
5. Microscopy
6. Laboratory Medicine
 - a. Clinical Pathology
 - b. Clinical Biochemistry
7. Haematology
8. Surgical Pathology
9. Cyto-Pathology
10. Microbiology
11. Medical Autopsy techniques and interpretation
12. Museum techniques
13. Blood Banking including Transfusion Medicine
14. Organization of laboratory including quality control
15. Safe & effective disposal of laboratory waste.

B. 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 DCP Course is given under each head.

1. General pathology

- a) Normal cell and tissue structure and function.
- b) The changes in cellular structure and function in disease.
- c) Causes of disease and its pathogenesis.
- d) Reaction of cells, tissues, organ systems.

2. Basic sciences pertaining to Pathology

- a) Immunopathology
- b) Serology
- c) Enzyme histochemistry
- d) Immunohistochemistry
- e) Electroimmunoassay

- f) Molecular biology
- g) Cytogenetics
- h) Tissue culture
- i) Principles of Medical Statistics

3. Systemic pathology

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

4. Laboratory methods including – Sample collection, process of the sample and quality control.

5. Microscopy

6. Laboratory Medicine

a) Knowledge:

- Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical finding 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
- 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
- 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.

b) Clinical Pathology

- **Skills:** Demonstrate familiarity with and successfully perform:
 - 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.

c) Clinical biochemistry

- **Skills:**
 - Basic Biochemistry applied to biochemical investigations:
 - Appropriate use of Photocolorimeter, Spectrophotometer, pH meter, Flame photometer, Semi-Autoanalyser and Autoanalyser, Electrophoresis apparatus.
 - Perform biochemical investigations like blood sugar, urea, creatinine, proteins, bilirubin, SGOT, SGPT, Alkaline Phosphatase etc.
 - Demonstrate familiarity with the following quantitative estimations of blood/serum by Automated Techniques:

- 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 and Buffers.

7. Haematology

a) Knowledge:

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

b) Skills:

- Anticoagulants.
- Preparation of Romanowsky's stain and reagents for blood counts.
- Hands on experience in different methods of Haemoglobin estimation, RBC,
- WBC Platelets and Reticulocyte counts, AEC, PCV, ESR and absolute indices and Coagulation tests.
- Preparation and interpretation of peripheral smear and bone marrow.
- Correctly and 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.
 - Comprehensive work up of Haemolytic Anaemias. Hemolytic anemia profile including High Performance Liquid Chromatography, Hb electrophoresis etc.
 - Coagulation profile including PT, APTT (activated partial thromboplastin time), FDP,
 - Describe prominent morphologic findings in the peripheral smears.
- Cytochemistry – Peroxidase/Sudan Black B, PAS, LAP, NSE and Perl's stain
- Quality control and use of automated cell counters.
- Cleaning of Glassware.

8. Surgical Pathology

a) Knowledge:

b) 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:
 - Haematoxylin and eosin
 - Iron stain
 - Acid fast stains
- Demonstrate understanding of the principles of:
 - Fixation of tissues
 - Processing of tissues for section cutting

- Section cutting and maintenance of related equipment

9. Cyto-pathology

a) Knowledge:

b) Skills:

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

10. Microbiology

a) Knowledge:

b) Acquire knowledge of the following:

- Stool examination
- AFB staining of sputum
- Bacterial culture

c) Skills:

- Perform, interpret and report
- Gram's stain
- Ziehl-Neelsen
- Hanging drop
- KoH/Lactophenol preparation for fungi
- Sterilization and disinfection techniques.
- 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.

11. Medical Autopsy techniques and interpretation

12. Museum techniques.

13. Blood Banking including Transfusion Medicine

a) 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

b) Skills:

- Blood grouping and typing
- Cross matching
- Coomb's test
- Donor screening and blood collection
- Testing for STD, HIV, Hepatitis B and C.
- Rh antibody titration
- Cold agglutinin titre
- Quality control

14. Organization of laboratory including quality control

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

15. Safe & effective disposal of laboratory waste.

16. Record keeping:

- a) 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.

C) SCOPE OF TRAINING:

1. High degree of Professional competence

In the following fields, related to diagnosis of appropriate diseases, a high degree of professional competence and theoretical knowledge is expected.

- Clinical Haematology
- Laboratory Medicine (Clinical Pathology, Clinical biochemistry)
- Clinical Microbiology
- Transfusion Medicine (Blood-Banking)

2. Reasonable Professional competence:

- Pathologic Anatomy (General Pathology, Surgical Pathology including, Surgical Pathology and Cytopathology)
- Haematology
- Microbiology

3. General Acquaintance:

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

- Immunopathology
- Electron microscopy
- Histochemistry
- Immunohistochemistry
- Use of radioisotopes
- Cytogenetics
- Tissue culture

4. POSTING SCHEDULE: Total Duration 23 Months

| Sr. No. | Posting Section | Duration in Months |
|--------------|--------------------|--------------------|
| 1 | Histopathology | 4 |
| 2 | Cytopathology | 3 |
| 3 | Haematology | 4 |
| 4 | Clinical Pathology | 3 |
| 5 | Blood Bank | 2 |
| 6 | Microbiology | 3 |
| 7 | Biochemistry | 4 |
| TOTAL | | |

5. Postgraduate teaching programme should include

- On job training
- Subject seminars

- (C) Journal club
- (D) Slide seminars-Histopathology, Haematology and Cytopathology
- (E) Grossing seminars
- (F) Group discussion on clinical cases
- (G) Inter departmental seminars
- (H) Post graduate students should be encouraged to attend CME, Workshop, Conferences and present papers
- (I) Microteaching
- (J) Ward rounds

6. **EXAM PATTERN:**

- a. **Formative**
- b. **Summative:**

Theory:

Three Papers 100 marks each:

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

Each Paper will be:

| | | | | |
|------------------------|----------|----------|-----------|-------------------------|
| Full Questions: | 3 | X | 20 | Marks each – 60 |
| Short Notes: | 4 | X | 10 | Marks each -- 40 |
| Total | | | | 100 |

GRAND TOTAL 300 marks

Practical:

| Sr. No. | Practical | Marks |
|---------|--|------------|
| 1 | Microbiology | 20 |
| 2 | Clinical case discussion | 10 |
| 3 | Haematology | 40 |
| | a. Routine test | 25 |
| | b. Special Haematology test | 15 |
| 4 | Blood Banking | 20 |
| 5 | Biochemistry | 30 |
| 6 | Clinical Pathology | 30 |
| | a. Urine analysis | 20 |
| | b. Fluid analysis (CSF/Pleural Fluid/Ascitic Fluid) or Semen analysis or stool examination | 10 |
| 7 | Surgical Pathology | 30 |
| | Grossing Specimen | 20 |
| | Histotechniques | 10 |
| 8 | Slides | 70 |
| | a. Histopathology slides 5-6 | 25 |
| | b. Cytology slides 4-6 | 20 |
| | c. Haematology slides 5-6 | 25 |
| 9 | Oral / Viva Voce | 50 |
| | Total | 300 |

Two Days Practical Examination

❖ **DAY 1**

- Microbiology exercise (including reporting on day 2)
- Clinical case examination / discussion
- Haematology exercise, Blood Banking
- Biochemistry exercise
- Urine Analysis, Clinical Pathology exercise – semen analysis / stool examination, CSF / Pleural tap.

❖ **DAY 2**

- Reporting on Microbiology exercises
- Grossing
- Histopathology and cytology techniques – H and E, Pap, Geimsa
- Staining, Iron staining, AFB staining
- Histopathology slides: 5-6
- Cytology slides: 4-6
- Haematology slides: 5-6

- **Oral / Viva voce Examination:**
 - The oral examination shall be through 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.

7. Recommended Text Books; Reference Book And Journals:

1. Cotran, Kumar, Collins. Robin's Pathologic Basis of Disease, 9th edition 2015 published by W.B. Saunders & Company.
2. Ivan Damjanov, James Linder. Anderson's Pathology, 10th edition, 2010, published by C.V. Mosby Company.
3. Juan Rosai, Ackerman's Surgical Pathology, 10th Edition volume 1 & 2, 2011 published by C.V. Mosby Company.
4. Christopher D.M. Fletcher. Diagnostic Histopathology of tumours volume 1&2, 4th edition, 2013. published by Churchill Livingstone Elsevier company
5. Jurgen Ludwig, Hand book of Autopsy Practice; 5th Edition; 2009; Human Press.
6. Theory & practice of Histological Techniques edited by John. D. Bancroft- 7th edition 2012 published by Churchill Livingstone.
7. Gradwohl's Clinical laboratory methods and diagnosis volume 1 & 2 Eight Edition, 1990 by Alex Sonned with Leonard Jarett
8. Henry J.B Clinical Diagnostics and Management by Laboratory Methods, 22nd edition, 2012 published by W.B. Saunders & Company.
9. Lewis S.M, Bain D.J, Bates I, Dacie & Lewis Practical Haematology 11th edition, 2012 published by Churchill Livingstone.
10. Atlas and Text of Haematology by Tejinder Singh
11. Hoffbrand A.V, Catovsky D, Tuddenham G.D, Postgraduate Haematology – 7th edition, 2016 published by Blackwell Sciences.
12. Firkin F , Chesterman C, Penington D, de Gruchy's Clinical Haematology in Medical Practice, 6th edition 2012, published by Blackwell Sciences
13. Greer J.P, Foerster J, Jukens J et. Al, Wintrobe's Clinical Haematology, 13th edition, 2013, published by Lippincott Williams and Wilkins
14. Mollison P.L, Blood transfusion in clinical medicine, 12th edition, 2015, published by Oxford, ELBS & Blackwell Scientific Publication
15. Orell, Sterrett- Walters and Whittaker, Fine Needle Aspiration Cytology (Manual & Atlas), 5th edition, 2011, published by Churchill Livingstone
16. Leopold G Koss, Diagnostic cytology and its histopathologic basis 5th edition, 2006, published by J.B. Lippincott Company.
17. Marluce Bibbo, Comprehensive cytopathology, 4th edition, 2015 published by W.B Saunders Company
18. Winnifred Grey, Grace T Mckee, Diagnostic cytopathology, 3rd edition, 2010, published by Churchill Livingstone
19. Sudha R.Kini , Colour Atlas of differential diagnosis in exfoliative and aspiration cytopathology, 2nd edition, 2011 , published by Lippincott, Williams & Wilkins.
20. Praful B. Godkar ,Clinical Biochemistry – Principles & practice, published by Bhalani Publishing House, Bombay
21. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics Edited by Carl Burt Edward R. Ashwood David E. Bruns, 5th edition 2013 Elsevier, Inc. Publication .
22. Varley's Practical Clinical Biochemistry edited by Alan H. Gowen lock with assistance of Janet R Mc Mulla and Donald M. Mclauchlan Sixth edition 2010.
23. R.Anantnarayan , C.K.Paniker, Textbook of Microbiology, 9th edition, 2013, published by Orient Longman.
24. Parasitology (Protozoology & Helminthology.) in relation to clinical medicine – K.D.Chatterje published by Chatterjee Medical Publication.

25. McKee & McCartney Practical Medical Microbiology volume 1 & 2 14th edition 1996 edited by J.Gerald Collee, Andrew G Frasel, Ballies P Masmion, Anthony Simmon.
26. Bailey & Scott Diagnostic Microbiology Edited by Denni S.C. Capson 13th edition, 2013.
27. WHO Classification of tumours, published by IARC Press
28. Recent advances in Histopathology, Haematology etc.
29. Text Book on Thyroid Pathology by Geetha Jayaram
30. Robbins Pathology
31. Text Book of Microbiology by C. P. Baveja
32. Harper's Text Book of Biochemistry

Journals:

1. Acta Cytologica
2. The American Journal of Pathology
3. American Journal of Surgical Pathology, published by Lippincott & Raven
4. The American Journal of Hematology
5. The American Journal of Clinical Pathology
6. Archives of Pathology and Laboratory Medicine
7. Blood
8. British Journal of Haematology, published by Blackwell Sciences.
9. CANCER, International journal of American Cancer Society, published by John Wile & sons Inc.
10. Diagnostic Cytopathology published by Wiley Liss, inc, publication
11. Histopathology
12. Human Pathology
13. Haematology/Oncology Clinics of North America, published by W.B. Saunders &Company.
14. Journal of Cytology, published by I.AC.
15. I.C.M.R. Bulletin, published by ICMR
16. Indian Journal of Pathology & Microbiology, published by IAPM.
17. Indian Journal of Pathology and Microbiology
18. Indian Journal of Cancer, published by Indian Cancer Society.
19. Journal of Pathology
20. Journal of Clinical Pathology, published by B.M.J.
21. Laboratory Investigation
22. LANCET, published by Elsevier
23. Modern Pathology
24. Pathology
25. Seminars in Hematology
26. Seminars in Diagnostic Pathology
27. Virchows Archives
28. Year Book Series
29. Recent Advances Series



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