BLDE UNIVERSITY

PG CURRICULUM
2012-13
MD Pathology

Published by

BLDE UNIVERSITY

[Declared as Deemed to be University u/s 3 of UGC act, 1956, vide notification No.F.9-37/2007-U.3(A)]

The Constituent College

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE

Smt. Bangaramma Sajjan Campus, Sholapur Road, Bijapur - 586103, Karnataka, India.

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B.L.D.E. UNIVERSITY

(Declared vide notification No. F.9-37/2007-U 3 (A) Dated. 29-2-2008 of the MHRD, Government of India under Section 3 of the UGC Act,1956)

The Constituent College

SHRI. B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE

BLDEU/REG/PG/2012-13/845 September 20, 2012

NOTIFICATION

Subject: Revised Curriculum for the Post Graduate Degree and Diploma Courses – 2012

Reference:

1. Medical Council of India Regulation on Graduate Medical Education, 1997 and subsequent amendments of the same from time-to-time.
2. Minutes of the meeting of the Academic Council of the University held on April 11, 2012
3. Minutes of the meeting of the BOM of the University held on May 23, 2012.

The Board of Management of University is pleased to approve the Curriculum for Post Graduate Degree and Diploma Courses at its meeting held on May 23, 2012.

The revised curriculum shall be effective, from the Academic Session 2012-13 onwards, for Post Graduate Degree and Diploma Course in the Constituent College of the University viz Shri B. M. Patil Medical College, Hospital and Research Centre.

REGISTRAR
REGISTRAR.
BLDE University, Bijapur.

To,
The Dean, Faculty of Medicine and Principal
Shri B. M. Patil Medical College,
Hospital and Research Centre,
BIJAPUR

Copy to:

1. The Secretary, UGC, New Delhi
2. The Controller of Examinations
3. Prof. & HODs of Pre, Para and Clinical Departments.
4. PS to Hon'ble President
5. PS to Hon'ble Vice Chancellor
6. Office Copy

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Vision and Mission

- *Committed to provide globally competitive quality medical education.*

- *To provide the best health care facilities in this backward region, in particular, to socially disadvantaged sections of the society.*

- *Constantly striving to become a reputed research University with world-class infrastructure, latest tech-tools for teaching/research and adopting global best practices.*

Section - I

Goals and General Objectives of Postgraduate Medical Education Program

Goal

The goal of postgraduate medical education shall be to produce a competent specialist and / or a medical teacher:

(i) Who shall recognize the health needs of the community, and carry out professional obligations ethically and in keeping with the objectives of the national health policy;

(ii) Who shall have mastered most of the competencies, retraining to the specialty, that are required to be practiced at the secondary and the tertiary levels of the health care delivery system;

(iii) Who shall be aware of the contemporary advances and developments in the discipline concerned;

(iv) Who shall have acquired a spirit of scientific inquiry and is oriented to the principles of research methodology and epidemiology; and

(v) Who shall have acquired the basic skills in teaching of the medical and paramedical professionals.

General Objectives

At the end of the postgraduate training in the discipline concerned the student shall be able to:

(i) Recognize the importance of the concerned specialty in the context of the health need of the community and the national priorities in the health sector.

(ii) Practice the specialty concerned ethically and in step with the principles of primary health care.

(iii) Demonstrate sufficient understanding of the basic sciences relevant to the concerned specialty.

(iv) Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive and promotive measures/strategies.

(v) Diagnose and manage majority of the conditions in the specialty concerned on the basis of clinical assessment, and appropriately selected and conducted investigations.

(vi) Plan and advice measures for the prevention and rehabilitation of patients suffering from disease and disability related to the specialty.

(vii) Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.

(viii) Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behavior in accordance with the societal norms and expectations.

(ix) Play the assigned role in the implementation of national health programs, effectively and responsibly.

(x) Organize and supervise the chosen/assigned health care services demonstrating adequate managerial skills in the clinic/hospital or the field situation.

(xi) Develop skills as a self-directed learner; recognize continuing educational needs; select and use appropriate learning resources.

(xii) Demonstrate competence in basic concept of research methodology and epidemiology, and be able to critically analyse relevant published research literature.

(xiii) Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.

(xiv) Function as an effective leader of a team engaged in health care, research or training.

Statement of the Competencies

Keeping in view the general objectives of postgraduate training, each discipline shall aim at development of specific competencies, which shall be defined and spelt out in clear terms. Each department shall produce a statement and bring it to the notice of the trainees in the beginning of the program so that he or she can direct the efforts towards the attainment of these competencies.

Components of the PG Curriculum

The major components of the PG curriculum shall be:

- Theoretical knowledge
- Practical/clinical Skills
- Training in writing thesis/research articles
- Attitudes, including communication.
- Training in research methodology, medical ethics & medicolegal aspects

Source: Medical Council of India, Regulations on Postgraduate Medical Education, 2000. [amended upto January 2010]

Eligibility for Admission:

Eligibility requirements for Post Graduate Diploma and Degree Courses are : -

1. The candidates seeking admission to these courses should have passed MBBS from the college recognized by Medical Council of India.

Eligibilty requirements for Post graduate degree in superspeciality courses,M.Ch./D.M are:

The candidate seeking admission to these courses should have passed MS/MD from the college recognized by Medical Council of India.

2. As per the requisitions of statutory bodies, as laid out in post graduate regulations 2000 of Medical Council of India and its amendments thereof, the minimum percentage of marks in the entrance test conducted by the University for eligibility for admission to Post Graduate courses in broad specialties and super specialties shall be 50 percent for candidates belonging to General category and 40 percent for the candidates belonging to Scheduled Caste, Scheduled Tribes and Other Backward Classes. Eligibility for persons with locomotor disability of lower limbs category will be 45 percent.

Eligibility for Foreign / PIO / NRI students will be based on qualifying examination marks.

The MCI norms to qualify for Admissions

Candidates seeking admission to these Post Graduate Degree courses should have passed M.B.B.S. recognised by Medical Council of India or equivalent qualification and should have obtained permanent Registration from the Medical Council of India or any of the

State/ Medical council or candidate should register the same within one month from the date of admission, failing which the admission of the candidate shall be cancelled. Provided that in the case of a foreign national, the MCI may on the payment of prescribed fee for the registration, grant temporary registration for the duration of post graduate training restricted to the medical college/ institute to which the applicant is admitted for the time being exclusively for post graduate studies; provided further, that temporary registration to such foreign national shall be subjected to the condition that such person is duly registered with appropriate registering authority in his /her country wherefrom he has obtained his basic medical qualification ,and is duly recognized by the corresponding Medical Council or concerned authority..

If the candidate fails to fulfill the relevant eligibility requirements as mentioned above he/she will not be considered eligible for admission for Medical Postgraduate Degree and Diploma Courses even if he/she is placed in the merit list of BLDEU-PGET/BLDEU-SUPERSPECIALTY ET.

Obtaining Eligibility Certificate by the University before making Admission

Candidate shall not be admitted for any postgraduate degree/diploma course unless he/she has obtained and produced the eligibility certificate used by the University. The candidate has to make an application to the University with the following documents along with the prescribed fee:

1. MBBS pass/degree certificate issued by the University.
2. Marks cards of all the university examinations passed MBBS course.
3. Attempt Certificate issued by the Principal
4. Certificate regarding the recognition of the Medical College by the Medical Council of India.
5. Completion of internship certificate.
6. In case internship was done in a non-teaching hospital, a certificate from the Medical Council of India that the hospital has been recognized for internship.
7. Registration by any State Medical council and
8. Proof of SC/ST or OBC or physically handicapped status, as the case may be.

In addition to the above mentioned documents, candidate applying for admission to superspecialty courses has to produce degree/pass certificate of MD/MS degree with prescribed fee.

Intake of Students

The intake of students to each course shall be in accordance with the ordinance in this behalf.

Course Duration

a. M.D. / M.S. Degree Courses:
   The course of study shall be for a period of 3 years consisting of 6 terms including examinations. For Candidates possessing recognized two year Postgraduate Diploma in the same subject the duration of the course shall be two years including examinations. (MCI PG REG 2000 10:1)

b.D.M/M Ch Degree Courses;(MCI PG REG 2000,10:2)
   The duration of these courses shall be for a period of 3 years including examinations.

c.Diploma Courses:

The course of study shall be for a period of 2 years consisting of 4 terms including examinations(MCI PG REG 2000,10.3).

Training Method

The postgraduate training for degree/diploma shall be of residency pattern. The post graduate shall be trained with graded responsibilities in the management and treatment of patients entrusted to his/her care. The participation of the students in all facets of educational process is essential. Every candidate should take part in seminars, group discussions grand rounds, case demonstration, clinics, journal review meetings, CPC and clinical meetings. Every candidate should be required to participate in the teaching and training program of undergraduate students. Training should include involvement in laboratory and experimental work, and research studies. Basic medical sciences students should be posted to allied and relevant clinical departments or institutions. Similarly, clinical subjects' students should be posted to basic medical sciences and allied specialty departments or institutions.

Attendance, Progress and Conduct

A candidate pursuing degree/diploma course should work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run a clinic/laboratory/nursing home while studying postgraduate course

Each year shall be taken as a unit for the purpose of calculating attendance. Every student shall attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons. Every Candidate is required to attend a minimum of 80% of the training during each academic year of the post graduate course.This shall include assignments,assessed full time responsibilities and participation in all facets of educational process. Provided further, leave of any kind shall not be counted as part of academic term without prejudice to minimum 80% attendance of training period every year. Leave benefits shall be as per university rules.

A post graduate student persuing degree course in broad specialities, MD,MS and superspeciality courses DM,M.Ch would be required to present one poster presentation,read one paper in 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/her to be eligible to appear at the university degree examinations.(MCI,PG 2000,13.9)

Any student who fails to complete the course in the manner stated above shall not be permitted to appear for the University Examinations.

Monitoring Progress of Studies

The learning process of students should be monitored through continuous appraisal and regular assessment. It not only helps teachers to evaluate students, but also students to evaluate themselves. The monitoring is done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment done by using checklists that assess various aspects.

The learning out comes to be assessed include:

- Personal Attitudes,
- Acquisition of Knowledge,
- Clinical and operative skills,
- Teaching skills.

Personal Attitudes:

The essential items are :

- Caring attitudes
- Initiative
- Organizational ability
- Potential to cope with stressful situations and undertake responsibility
- Trust worthiness and reliability
- To understand and communicate intelligibly with patients and others
- To behave in a manner which establishes professional relationships with patients and colleagues
- Ability to work in team
- A critical enquiring approach to the acquisition of knowledge

The Methods used mainly consist of observation. It is appreciated that these items require a degree of subjective assessment by the guide, supervisors and peers.

Acquisition of Knowledge:

The methods used comprise of 'Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made are to be recorded. The log book should periodically be validated by the supervisors. Some of the activities are listed. The list is not complete. Institutions may include additional activities, if so, desired.

Lectures: Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.

a) Didactic Lectures: Recommended for selected common topics for post graduate students of all specialties. Few topics are suggested here.

- Bio-statistics
- Use of library,
- Journal review
- Use of computers,
- Appropriate use of AV aids
- Research Methods,
- Search of literature,
- Rational drug therapy
- Medical code of Conduct and Medical Ethics
- National Health and Disease Control Programmes
- Communication skills etc.

These topics may preferably taken up in the first few weeks of the 1st year commonly for all new postgraduates

b)Integrated teaching : These are recommended to be taken by multidisciplinary teams for selected topics, eg. Jaundice,Diabetes mellitus,thyroid diseases etc.

Journal Review Meeting (Journal club):

The ability to do literature search, in depth study, presentation skills, and use of audio – visual aids are to be assessed. The assessment is made by faculty members and peers attending the meeting using a checklist

Seminars / symposia:

The topics should be assigned to the student well in advance to facilitate in depth study. The ability to do literature search, in depth study, presentation skills and use of audio – visual aids are to be assessed using a checklist.

Clinico-Pathological conferences:

This should be a multidisciplinary case study of an interesting case to train the candidate to solve diagnostic and therapeutic problems by using an analytical approach. The presenter(s) are to be assessed using a check list similar to that used for seminar.

Medical Audit: Periodic morbidity and mortality meeting be held. Attendance and participation in these must be insisted upon. This may not be included in assessment.

Clinical Skills: Day to Day Work: Skills in outpatient and ward work should be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills

Clinical Meetings:

Candidates should periodically present cases to his peers and faculty members. This should be assessed using a check list

Clinical and Procedural Skills:

The candidate should be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by direct observation. Particulars are recorded by the student in the log book.

Teaching Skills:

Candidates should be encouraged to teach undergraduate medical students and paramedical students, if any. This performance should be based on assessment by the faculty members of the department and from feedback from the undergraduate students

Work diary / Log Book:

Every candidate shall maintain a work diary and record his/her participation in the training programs conducted by the department such as journal reviews, seminars, etc. Special mention may be made of the presentations by the candidate as well as details of clinical or laboratory procedures, if any, conducted by the candidate. The work diary shall be scrutinized by concerned teachers periodically and certified, by the Head of Department and Head of the Institution, and presented during university practical / Clinical examination.

Periodic tests:

In case of degree courses of three years duration (MD/MS, DM, M.Ch), the concerned departments may conduct three tests, two of them be annual tests, one at the end of first year and the other in the second year. The third test may be held three months before the final examination. The tests may include written papers, practical / clinical and viva voce.

One of these practical/clinical tests should be conducted by OSPE(objective structured practical examination or OSCE(objective structured clinical examination) method.
.Records and marks obtained in such tests will be maintained by the Head of Department and sent to the University, when called for,

In case of diploma courses of two years duration, the concerned departments may conduct two tests, one of them be at the end of first year and the other in the second year three months before the final examination. The tests may include written papers, practical /clinical and viva voce.
One of these practical/clinical tests should be conducted by OSPE or OSCE method.

Records: Records and marks obtained in tests will be maintained by the Head of the Departments and will be made available to the University or MCI.

Procedure for defaulter:

Every department should have a committee to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the requirements in spite of being given adequate chances to set himself or herself right.

Dissertation: Every candidate pursuing MD/MS degree course is required to carry out work on a selected research project under the guidance of a recognized post graduate teacher. The results of such a work shall be submitted in the form of a dissertation.

The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis and comparison of results and drawing conclusions.

Every candidate shall submit to the Registrar (Academic) of the University in the prescribed proforma, a synopsis containing particulars of proposed dissertation work within six months from the date of commencement of the course on or before the dates notified by the University. The synopsis shall be sent through the proper channel.

Such synopsis will be reviewed and the dissertation topic will be registered by the University. No change in the dissertation topic or guide shall be made without prior approval of the University.
The dissertation shall be written under the following headings:

1. Introduction
2. Aims or Objectives of study
3. Review of Literature
4. Material and Methods
5. Results
6. Discussion
7. Conclusion
8. Summary
9. References
10. Tables
11. Annexure

The written text of dissertation shall be not less than 50 pages and shall not exceed 150 pages excluding references, tables, questionnaires and other annexure. It should be neatly

typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided. The dissertation shall be certified by the guide, head of the department and head of the Institution.

Four copies of dissertation thus prepared shall be submitted to the Controller of Examinations six months before final examination on or before the dates notified by the University.

The dissertation shall be valued by examiners appointed by the university. Approval of dissertation work is an essential precondition for a candidate to appear in the University examination.

Guide:

The academic qualification and teaching experience required for recognition by this University as a guide for dissertation work is as per Medical Council of India Minimum Qualifications for Teachers in Medical Institutions Regulations, 1998. Teachers in a medical college/institution having a total of eight years teaching experience out of which at least five years teaching experience as Lecturer or Assistant Professor gained after obtaining post graduate degree shall be recognized as post graduate teachers.

A Co-guide may be included provided the work requires substantial contribution from a sister department or from another medical institution recognized for teaching/training by this University / Medical Council of India. The co-guide shall be a recognized post graduate teacher of BLDE University

Change of guide:

In the event of a registered guide leaving the college for any reason or in the event of death of guide, guide may be changed with prior permission from the university.

Schedule of Examination:

The examination for M.D. /M.S and DM/M.Ch courses shall be held at the end of three academic years (six academic terms). The examination for the diploma courses shall be held at the end of two academic years (four academic terms).

The university shall conduct two examinations in a year at an interval of four to six months between the two examinations. Not more than two examinations shall be conducted in an academic year.

Scheme of Examination

M.D. /M.S. Degree

M.D. / M.S. Degree examinations in any subject shall consist of dissertation, written papers (Theory), Practical/Clinical and Viva Voce.

Dissertation:

Every candidate shall carryout work and submit a Dissertation as indicated above. Acceptance of dissertation shall be a precondition for the candidate to appear for the final examination.

Written Examination (Theory):

Written examination shall consist of **four** question papers, each of **three** hours duration. Each paper shall carry 100 marks. Out of the **four** papers, the 1st paper in clinical subjects will be on applied aspects of basic medical sciences. Recent advances

may be asked in any or all the papers. In basic medical subjects and para-clinical - subjects, questions on applied clinical aspects should also be asked.

Practical / Clinical Examination:

In case of practical examination, it should be aimed at assessing competence and skills of techniques and procedures as well as testing students ability to make relevant and valid observations, interpretations and inference of laboratory or experimental work relating to his/her subject.

In case of clinical examination, it should aim at examining clinical skills and competence of candidates for undertaking independent work as a specialist. Each candidate should examine at least one long case and two short cases.

The total marks for Practical / clinical examination shall be 200.

Viva Voce:

Examination shall aim at assessing depth of knowledge, logical reasoning, confidence and oral communication skills.

The total marks shall be 100:

- 80 Marks, for examination of all components of syllabus
- 20 Marks for Pedagogy

Examiners:

There shall be at least four examiners in each subject. Out of them two shall be external examiners and two shall be internal examiners. The qualification and teaching experience for appointment as an examiner shall be as laid down by the Medical Council of India.

Criteria for declaring as pass in University Examination: A candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory, (2) Practical/ clinical and(3)viva voce examination. The candidate should pass independently in practical/clinical examination and Viva Voce vide MCI pg 2000 reg no 14(4)(Ciii)

A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. Failed candidate may appear in any subsequent examination upon payment of fresh fee to the Controller of Examinations.

Declaration of distinction: A successful candidate passing the University examination in first attempt will be declared to have passed the examination with distinction, if the grand total aggregate of marks is 75 percent and above.

Distinction will not be awarded for candidates passing the examination in more than one attempt.

D.M/M.Ch Degree

DM/M.Ch Degree examinations in any subject shall consist of written theory papers(theory),practical/clinical and Viva voce.

Written Examination (Theory):

Written examination shall consist of **four** question papers, each of **three** hours duration. Each paper shall carry 100 marks. Out of the **four** papers, the 1st paper in clinical subjects will be on applied aspects of basic medical sciences. Recent advances may be asked in any or all the papers. In basic medical subjects and para-clinical - subjects, questions on applied clinical aspects should also be asked.

Practical / Clinical Examination:

In case of practical examination, it should be aimed at assessing competence and skills of techniques and procedures as well as testing students ability to make relevant and valid observations, interpretations and inference of laboratory or experimental work relating to his/her subject.

In case of clinical examination, it should aim at examining clinical skills, competence of candidates for undertaking independent work as a specialist. Each candidate should examine at least one long case and two short cases.

The total marks for Practical / clinical examination shall be 200.

Viva Voce:

Examination shall aim at assessing depth of knowledge, logical reasoning, confidence and oral communication skills.

The total marks shall be 100:

- 80 Marks, for examination of all components of syllabus
- 20 Marks for Pedagogy

Examiners:

There shall be at least four examiners in each subject. Out of them two shall be external examiners and two shall be internal examiners. The qualification and teaching experience for appointment as an examiner shall be as laid down by the Medical Council of India.

Criteria for declaring as pass in University Examination: A candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory, (2) Practical including clinical and(3)viva voce examination. The candidate should pass independently in practical/clinical examination vide MCI pg 2000 reg no 144-c(iii).

Declaration of distinction: A successful candidate passing the University examination in first attempt will be declared to have passed the examination with distinction, if the grand total aggregate of marks is 75 percent and above.

A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. Failed candidate may appear in any subsequent examination upon payment of fresh fee to the Controller of Examinations.

Distinction will not be awarded for candidates passing the examination in more than one attempt.

Diploma Examination:

Diploma examination in any subject shall consist of Theory (written papers), Practical / Clinical and Viva-Voce.

Theory:

There shall be **three** written question papers each carrying 100 marks. Each paper will be of **three** hours duration. In clinical subjects one paper out of this shall be on basic medical sciences. In basic medical subjects and Para clinical subjects, questions on applied clinical aspects should also be asked.

Practical / Clinical Examination:

In case of practical examination it should be aimed at assessing competence, skills related to laboratory procedures as well as testing students ability to make relevant and valid observations, interpretation of laboratory or experimental work relevant to his/her subject.

In case of clinical examination, it should aim at examining clinical skills and competence of candidates for undertaking independent work as a specialist. Each candidate should examine at least one long case and two short cases.

The maximum marks for Practical/Clinical shall be 150.

Viva-Voce Examination: Viva Voce examination should aim at assessing depth of knowledge, logical reasoning, confidence and oral communication skills. The total marks shall be 50.

Criteria for declaring as pass in University Examination: A candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory, (2) Practical / clinical and viva voce examination.

A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. Failed candidate may appear in any subsequent examination upon payment of fresh fee to the Controller of Examinations.

Declaration of distinction: A successful candidate passing the University examination in first attempt will be declared to have passed the examination with distinction, if the grand total aggregate of marks is 75% and above. Distinction will not be awarded for candidates passing the examination in more than one attempt.

Examiners:

There shall be at least four examiners in each subject. Out of them, two shall be external examiners and two shall be internal examiners. The qualification and teaching experience for appointment as an examiner shall be as laid down by the Medical Council of India.

Number of Candidates per day:

The maximum number of candidates for practical / clinical and viva-voce examination shall be as under:

MD / MS Courses: Maximum of 6 per day

Diploma Courses: Maximum of 6 per day

DM/M.Ch Courses: Maximum of 3 per day

SECTION II

BLDE UNIVERSITY
SHRI.B.M.PATIL MEDICAL COLLEGE

DEPARTMENT OF PATHOLOGY

CURRICULUM FOR MD- PATHOLOGY

GOAL:

After completing, post graduate medical education in pathology,the student should be capable of directing and managing laboratory services and be able to:

1. Serve as a consultant to physicians on cost-effective test strategies and interpretation of results
2. Select, evaluate, and apply laboratory instruments and procedures appropriate to the screening,diagnostic, and monitoring needs of clinical decision making
3. Plan, organize, staff and direct laboratory resources
4. Use the techniques of medical informatics to acquire and manage data, translate data to clinically useful information, and communicate that information in support of patient care and educational programs
5. Play an influential role in medical staff and health-care delivery activities that reach beyond the confines of the laboratory
6. Recognize the health needs of the community and carry out professional obligation ethically and in keeping with the objectives of the national health policy.
7. Should master most of the competencies, pertaining to the specialty, that are required to be practiced at the secondary and tertiary levels of the healthcare delivery system.
8. Should be aware of contemporary advances and developments in the discipline concerned
9. Should have acquired a spirit of scientific inquiry and oriented to the principles of research methodology and epidemiology.
10. Should have acquired the basic skills in teaching of the medical and paramedical professionals.

OBJECTIVES:

At the end of the course a candidate must be able to

1. Understand and explain factors in causation of disease.
2. Understand processes involved in the gross and microscopic changes of organs and tissues and explain these changes.
3. Understand and explain the pathologic basis of clinical signs and symptoms.
4. Should be able to perform diagnostic procedures designed for Laboratory detection of diseases.
5. Should be able to recognize and report morphological changes in cells, tissues and organs.
6. Should be able to identify, plan, perform and report specific research projects.
7. Should be able to perform clinical autopsy and present a CPC (Clinico Pathological Conference).
8. Should be able to plan and teach pathology for Laboratory technicians, Nursing, Dental and Medical students.
9. Should be aware of Telepathology, Molecular biology, newer diagnostic modalities, ongoing researches and recent advances**.**

Patient care

1. Gather essential and accurate information about patients using all relevant available modalities
2. Act as a skilled consultant to other clinicians to develop a diagnostic plan based on specific clinical questions and relevant clinical and pathological information
3. Consult, as part of a multidisciplinary health care team, in developing a therapeutic plan that includes laboratory monitoring of efficacy and toxicity
4. Provide expert consultation on the interpretation and follow-up of unusual or unexpected test results
5. Consult as a clinical expert in Laboratory Medicine at multidisciplinary conferences

Medical knowledge

1. Be able to use all relevant information resources to acquire and evaluate evidence-based information; demonstrate proficiency in evaluating and presenting findings from appropriate peer-reviewed journals
2. Demonstrate sufficient knowledge to determine clinically optimal yet cost-effective testing and laboratory- based therapeutic strategies, including issues of turnaround time, test menu construction, and in-house versus referral diagnostic testing
3. Use mathematics and statistics as appropriate to laboratory testing; understand and implement quality control (QC) and quality assurance procedures as required
4. Demonstrate awareness and understanding of proficiency programs, such as those provided by NABL and similar organizations
5. Demonstrate knowledge of the principles of clinical research design, implementation, and interpretation; understand the various levels of evidence in medicine and their translation into evidence-based practice
6. Be able to design a study that can be used to validate methodologies and parameters of clinical utility for the implementation and continuing use of new evidence-based analytes in the local setting

Practice-based learning and improvement

1. Demonstrate the ability to critically assess the scientific literature
2. Demonstrate knowledge of evidence-based medicine and apply its principles in practice
3. Use proficiency programs to improve laboratory practices

Interpersonal and communication skills

1. Demonstrate the ability to write an articulate, legible, and comprehensive yet concise consultation note; provide a clear and informative report, including a precise
2. diagnosis whenever possible, a differential diagnosis when appropriate, and recommended follow-up or additional studies, as appropriate
3. Demonstrate the ability to provide direct communication to the referring physician or appropriate clinical personnel when interpretation of a laboratory assay reveals an urgent, critical, or unexpected finding and document this communication in an appropriate fashion
4. Choose effective modes of communication (listening, nonverbal, explanatory, or questioning) and mechanisms of communication (face to face, telephone, email, or written), as appropriate
5. Demonstrate skills in obtaining informed consent, including effective communication to patients about procedures, alternative approaches, and possible complications of laboratory-

based patient care diagnostic and therapeutic activities such as those related to transfusion medicine

6. Demonstrate skills in educating colleagues and other health care professionals:

Professionalism

1. Demonstrate compassion: be understanding and respectful of patients, their families, and the staff and physicians caring for them
2. Interact with others without discriminating based on religious, ethnic, sexual, or educational differences
3. Demonstrate positive work habits, including punctuality, dependability, and professional appearance
4. Demonstrate a responsiveness to the needs of patients and society that supersedes self-interest
5. Demonstrate principles of confidentiality with all information transmitted both during and outside a patient encounter
6. Demonstrate knowledge of regulatory issues pertaining to the use of human subjects in research
7. Demonstrate a commitment to excellence and ongoing professional development
8. Demonstrate interpersonal skills in functioning as a member of a multidisciplinary health care team

Systems-based practice

1. Demonstrate understanding of the role of the clinical laboratory in the health care system
2. Demonstrate the ability to design resource-effective diagnostic plans based on knowledge of best practices in collaboration with other clinicians
3. Demonstrate knowledge of basic health care reimbursement methods
4. Demonstrate knowledge of the laboratory regulatory environment, including licensing authorities; federal, state, and local public health rules and regulations; regulatory agencies such as the Food and Drug Administration; and accrediting agencies such as the NABL
5. Understand and implement policies to continually improve patient safety as they relate to clinical laboratory testing at all levels

Basic sciences:

1. Anatomy – Histology – of all structures in the human body / organ.
2. Physiology – Biochemistry – basic aspects of various metabolisms and functioning of endocrines.
3. Genetics – Fundamental / Applied aspects.
4. Biostatistics.
5. Bio-medical ethics – Ethical issues related to medical practice and research involving human subjects and animals.

Pathology :

1. Historical aspects.
2. General pathology including immunopathology.

3. Systemic pathology.
4. Haematopathology.
5. Blood banking including transfusion medicine.
6. Cytopathology.
7. Genetic disorders: molecular pathology.
8. Recent advances in all fields.
9. Organization of laboratory including quality control.

METHODS OF TRAINING

Duration of course – 3 years.

A. On job training

1.Histopathology including techniques and reporting

2. Cytology including FNAC (direct and guided), fluid cytology ,exfoliative cytology- techniques and
reporting

3.Haematology including blood banking and transfusion medicine- techniques and reporting

4.Clinical pathology- techniques and reporting

5. Museum techniques

6. Autopsy techniques and interpretation

7. Microbiology –Serology, Handling of hazardous material

8.Undergraduate teaching

9. Clinico Pathological Correlation

10. Frozen section

11. Immuno Histo Chemistry

12. Fluorescent microscopy

13. Electron microscopy

14. Biomedical waste management

B.Group teaching sessions

Any three /week

1. Slide seminar including histopathology ,haematology, and cytopathology

2 Journal review

3. Subject seminar

4. Grossing discussions for autopsies and surgical material

5 Clinical case- group discussion

6 Interdepartmental seminars

7. Theory classes for post graduates

8. Training in answering model questions- on one topic every month

POSTING SCHEDULE:

		I Year	II Year	III Year
1. Histopathology-	12months	**04**	**04**	**04**
2. Autopsy	01month	**01**	**---**	**---**
3. Clinical and chemical pathology	04months	**02**	**02**	**---**
4. Haematology	06months	**02**	**02**	**02**
5. Cytopathology	06months	**02**	**02**	**02**
6. Blood Bank	01month	**---**	**---**	**01**
7. Serology	01month	**01**	**---**	**---**
8. Museum	01month	**---**	**---**	**01**
9. External Posting(NIMHANS etc)	02month	**---**	**02**	
10. Revision in all sections	02months	**---**		**02**
		12	**12**	**12**

TOTAL **36 months**

TRAINING FOR HEMATOLOGY SKILLS

	Skill Level I	**Skill Level II**
Automated hematology	1. Understand clinical indications for peripheral blood cell enumeration and differential analysis 2. Know the components of a complete blood count and understand the information provided by each 3. Understand the principles of automated cell counting including red blood cell (RBC) indices and their derivation 4. Understand how "absolute values" are determined and how they differ from "relative percent" 5. Identify spurious white blood count (WBC), RBC, Hgb, and platelet and be able to propose a course of action to be followed for reporting results 6. Understand appropriate WBC correction for the presence of nucleated RBC 7. Understand automated differential analysis and manual review criteria 8. Understand the absolute neutrophil count and its clinical utility, as well as problems associated with band counts 9. Understand QC procedures specific to cell counters, such as Rumke limits on differential cell counts and Bull analysis of indices 10. Understand principles of automated and manual reticulocyte enumeration and respective technical limitations	1. Interpret results of automated and manual cell counts and understand relevant technical limitations 2. Recommend appropriate steps for abnormal sample processing, analysis, and result reporting 3. Review abnormal results and correlate results with peripheral blood smear findings and clinical history

Peripheral blood smear analysis	1. Know proper preparation and handling of peripheral blood smears, including standard stains and special stains used to identify cellular structures and inclusions 2. Understand normal RBC, WBC, and platelet morphology 3. Be able to estimate WBC and platelet counts	1. Recognize abnormal RBC, WBC, and platelet morphology; formulate a differential diagnosis; and suggest appropriate laboratory testing for follow-up 2. Recognize technical artifacts in WBC, RBC, and platelet morphology 3. Recognize infectious disorders that can be diagnosed by blood smear 4. Recognize storage disorders and congenital disorders that have morphological manifestations in the peripheral blood smear 5. Correlate peripheral blood smear findings with bone marrow morphology
Red blood cell disorders	1. Learn the clinical indications for laboratory tests involved in the assessment of intrinsic and extrinsic RBC defects/disorders 2. Know the pathophysiology and characteristic laboratory findings of the major disorders causing normocytic, microcytic, and macrocytic anemia 3. Describe iron metabolism and laboratory tests for iron depletion 4. Understand Hgb synthesis and degradation 5. Understand the principles of Hgb screening by highperformance liquid chromatography and electrophoresis at acid and alkaline pH 6. Understand the principle and clinical utility of screening tests for the presence of Hgb S 7. Know the pathophysiology and laboratory features of intravascular and extravascular hemolysis 8. Understand the principle and clinical utility of Kleihauer Betke and/or flow cytometric analysis for fetal Hgb	Interpret Hgb electrophoretic patterns & ancillary tests for the diagnosis of the following. 1. Major Hgb opathies 2. RBC disorders related to enzyme defects 3. Hereditary spherocytosis and other RBC membrane/ cytoskeletal defects 4. Paroxysmal nocturnal hemoglobinuria; 5. Hemolytic anemia 6. Congenital dyserythropoietic anemias
White blood cell disorders	**Flow Cytometry** 1. Understand clinical indications for flow cytometric evaluation of blood, marrow, solid tissue, or fluid cells. 2. Understand the physical components and operating principles of a flow cytometer. 3. Understand QC procedures unique to flow cytometry assays (eg, nature of controls and accounting for all lymphocyte subsets in a blood sample). 4. Understand the principles of routine flow cytometry evaluation of leukocytes,	1. Evaluate and interpret results of flow cytometry in conjunction with cytochemical, immunocytochemical, and immunohistochemical studies and lymph node pathology as related to hematopoietic and lymphoproliferative diseases. 2. Understand the characteristic clinical, morphologic, immunophenotypic, cytochemical, and cytogenetic/molecular features of acute

	including surface and intracellular markers and recognition of clonal abnormalities. 5. Understand principles of tests designed to evaluate DNA content (ploidy) and cell cycle as used in the evaluation of products of conception and other tissues. 6. Understand platelet antibody testing by flow cytometry and its clinical applications. 7. Understand the diagnostic and prognostic information provided by flow cytometry. 8. Understand the principles of lymphocyte subset analysis: know the commonly used antigens to defineT-cell subsets and natural killer (NK) and B cells. 9. Appreciate the effect of age on lymphocyte subset normal ranges. 10. Observe/perform a lymphoma-leukemia panel on blood and/or bone marrow. 11. Observe/perform lymphoma panel on lymph node or spleen specimens.	myeloid leukemia, acute lymphoid leukemia, myelodysplastic syndromes, paroxysmal nocturnal hemoglobinemia, multiple myeloma and monoclonal gammopathy of undetermined significance, non-Hodgkin and Hodgkin lymphoma, neuroblastoma, chronic lymphoproliferative disorders, lymphomatoid granulomatosis, posttransplant lymphoproliferative disorder, polymorphic and lymphomatoid papulosis, and histiocytic disorders. 3. Interpret specific flow cytometric abnormalities associated with immunodeficiency syndromes. 4. Interpret CD34 counts for stem cell transplantation and for prognostication in myeloproliferative disorders. 5. Understand the principles and interpretation of reticulated platelet analysis. 6. Understand the principles of and interpret analyses for minimal residual disease.
	Lymph Nodes 1. Understand principles of gross examination of lymphnodes and the indications and procedures for proper specimen preparation of lymph node tissue for special studies. 2. Recognize normal lymph node and spleen morphology,and understand normal patterns of lymphocyte development and trafficking in lymph nodes.	1. Recognize and be able to diagnose changes in lymph node morphology associated with lymphoma and other lymphoproliferative disorders. Understand the relative value of different diagnostic modalities in this setting. 2. Recognize and be able to diagnose reactive autoimmune and infectious lymphadenopathies, storage disease, and histiocytic disorders in lymph nodes; the changes associated with these disorders in bone marrow; and the approach to effective differential diagnosis involving all available modalities (eg, molecular studies, immunohistochemistry, flow cytometry, cytogenetics, and others as indicated). 3. Recognize the presence of metastatic disease in lymph nodes and bone marrow, and understand the ancillary diagnostic modalities that may be useful in this setting.

Platelet disorders	1. Understand the pathophysiology of thrombocytopenia and thrombocytosis 2. Demonstrate competency in taking a bleeding history 3. Understand the clinical utility of platelet function testing 4. Understand general principles of platelet function testing 5. Understand the pathophysiology of acquired and congenital platelet function disorders 6. Understand the pathophysiology leading to major von Willebrand disease subtypes and expected laboratory results 7. Recognize acquired platelet function abnormalities associated with antiplatelet therapy	1. Interpret platelet function studies including screening tests, platelet aggregation, and platelet secretion studies 2. Interpret studies performed for the evaluation of von Willebrand disease
Coagulation disorders	1. Understand the clinical utility of coagulation and thrombosis testing 2. Develop basic understanding of hemostatic and thrombotic disorders 3. Understand the pathophysiology of arterial and venous thrombosis 4. Understand the general principles of screening coagulation tests (eg, prothrombin time, activated partial 5. thromboplastin time, fibrinogen, or thrombin time) 6. Understand the international normalized ratio derivation and its clinical significance 7. Understand the effect of hematocrit and blood drawing technique on anticoagulation of blood samples for coagulation testing 8. Demonstrate competency in taking bleeding and thrombosis history 9. Understand results of mixing studies and factor assays to guide further coagulation testing 10. Understand the principles of tests involved in the identification of lupus anticoagulant and antiphospholipid antibody syndromes 11. Recognize the effect of circulating anticoagulants on coagulation testing 12. Understand the monitoring of anticoagulation therapy 13. Understand the method of action of direct thrombin inhibitors and their effect on coagulation testing 14. Understand the principles of molecular analysis of thrombotic risk factors 15. Understand the principles of functional and	1. Interpret results of coagulation and hypercoagulability testing and recommend further studies as needed 2. Summarize laboratory evidence for hemostatic and thrombotic disorders and be able to assess and explain 3. bleeding and thrombosis risk 4. Interpret results of Bethesda assays for factor inhibitors 5. Interpret results of coagulation tests in the setting of fibrinolytic therapy 6. Interpret results of heparin-induced thrombocytopenia testing (ELISA tests versus serotonin release assay/ platelet aggregation studies) in the appropriate clinical context 7. Understand monitoring and complications of biologics as drugs (eg, recombinant Activated Protein C 8. or Recombinant F VIIa)

	antigenic assays for proteins of the anticoagulation and fibrinolytic 16. Systems	
. ***Bone Marrow***	**Hematopathology** 1. Understand the clinical indications for bone marrow evaluation. 2. Understand the diagnostic limitations of bone marrow aspirate and biopsy sections. 3. Learn technical aspects of performing and analyzing bone marrow aspiration and biopsy;Encourage performance of bone marrow aspiration and biopsy. 4. Identify sites for the acquisition of bone marrow in children and adults. 5. Learn handling, preparation, and interpretation of bone marrow specimens including special stains (eg, silver stain, Prussian blue). 6. Correctly assess bone marrow cellularity and myeloid/erythroid ratio. 7. Recognize effects of chemotherapy and growth factor stimulation on blood and bone marrow. 8. Understand common drug effects leading to benign cytopenias. 9. Correctly identify storage iron, and assess adequacy. 10. Understand hematopoiesis, and distinguish the stagesfor cells in each hematopoietic cell series. 11. Know the major hematopoietic regulatory factors and cytokines. 12. Recognize normal WBC, RBC, and platelet maturation,as well as cellular dysplasia. 13. Understand diagnostic principles involved in distinguishing transient myeloproliferative syndromes (such as those associated with Down syndrome), transient cytopenias, and transient lymphocytoses from clonal disorders.	1. Understand the pathophysiology, clinical findings,etiology, and expected bone marrow morphology for vitamin deficiency anemias, hemoglobinopathies,thalassemias, aplastic anemia, red cell aplasia,leukemias, myeloproliferative disorders, myelodysplastic syndromes, plasma cell dyscrasias, and mast cell diseases. 2. Integrate morphology, cytochemistry,immunophenotype,and molecular ancytogenetics in the differential diagnosis of acute and chronic leukemia, lymphoma, and myeloproliferative and myelodysplastic diseases. 3. Integrate peripheral blood smear and bone marrow findings,and render a preliminary diagnosis. 4. Know the posttherapy findings seen after treatment for leukemia and the temporal relationships to marrow regeneration posttherapy. 5. Recognize the bone marrow manifestations of infections a. (eg, viral, fungal, and hemophagocytic syndromes). 6. Recognize the bone marrow manifestations of noninfectious systemic diseases (eg, alcoholism, collagen vascular disease, and nonhematologic malignancies).
Additional competencies Specific to Haematology	**1.Appreciate special considerations in pediatric hematology and coagulation and hematopathology.** **2.Understand the different types of hematopoietic stem cell transplants.**	
Based on	Am J Clin Pathol 2006;125(Suppl 1):S3-S37	

TRAINING IN CLINIAL PATHOLOGY		
Section	**Skill Level I**	**Skill Level II**
Body fluid analysis (CSF, ascetic fluid, pleural fluid)	1. Understand clinical conditions for body fluid analysis 2. Understand hemocytometer cell counting 3. Understand cytocentrifuge sample preparation and slide saying 4. Identify body fluid cell morphology	1. Interpret results of body fluid analysis in appropriate clinical context 2. Recognize malignant cells & recommend appropriate confirmation tests 3. Correlate abnormal body fluid cell morphology with cytology, flow cytometry
Manual Hematological Methods	1. Understand principles of microhematocrit determination and its limitation 2. Understand the principles of ESR 3. Understand the principles of supravital stains including Reticulocyte stains, Hb H preparation and Heinz body preparation	
Urine analysis	1. Understand the clinical indications for & utility of urine analysis 2. Understand principles of methods involved in urine chemistry and urine sediment analysis 3. Understand the limitations of manual and automated urine chemistry and sediment analysis	1. Interpretation of urine chemistry results and identify abnormal cells and organisms, provide clinical follow up as appropriate

TRAINING IN TRANSFUSION MEDICINE

	SKILL LEVEL 1	SKILL LEVEL 2
TRASFUSION SERVICES	1. Demonstrate knowledge of the principles of patient identification and pre transfusion testing ABO Rh typing , RBC antibody screen and antibody identification. 2. Recognize the symptoms & signs of haemolytic and nonhaemolyte transfusion reactions and demonstrate knowledge of pathophysiology, treatment and prevention of these complication. 3. Identify major infectious complications of blood transfusions. The current risk of these infections and explain how these infections can be prevented. 4. Identify major non infectious complications of blood transfusions. The risk of these complications and strategies to prevent them. 5. Choose appropriate blood components and derivatives based on a thorough knowledge of indications of transfusion. 6. Demonstrate knowledge of pathophysiology, prevention and treatment of haemolytic disease of newborn. Recognize these antibodies in pregnant patients who are clinically significant. And make appropriate recommendations blood products. 7. Demonstrate knowledge of pathophysiology and treatment of allo-neonatal ITP. 8. Demonstrate proficiency in the evaluation and appropriate transfusion therapy for thrombocytopenic patients. 9. Apply principles pf massive transfusion protocol	1. Identify clinically significant RBC antibodies from an antibody panel including multiple alloantibodies and a mixture of allo – antibodies and auto antibodies. 2. Demonstrate proficiency in evaluating and recommending treatment plans for complex transfusion reactions. 3. Demonstrate familiarity with appropriate use of highly specialized blood products. Like HLA matched antigens. 4. Demonstrate familiarity with the requirements of all regulatory accrediting agencies. 5. Compare and contrast the various means performing blood utilization review. 6. Demonstrate various methods of blood conservation, including pre and perioperative autologous blood collection and approaches to bloodless surgery. 7. Demonstrate proficiency in evaluating patients refractory to platelet transfusions. Outline the principles of histocompatibility testing and platelet crossmatching. 8. Demonstrate proficiency in the evaluation of the patients with immune mediated and non immune mediated hemolytic anaemia and appropriate

	10. Demonstrate a working knowledge of principles of haemostasis and coagulation and proficiency in the initial treatment of patients with bleeding disoders. 11. Demonstrate knowledge of he trnasfusion requirements of special patient populations(hematology, oncology, pediatrics, gediatrics, transplantation or burn, trauma). 12. Demonstrate knowledge in land mark published studies in transfusion medicine.	transfusion management of these patients.
Blood collection/ blood center/ cell processing responsibilities	1. Compare and contrast the eligibility requirements for allogenic and autologous blood donations. 2. Demonstrate knowledge of the indications for therapeutic phlebotomy. 3. Demonstrate proficiency in evaluating and treating adverse reactions associated with blood donation , phlebotomy, whole blood and aphaeresis donations. 4. Outline the assay principles of required donor blood tests and the associated confirmatory testing and prescribe donor reentry algorithm. 5. Demonstrate professionalism in interactions with prospective donors. 6. Summarize steps in blood component and blood derivative preparation. 7. Describe factors that influence the motivation of volunteers to donate blood. 8. Explain operation logistics required for determining appropriate blood inventory for a geographic region and the process of meeting daily, weekly and monthly collection goals.	1. Outline the necessary steps in donor notification and counseling associated with positive infectious disease testing results and donor lookback process. 2. Demonstrate knowledge concerning the requirements of all applicable regulatory and accrediting agencies. 3. Demonstrate knowledge of principles of hematopoetic stem cell transplantation including collection. 4. Demonstrate understanding of the elements of current good tissue, good manufacturing practices and current good tissue. 5. Develop an understanding of emerging area of cellular therapy

	Skill Level I	Skill Level II
Therapeutic apheresis	1. Summarize the principles of apheresis technology 2. Demonstrate knowledge of indications for therapeutic apheresis and of a appropriate replacement fluids. 3. Demonstrate proficiency in evaluating and preparing patients for therapeutic apheresis. 4. Communicate effectively with clinicians and house staff regarding therapeutic apheresis procedures	1. Demonstrate proficiency in evaluating and treating adverse reactions associated with therapeutic apheresis. 2. Demonstrate proficiency in the treatment

ADDITIONAL COMPETENCIES SPECIFIC TO TRANSFUSION MEDICINE

SECTION	Skill Level I	Level II
Medical knowledge	Demonstrate understanding of and ability to interpret major regulations and guidelines that are applicable to collection, storage, and release of blood and other cellular therapeutic products.	
Practice based learning and improvement	Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of literature or issuance of new guidelines by regulatory agencies	

GENERAL	1. Understands various cytological investigations 2. Understands preparation of cytological stains & methods 3. Understand use of imaging modalities to obtain material for cytology and histology 4. Understand cytological appearances in various conditions	**1.** Performs various FNAC, guided FNAC under supervision **2.** Interpret cytological findings in the background of clinical and radiological findings **3.** Effectively communicates for further approach in management **4.** Uses Cytochemistry for interpretations

CYTOPATHOLOGY

GYNAECOLOGICAL CYTOPATHOLOGY		
Smear taking	Smear-taking technique. Technical aspects of spreading and fixing a smear. Liquid-based cytopathology (LBC) techniques, if appropriate.	Ability to access teaching material and expertise of staff outside the pathology department.
Microscopy	Setting up a microscope for screening. How to screen a smear.	Screening. Marking appropriate cells for discussion. Photomicrography.
Use of Bethesda Nomenclature	Understanding of Bethesda Nomenclature.	Able to categorise abnormalities
Specimen adequacy	Understanding of criteria for adequacy.	Ability to diagnose inadequate smear.
Infections	Knowledge of features of infections in cervical smears.	Ability to recognise infections. Ability to formulate appropriate management advice.
Borderline nuclear Change	Understanding of criteria for diagnosis	Ability to diagnose borderline change.
Dyskaryosis	Knowledge of criteria for diagnosis of mild, moderate and severe	Ability to diagnose these abnormalities. Ability to formulate appropriate management advice.

	dyskaryosis. Knowledge of criteria for diagnosis of glandular abnormality. Knowledge of criteria of diagnosis of possibly invasive lesions. Knowledge of features of common pitfalls in the diagnosis of dyskaryosis (e.g. transmission electron microscopy [TEM], follicular cervicitis, metaplasia).	Ability to take and weigh advice on diagnosis from screening staff.
New technologies	Knowledge of liquid-based cytopathology, HPV testing and other new developments.	Keeping up with new developments through journals and other media.

NON-GYNAECOLOGICAL CYTOPATHOLOGY **Technical aspects**	Basic knowledge of preparation and staining techniques for common specimen types. Knowledge of use of special techniques, e.g. immunocytochemistry.	Able to recognise faults and artefacts of preparation, e.g. air-drying. Panels of antibodies for particular diagnostic applications, e.g. mesothelioma.
Diagnosis	Features of malignancy in sites commonly investigated with cytopathology. Features of specific non-malignant diagnoses, e.g. infection.	Able to diagnose malignancy with confidence in specimens from breast, gastro intestinal (GI) tract, respiratory tract, urinary tract, head and neck, lymphoreticular system, and serous fluids. Ability to integrate clinical information and histology or other

		investigations into diagnosis. Ability to recognise when definitive diagnosis is beyond capability.
Reporting	Requirements for a report. Relevant datasets.	Ability to write an accurate report that gives clinicians the information they need. Knowledge of the likely outcome in terms of further investigation or management of the patient.

HISTOPATHOLOGY

Skill Level I	**Skill Level II**
1) Understands the normal histology of body tissue 2) Understands the techniques grossing of biopsy tissue 3) Understands the techniques of tissue processing for biopsy tissue 4) Understands the techniques involved in autopsy of fetus & adults 5) Understands the importance of special staining procedures in histological tissue diagnosis. 6) Identify the histological changes in biopsy tissue 7) Understands the role of specialized techniques like frozen section, immuno histochemistry in tissue diagnosis	- Performs grossing of biopsy tissue - Performs fetal autopsy - Correlate histological and gross findings with clinical findings to arrive at biopsy diagnosis - Performs special staining procedures on histological tissue sections. - Correlate special stains, immunochemistry findings with histological and clinical findings - Prepares a preliminary histological report and effectively communicate the report to the clinician.

System wise curriculum:

SKIN: **INTRODUCTION TO DERMATOPATHOLOGY** **NORMAL ANATOMY** **INFLAMMATORY DISEASES OF KNOWN ETIOLOGY** Viral diseases Warts Molluscum contagiosum Herpes zoster Bacterial diseases	**OTHER DERMATOSES** Psoriasis Exfoliative dermatitis and erythroderma lichen planus Graft-versus-host disease Vasculitis Granuloma faciale and related lesions Erythema nodosum and related lesions Granuloma annulare and related lesions Necrobiosis lipoidica Weber-Christian disease and other lobular

Folliculitis
Hidradenitis suppurativa
Tuberculosis and atypical mycobacteriosis
Leprosy
Malakoplakia
Spirochetal diseases
Syphilis
Lyme disease
Fungal diseases
Tinea (dermatophytoses)
North American blastomycosis
Chromoblastomycosis
Other granulomatous diseases
Sarcoidosis
Foreign body reaction

EPIDERMIS

Seborrheic keratosis
Acrochordon
Actinic keratosis
Cutaneous horn
Bowen's disease
Squamous cell carcinoma
General features
Microscopic features
Immunohistochemical and molecular genetic features
Other microscopic types
Treatment
Prognosis
Pseudoepitheliomatous hyperplasia
Basal cell carcinoma
General features
Microscopic features
Histochemical and immunohistochemical features
Molecular genetic features
Other microscopic types
Spread and metastases
Treatment

SKIN ADNEXA

Eccrine sweat glands
Eccrine poroma
Eccrine acrospiroma
Syringoma
Chondroids yringoma(mixed tumor) and myoepithelioma
Eccrine cylindroma
Eccrine spiradenoma
Papillary syringadenoma
Papillary eccrine adenoma
panniculitides
Mastocytosis
lupus erythematosus
Dermatomyositis
Scleroderma and eosinophilic fasciitis
Drug eruptions
Pyoderma gangrenosum
VESICUlOBUllOUS DISEASES
DEGENERATIVE AND MISCEllANEOUS DISEASES
lichen sclerosus et atrophicus
Elastosis perforans
Pseudoxanthoma elasticum
Cutaneous mucinoses
Acanthosis nigricans
Darier's disease
Dermatoses in HIV-infected patients

ME LANOCYTES

Nevi
Junctional,intradermal, and compound nevi
Blue, cellular, and epithelioid blue nevi
Spitz nevus and related nevi
Congenital nevus
Other nevi
Treatment
Active and dysplastic nevi
Malignant melanoma
General features
Clinical appearance and clinicopathologic types
Microscopic features
Histochemical and immunohistochemical features
Electron microscopic features
Molecular genetic features
Biopsy and frozen section
Regression
Atypical in situ melanocytic lesions
Spread and metastases
Sentinel lymph node
Treatment
Prognosis
Other pigmented skin lesions

NEUROENDOCRINE CELLS

Merkel cell carcinoma
Other neuroendocrine tumors

DERMIS

Fibroblastic tumors and tumorlike conditions
Fibrohistiocytic tumors and tumorlike

Aggressive digital papillary adenoma Clear cell acanthoma and other "acanthomas" Intraepidermal epithelioma Sweat gland carcinoma Extramammary Paget's disease Apocrine glands Sebaceousg lands Senile sebaceous hyperplasia Nevus sebaceous of Jadassohn and epidermal nevus Sebaceous adenoma Sebaceous carcinoma Hair follicles Inverted follicular keratosis Tricho epithelioma Trichilemmoma Trichofolliculoma Keratoacanthoma Keratinous cyst Other cutaneous cysts Warty dyskeratoma Pilar tumor (proliferating trichilemmal cyst) Pilomatrixoma	conditions Benign fibrous histiocytoma Atypical fibroxanthoma Dermatofibrosarcoma protuberans Malignant fibrous histiocytoma Xanthoma Juvenile xanthogranuloma Other histiocytic proliferations Smooth muscle tumors Skeletal muscle tumors Peripheral nerve tumors Vascular tumors and tumorlike conditions Hemangioma Lymphangioma Pyogenic granuloma and related lesions Masson's hemangioma Epithelioid hemangioma Kaposi's sarcoma Bacillary angiomatosis and verruga peruana Angiosarcoma Lymphoid tumors and tumorlike conditions Cutaneous lymphoid hyperplasia Mycosis fungoides and related peripheral T-cell lymphomas Lymph nodes in mycosis fungoides Lymphomatoidpapulosis and anaplastic large cell lymphoma Other malignant lymphomas Leukemia Other primary tumors and tumorlike conditions Metastatic carcinoma
ORAL CAVITY AND OROPHARYNX: NORMAL ANATOMY **CONGENITAL ABNORMALITIES** **INFLAMMATORY DISEASES** **OTHER NON-NEOPLASTIC LESIONS** **TUMORS AND TUMORLIKE CONDITIONS OF SURFACE EPITHELIUM** Intraepithelial proliferative lesions Oral lesions and human papilloma virus (HPV) Squamous cell carcinoma General features Location Microscopic features Histochemical and Immunohistochemical features	**TUMORS AND OTHER LESIONS OF MINOR SALIVARY GLANDS** **TUMORS OF ODONTOGENIC EPITHELIUM** **TUMORS OF MELANOCYTES** **TUMORS AND TUMORLIKE CONDITIONS OF LYMPHOID TISSUE** **OTHER TUMORS AND TUMORLIKE CONDITIONS**

Molecular genetic features Biopsy, cytology, and frozen section Spread and metastases Treatment Prognosis Verrucous carcinoma Other microscopic types	
MANDIBLE AND MAXILLA: **NORMAL ANATOMY** **INFLAMMATORY DISEASES** **SIMPLE BONE CYST** **CENTRAL GIANT CELL GRANULOMA AND OTHER GIANT CELL-CONTAINING LESIONS** **BENIGN FIBRO-OSSEOUS LESIONS** Fibrous dysplasia and related lesions Cementoma and related lesions **EPITHELIAL CYSTS** **ODONTOGENIC TUMORS** **Benign tumors** Adenomatoid odontogenic tumor (adenoameloblastoma) Calcifying epithelial odontogenic tumor Squamous odontogenic tumor Ameloblastic fibroma Odontoma Cementoma (Odontogenic) myxoma, myxofibroma, and fibroma Borderline tumors **Ameloblastoma** General and clinical features Morphologic features Histochemicaal nd immunohistochemicafle atures Electronm icroscopicfe atures Spread and metastasis Differential diagnosis	**Malignant tumors** **Ameloblastic carcinoma** **Ameloblastic fibrosarcoma** **Clear cell odontogenic carcinoma** **OTHER TUMORS AND TUMORLIKE CONDITIONS** **DISEASES OF THE TEMPOROMANDIBULAR JOINT**
MEDIASTIUM: **GENERALITIES** **INFLAMMATORY DISEASES** **CYSTS (OTHER THAN THYMIC)** Pericardial (coelomic) cysts Foregut cysts Other cysts **THYROID AND PARATHYROID LESIONS** **THYMUS**	**GERM CEll TUMORS** **MALIGNANT lYMPHOMA** Hodgkin's lymphoma lymphoblastic lymphoma yfJ large cell lymphoma Marginal zone B-ceillymphoma Other hematolymphoid conditions **NEUROGENIC TUMORS** Tumors of sympathetic nervous system Tumors of peripheral nerves

Normal anatomy Primary immunodeficiencies Cysts Other non-neoplastic diseases Thymoma General features Myasthenia gravis Other associated diseases Pathologic features; electron microscopic, histochemical, immunqhistochemical and molecular genetic features Classification Staging Treatment Prognosis Cervical tumors of thymic or related branchial pouch derivation Neuroendocrine tumors Stromal and other tumors	Other neurogenic tumors **TUMORS OF PARAGANGLIA** **MESENCHYMAL TUMORS** **METASTATIC TUMORS**
THYROID GLAND: **NORMAL ANATOMY** **CONGENITAL ABNORMALITIES** **THYROIDITIS** Acute thyroiditis Granulomatous (de Quervain's) thyroiditis Other granulomatous inflammations Autoimmune (lymphocytic and Hashimoto's) thyroiditis Riedel's thyroiditis **HYPERPLASIA** Dyshormonogenetic goiter Graves' disease (diffuse toxic goiter) Nodular hyperplasia **TUMORS** **EPITHELIAL TUMORS-SPECIFIC TYPES** Follicular adenoma Hyalinizing trabecular adenoma and related lesions Papillary carcinoma General features Gross features Microscopic features Electron microscopic features Histochemical and immunohistochemical features Molecular genetic features Variants	**EPITHELIAL TUMORS-GENERAL FEATURES** Geographic distribution Thyroid neoplasia in childhood Thyroid neoplasia and radiation exposure Association with other conditions Evaluation of the solitary thyroid nodule Needle biopsy and fine needle aspiration Frozen section Presence of thyroid tissue outside gland Treatment Prognosis **LYMPHOID TUMORS AND TUMORLIKE CONDITIONS** **MESENCHYMAL TUMORS** **OTHER PRIMARY TUMORS AND TUMORLIKE CONDITIONS** **METASTATIC TUMORS**

Spread and metastases Treatment Prognosis Follicular carcinoma Hurthle cell (oncocytic) tumors The oncocyte Clinicopathologic features Clear cell tumors Squamous cell, mucinous, and related tumors Poorly differentiated carcinoma Undifferentiated carcinoma **MEDULLARY CARCINOMA AND RELATED** **NEUROENDOCRINEL ESIONS** Medullary carcinoma Morphologic features Cytologic features Electron microscopic, histochemical, and immunohistochemical features Familial medullary carcinoma and C-cell hyperplasia Spread and metastases Treatment and prognosis Other neuroendocrine tumors	
PARATHYROID GLANDS: NORMAL GROSS ANATOMY AND EMBRYOLOGY NORMAL HISTOLOGY NORMAL PHYSIOLOGY ADENOMA Generalities and gross features Microscopic features Electron microscopic features Histochemical and immune histochemical features Molecular genetic features Adenoma variants CHIEF CELL HYPERPLASIA WATER CLEAR CELL HYPERPLASIA CARCINOMA	OTHER LESIONS HYPERPARATHYROIDISM Primary hyperthyroidism Secondary hyperthyroidism Tertiary hyperthyroidism Differential diagnosis Therapy FROZEN SECTION
GASTROINTESTINAL TRACT: **Esophagus** **NORMAL ANATOMY** **ATRESIA AND RELATED ANOMALIES** **HETEROTOPIA** **DIVERTICULA** **CYSTS** **RINGS AND WEBS**	**Large bowel** NORMAL ANATOMY HIRSCHSPRUNG'S DISEASE AND RELATED DISORDERS DIVERTICULOSIS COLITIS

ACHALASIA AND RELATED MOTOR DISORDERS
LYE STRICTURES
REFLUX ESOPHAGITIS
Barrett's esophagus
Dysplasia and carcinoma in situ in Barrett's esophagus
OTHER TYPES OF ESOPHAGITIS
SQUAMOUS CELL CARCINOMA
General and clinical features
Morphologic features and local spread
Immunohistochemical and molecular genetic features
In situ and superficial squamous cell carcinoma and
related lesions
Metastases
Cytology
Treatment
Prognosis
OTHER TYPES OF CARCINOMA
SMOOTH MUSCLE TUMORS AND GIST-TYPE STROMAL
TUMORS
OTHER TUMORS AND TUMORLIKE CONDITIONS
Stomach
NORMAL ANATOMY
HETEROTOPIC TISSUES
HYPERTROPHIC PYLORIC STENOSIS
CHRONIC GASTRITIS
OTHER TYPES OF GASTRITIS
PEPTIC AND OTHER BENIGN ULCERS
OTHER NON-NEOPLASTIC LESIONS
POLYPS
MENETRIER'S DISEASE AND ZOLLINGER-ELLISON SYNDROME
DYSPLASIA
CARCINOMA
General features
Morphologic features and classification
Histochemical, immunohistochemical, and electron
microscopic features
Molecular genetic features
Other microscopic types
Diagnosis-biopsy and cytology
Relationship with peptic ulcer
So-called "early" carcinoma
Ulcerative colitis
Carcinoma and dysplasia in ulcerative colitis
Crohn's disease (granulomatous colitis)
Ischemic and obstructive colitis
Other types of colitis
OTHER NON-NEOPLASTIC LESIONS
TUMORS
Epithelial polyps
Relationship with carcinoma and treatment
Carcinoma
General features
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Site and gross features
Microscopicf eatures
Histochemical immunohistochemical and electron
microscopicfe atures
Molecular genetic features
Other microscopic types
Biopsy
Cytology
Staging and grading
Spread and metastases
Treatment
Prognosis
Carcinoid tumor
Malignant lymphoma and related lesions
Gastrointestinal stromal tumors and related tumors
Other tumors and tumor like conditions
Anus
NORMAL ANATOMY
EMBRYOLOGIC DEFECTS
INFLAMMATORY DISEASES
HYPERTROPHIED PAPILLAE
HEMORRHOIDS
TUMORS
Condyloma and other human papilloma virus-related
lesions
Dysplasia and carcinoma in situ
Carcinoma
Generala ndc linicafl eatures
Morphologic features
Immunohistochemicl and molecular genetic features
Spread and metastases therapy prognosis
Paget's disease
Other microscopic types
Malignant melanoma

Spread Treatment Frozen section Prognosis **WELL-DIFFERENTIATED NEUROENDOCRINE TUMORS ("CARCINOID TUMORS")** **STROMAL TUMORS (GISTS AND RELATED LESIONS)** Histogenetic considerations; microscopic, immunohistochemical, electron microscopic, and molecular genetic features Microscopic differential diagnosis General, clinical, and gross features Spread and metastases Treatment Prognosis **LYMPHOID TUMORS AND TUMORLIKE CONDITIONS** The MALT concept Low-grade lymphomas Lymphoid hyperplasia and plasma cell granuloma Intermediate/high-grade (large cell) lymphomas Other types of lymphoma and related conditions **OTHER TUMORS** **Small bowel** **NORMAL ANATOMY** **CONGENITAL DEFECTS** Heterotopic pancreas Heterotopic gastric mucosa Duplication, atresia, and related defects Meckel's diverticulum and related vitelline duct abnormalities Other diverticula Other congenital defects **MALABSORPTION** **ULCERS** **VASCULAR DISEASES** **CROHN'S DISEASE** **AIDS-RELATED INFLAMMATORY DISEASES** **OTHER INFLAMMATORY DISEASES** **IRRADIATION EFFECT** **INTUSSUSCEPTION** **OTHER NON-NEOPLASTIC DISEASES** **TUMORS** Benign epithelial tumors Adenocarcinoma	Other tumors and tumor like conditions

Other types of carcinoma Carcinoid tumors and related endocrine tumors General and clinical features Morphologic features Microscopic types Histochemical,im munohistochemicala, nd electron microscopicfe atures Molecular genetic features Spread and metastases Treatment and prognosis **Carcinoid syndrome** **Duodenal endocrine tumors** **Gangliocytic paraganglioma** **Gastrointestinal stromal tumors and related tumors** **Malignant lymphoma and related disorders** **Other tumors and tumor like conditions** **Appendix** **NORMAL ANATOMY** **ACUTE APPENDICITIS** Epidemiology and pathogenesis Clinical features Pathologic features Treatment **CHRONIC APPENDICITIS** **OTHER INFLAMMATORY PROCESSES** **TUMORS** Mucinous tumors and tumorlike conditions (including so-called "mucocele") Pseudomyxoma peritonei Adenocarcinoma Carcinoid tumor **OTHER LESIONS**	
SALIVARY GLANDS: NORMAL ANATOMY HETEROTOPIA SIALOLITHIASIS SIALADENITIS BENIGn Lymphoepithelial CYSTS AND HIV-RElATED lESIONS MIKULlCZ'S DISEASE AND SJOGREN'S SYNDROME IRRADIATION EFFECT OTHER NON-NEOPLASTIC LESIONS EPITHELIAL TUMORS Classification	Mucoepidermoid carcinoma Acinic cell carcinoma Adenoid cystic carcinoma Salivary duct tumors Terminal duct carcinoma Papillary adenocarcinoma Squamous cell carcinoma Small cell carcinoma and other neuroendocrine carcinomas Lymphoepithelioma-like carcinoma Other primary carcinomas MALIGNANT LYMPHOMA OTHER PRIMARY NEOPLASMS

Tumors with stromal differentiation Benign mixed tumor (pleomorphic adenoma) Malignant mixed tumor Tumors with oxyphilic (oncocytic) change Oxyphilic adenoma Warthin's tumor Monomorphic adenoma Basal cell adenoma and adenocarcinoma'0 Tumors with sebaceous differentiation Tumors with myoepithelial differentiation Tumors with clear cell change	METASTATIC TUMORS GENERAL FEATURES OF SALIVARY GLAND TUMORS Relative incidence and malignancy Clinical diagnosis Staging Biopsy and cytology Frozen section Treatment Prognosis
LIVER: NORMAL ANATOMY BIOPSY VIRAL HEPATITIS VIRAL HEPATITIS CAUSED BY HEPATOTROPIC VIRUSES Acute viral hepatitis Typical acute viral hepatitis Minimal acute hepatitis Severe acute hepatitis, acute hepatitis with bridging necrosis Acute hepatitis with panlobular and multilobular necrosis (submassive liver necrosis) Causative viruses Differential diagnosis Chronic (viral and other) hepatitis Elementary lesions Classification Grading and staging Histopathology HEPATITIS CAUSED BY "NONHEPATITIS" VIRUSES CIRRHOSIS DRUG-INDUCED AND TOXIC LIVER INJURY Elementary lesions Hepatocytes Hepatocellular death: apoptosis and necrosis Hepatocellular tumors Composite patterns STEATOSIS AND STEATOHEPATITIS Steatosis Patterns and distribution Steatohepatitis, fibrosis, and cirrhosis Alcoholic steatohepatitis Differential diagnosis of alcoholic	LIVER INVOLVEMENT IN OTHER ORGAN AND SYSTEMIC DISEASES Granulomas Cytomegalovirus infection Infectious mononucleosis Acquired immune deficiency syndrome Malaria Total parenteral nutrition Amyloidosis and light chain deposition disease Nonspecific reactive changes LIVER PATHOLOGY IN ORGAN TRANSPLANTATION Liver transplantation Preservation injury Allograft rejection Other complications Recurrent disease Bone marrow transplantation: graft-versus-host disease ECHINOCOCCUS CYST (HYDATID CYST) ABSCESS HETEROTOPIA LIVER CELL TUMORS AND TUMORLIKE CONDITIONS Focal nodular hyperplasia Liver cell adenoma Liver cell carcinoma General and clinical features Predisposing and associated factors Gross features Microscopic features

steatohepatitis Nonalcoholic liver disease in the alcoholic patient Nonalcoholic steatohepatitis CHOLESTASIS AND BILIARY DISEASES Histopathologic liver changes of cholestasis in general Acute complete cholestasis Chronic complete cholestasis Chronic incomplete cholestasis Individual cholestatic liver diseases Hepatocellular (parenchymal) diseases Ductular pathology Ductal pathology: vanishing bile duct diseases CHILDHOOD DISORDERS AND DISORDERS OF METABOLISM Cholestasis and hyperbilirubinemia Cholestatic disorders Hyperbilirubinemias Inherited metabolic disorders Endoplasmic reticulum storage diseases Fibropolycystic diseases Indian childhood cirrhosis DISORDERS OF COPPER AND IRON METABOLISM Wilson's disease (hepatolenticular degeneration) Iron overload (siderosis, hemosiderosis) Genetic (hereditary, primary, or idiopathic) hemochromatosis Neonatal (perinatal) iron overload (neonatal (perinatal) hemochromatosis) Hepatic siderosis of varied etiology FIBROPOL YCYSTIC DISEASES (DUCTAL PLATE MALFORMATION) Autosomal recessivep olycystick idney disease (infantile-type polycystic disease) Congenital hepatic fibrosis Caroli's disease (congenital dilatation of the intrahepatic bile ducts) Von Meyenburg complex (microhamartoma) Autosomal dominant polycystic kidney disease (or adulttype polycystic disease) Solitary (nonparasitic) cyst **VASCULAR DISORDERS**	Electron microscopic and immunohistochemical features Molecular genetic features Other microscopic types Biopsy and cytology Spread and metastases Treatment and prognosis Hepatoblastoma BILE DUCT TUMORS AND TUMORLIKE CONDITIONS Bile duct hamartoma Bile duct adenoma Biliary cystadenoma and cystadenocarcinoma Bile duct carcinoma (cholangiocarcinoma) MESENCHYMAL TUMORS AND TUMORLIKE CONDITIONS Vascular tumors Mesenchymal hamartoma Undifferentiated (embryonal) sarcoma Other mesenchymal tumors MALIGNANT LYMPHOMA AND RELATED LESIONS OTHER PRIMARY TUMORS AND TUMORLIKE CONDITIONS METASTATIC TUMORS

Hepatoportal sclerosis(noncirrhotic portal fibrosis, obliterative portal venopathy, noncirrhotic portal hypertension, idiopathic portal hypertension) Sinusoidal dilatation Peliosish epatis Venous outflow obstruction Venoocclusived isease **NODULAR REGENERATION** Nodular regenerative hyperplasia Partial nodular transformation Focal nodular hyperplasia **LIVER DISEASE IN PREGNANCY** Liver disease unique to pregnancy Acute fatty liver of pregnancy Toxemia of pregnancy (preeclampsia/eclampsia) HELLP syndrome Intrahepatic cholestasis of pregnancy Other liver disease in pregnancy	
GALL BLADDER AND EXTRAHEPATIC BILE DUCTS: Normal anatomy Congenital abnormalities Cholelithiasis Cholesterosis Acute cholecystitis Chronic cholecystitis and cholangitis Tumors Benign tumors and tumor like conditions	Carcinoma of gall bladder General and clinical features Gross features Microscopic features Electron microscopic and immunohistochemical features Molecular genetic features Other microscopic types Dysplasia and carcinoma in situ Spread and metatsases Treatment and prognosis Carcinoma of extrahepatic bile ducts Other malignant tumors
PANCREAS AND PERIAMPULLARY REGION: Pancreas NORMAL ANATOMY CONGENITAL ABNORMALITIES Annular pancreas Heterotopic pancreas PANCREATITIS Acute pancreatitis Chronic pancreatitis PANCREATIC TRANSPLANTATION ABSCESS PSEUDOCYSTS	Anaplastic carcinoma Cystic pancreatic neoplasms Microcystic cystadenoma and cystadenocarcinoma Mucinous cystic neoplasms Intraductal papillary mucinous neoplasms Acinar cell tumors and tumorlike conditions Solid-pseudo papillary tumor Pancreatoblastoma Endocrine tumors General and clinical features Morphologic features Specific types

TRUE CYSTS TUMORS Ductal adenocarcinoma General and clinical features Location and gross features Microscopic features Histochemical and immunohistochemical features Molecular genetic features Other microscopic types Spread and metastases Cytology Exploration and frozen section Treatment Prognosis	Malignancy Multiple endocrine neoplasia Lymphoid tumors and tumorlike conditions Mesenchymal and other primary tumors Metastatic tumors Ampullary region AMPULLARY CARCINOMA AND PRECURSOR LESIONS OTHER LESION
ADRENAL GLAND AND PARAGANGLIA: NORMAL ANATOMY Adrenal gland Paraganglion system BIOPSY AND CYTOLOGY LESIONS OF ADRENAL CORTEX Heterotopia Cortical nodule Congenital hyperplasia Acquired hyperplasia Adrenocortical tumors Clinical features Morphologic features Electron microscopic, histochemical, immunohistochemical, and molecular genetic features Differential diagnosis Spread and metastases Treatment and prognosis Functional manifestations Nonfunctioning lesions Aldosteronism Cushing's syndrome Adrenogenital syndrome Other functional manifestations LESIONS OF ADRENAL MEDULLA Neuroblastoma General and clinical features Morphologic features Electron microscopic,histochemical, immunohistochemical, and molecular genetic features In situ, regressing, and maturing neuroblastoma Spread and metastases	OTHER ADRENAL LESIONS TUMORS AND TUMORLIKE LESIONS OF OTHER PARAGANGLIA Generalities Morphologic features Histochemical immunohistochemical electron microscopic, and molecular genetic features Spread and metastases treatment, and prognosis Specific paraganglioma types

Therapy and prognosis Ganglioneuroblastoma Ganglioneuroma Adrenal medullary hyperplasia Pheochromocytoma General and clinical features Morphologic features Electron microscopic,histochemical, immunohistochemical, and molecular genetic features Spread, metastases treatment, and prognosis	
URINARY TRACT: Kidney, Renal pelvis & ureter Non-neoplastic diseases THE RENAL BIOPSY Handling of the biopsy Biopsy interpretation NORMAL STRUCTURE OF THE GLOMERULUS CLASSIFICATION OF GLOMERULAR DISEASE GLOMERULAR LESIONS ASSOCIATED WITH THE NEPHROTIC SYNDROME Minimal change glomerulopathy Diffuse mesangial hypercellularity with nephrotic syndrome Focal and segmental glomerulosclerosis C1q nephropathy Membranous glomerulonephritis Diabetic nephropathy Amyloidosis Fibrillary glomerulonephritis and immunotactoid glomerulopathy Light chain deposition disease Heavy chain deposition disease Congenital nephrotic syndrome GLOMERULAR LESIONS ASSOCIATED WITH THE SYNDROME OF ACUTE NEPHRITIS Diffuse endocapillary proliferative glomerulonephritis Membranoproliferative (mesangiocapillary) glomerulonephritis Diffuse mesangioproliferative glomerulonephritis Crescentic glomerulonephritis	Bladder NORMAL ANATOMY CONGENITAL ABNORMALITIES Urachal lesions Exstrophy DIVERTICULOSIS LITHIASIS ENDOMETRIOSIS AND RELATED MULLERIAN-TYPE CHANGES AMYLOIDOSIS CYSTITIS Interstitial (Hunner's) cystitis Eosinophilic cystitis Polypoid cystitis Emphysematous cystitis Tuberculosis and BCG-induced granulomas Malakoplakia Other forms of cystitis METAPLASTIC CONDITIONS TUMORLIKE CONDITIONS BENIGN TUMORS TRANSITIONAL CELL (UROTHELlAL) CARCINOMA General and clinical features Morphologic features Histochemicaal nd immunohistochemicafle atures Electronm icroscopicfe atures Molecular genetic features Biopsy Cytology Classification Local spread and metastases Carcinoma in situ and dysplasia Treatment Prognosis

Lupus nephritis GLOMERULAR LESIONS ASSOCIATED WITH VASCULAR DISEASES Systemic vasculitis Hemolytic uremic syndrome and thrombotic thrombocytopenic purpura Systemic sclerosis RENAL DISEASES OF PREGNANCY Preeclampsia HEREDITARY GLOMERULAR DISEASES Alport's syndrome (hereditary nephritis) Thin glomerular basement membrane disease Angiokeratoma corporis diffusum universale Hereditaryonycho-osteodysplasia Collagen type III glomerulopathy Fibronectin glomerulopathy RENAL TRANSPLANT REJECTION Hyperacute rejection Acute rejection Chronic rejection The Banff classification Cyclosporin A toxicity Tacrolimus (FKS06) toxicity TUBULOINTERSTITIAL NEPHRITIS Acute tubular necrosis Acute and chronic pyelonephritis Acute allergic tubulointerstitial nephritis Analgesic abuse nephropathy Heavy metals nephrotoxicity Pyelitis and ureteritis cystica Pelvic lipomatosis Nephrolithiasis and nephrocalcinosis Myeloma cast nephropathy RENAL VASCULAR DISEASE Renal arteriolar disease Renal arterial disease RADIATION NEPHROPATHY Bone marrow transplant nephropathy CYSTICD ISEASESO F THE KIDNEY Multicystic renal dysplasia Autosomal dominant (adult) polycystic kidney disease Autosomal recessive (infantile) polycystic kidney disease Medullary sponge kidney Nephronophthisis-medullary cystic kidney disease complex	OTHER PRIMARY CARCINOMAS Adenocarcinoma and related tumors Small cell carcinoma and related neuroendocrine tumors Squamous cell carcinoma and related tumors Lymphoepithelioma-like carcinoma Sarcomatoid carcinoma and related tumors OTHER MALIGNANT TUMORS

Acquired renal cystic disease Simple cysts Pediatric tumors and tumorlike conditions WilMS' TUMOR Morphologic features MESOBLASTIC NEPHROMA	
MALE REPRODUCTIVE SYSTEM: Prostate and Seminal Vesicles Prostate NORMAL ANATOMY ECTOPIA NODULAR HYPERPLASIA INFARCT PROSTATITIS Abscess Tuberculosis and BCG-induced granulomas Other specific infections Granulomatous prostatitis Prostatitis with eosinophils Other inflammations CALCULI TUMORLIKE CONDITIONS OF PROSTATE AND PROSTATIC URETHRA CARCINOMA General features Clinical features Pathologic features Adenocarcinoma of peripheral ducts and acini "Minimal adenocarcinoma" and atypical small acinar proliferation (ASAP) Carcinoma of large ("primary") ducts Histochemica&l immunohistochemicafle atures Molecular genetic features Other microscopicty pes Intraepithelial proliferative lesions Cytology Histologic examination Microscopic differential diagnosis Spread and metastases Staging and grading Treatment Prognosis OTHER TUMORS Seminal vesicles and Cowper's glands **Testis** NORMAL EMBRYOLOGY AND ANATOMY CRYPTORCHIDISM ATROPHY AND INFERTILITY	**Penis and Scrotum** Penis NORMAL ANATOMY NON-NEOPLASTIC LESIONS Condyloma acuminatum and related lesions TUMORS Bowen's disease and related intraepithelial neoplasias Squamous cell carcinoma General features Morphologic features and types Molecular genetic features Spread and metastases Treatment and prognosis Other carcinoma types Tumors of penile urethra Other tumors and tumorlike conditions Scrotum NORMAL ANATOMY NON-NEOPLASTIC LESIONS TUMORS

OTHER NON-NEOPLASTIC LESIONS TUMORS Germ cell tumors Classification Seminoma Embryonal carcinoma Mature (adult) and immature teratoma Teratocarcinoma Choriocarcinoma Yolk sac tumor Intratubular germ cell neoplasia Germ cell tumors-overview Sex cord-stromal tumors Leydig cell tumor and related lesions Tumors and tumorlike conditions of Sertoli cells Other sex cord-stromal tumors Mixed germ cell-sex cord-stromal tumors Malignant lymphoma and related tumors Other tumors **Testicular Adnexa**	
FEMALE REPROCTIVE SYSTEM: **Vulva:** NORMAL ANATOMY CONGENITAL ABNORMALITIES INFLAMMATORY DISEASES SO-CALLED "CHRONIC VULVAR DYSTROPHIES" HUMAN PAPILLOMA VIRUS AND VULVAR PATHOLOGY CONDYLOMA AND SEBORRHEIC KERATOSIS SQUAMOUS INTRAEPITHELIAL LESIONS INVASIVE SQUAMOUS CELL CARCINOMA General features Morphologic, histochemical, immunohistochemical, and molecular genetic features Spread and metastases Therapy Prognosis Microinvasive carcinoma Other microscopic types PAGET'S DISEASE OTHER EPITHELIAL TUMORS ~ MELANOCYTIC TUMORS AGGRESSIVE ANGIOMYXOMA AND	**Fallopian Tube:** **Ovary:** NORMAL ANATOMY GONADAL DYSGENESIS CYSTSS, TROMAL HYPERPLASIA, AND OTHER NON-NEOPLASTIC LESIONS INFLAMMATION ENDOMETRIOSIS OVARIAN BIOPSY TUMORS Classification Surface epithelial tumors Serous tumors Mucinous tumors Endometrioid tumors Clear cell (mesonephroid) tumors Brenner tumor and transitional cell carcinoma Malignant mixed mullerian tumor and mullerian adenosarcoma Adenoid cystic and basaloid carcinomas Mixed and other epithelial tumors Ovarian carcinoma-overview General and clinical features Ovarian tumors in children "Early," "occult," and in situ carcinoma Molecular genetic features

RELATED
LESIONS
OTHER TUMORS AND TUMORLIKE CONDITIONS
lESIONS OF BARTHOLIN'S GLANDS AND RELATED
STRUCTURES
LESIONS OF THE FEMALE URETHRA
Vagina:
Uterus – Cervix:
NORMAL ANATOMY
REMNANTS AND ECTOPIAS
SQUAMOUS AND OTHER METAPLASIAS
INFLAMMATORY LESIONS
NON-NEOPLASTIC GLANDULAR LESIONS
NON-NEOPLASTIC STROMAL LESIONS (INCLUDING
ENDOMETRIOSIS AND RELATED PROCESSES)
HUMAN PAPILLOMA VIRUS (HPV) AND THE LOWER
FEMALE GENITAL TRACT
TUMORS
Cervical intraepithelial neoplasia (CIN)
Microinvasive squamous cell carcinoma
Invasive squamous cell carcinoma
General features
Morphologic features
Immunohistochemicaal nd molecular genetic features
Spread and metastases
Treatment
Prognosis
Other microscopict ypes
Adenocarcinoma
Differential diagnosis lI'iIith endometrial adenocarcinoma
In situ and microinvasivea denocarcinoma
Morphologic variants of cervical adenocarcinoma
Neuroendocrine carcinoma
Cytology
OTHER TUMORS AND TUMORLIKE CONDITIONS
Uterine – Corpus
NORMAL ANATOMY
CURETTAGEA ND BIOPSY
EFFECTS OF HORMONE ADMINISTRATION
Spread and metastases
Peritoneal lesions and the mullerian system
Coexistence with uterine carcinoma
Cytology
Therapy
Prognosis
Germ cell tumors
Dysgerminoma
Yolk sac tumor (endodermal sinus tumor) and embryonal carcinoma
Choriocarcinoma
Immature (malignant) teratoma
Mature solid teratoma
Mature cystic teratoma
"Somatic-type" tumors developing in mature cystic
teratoma
Epidermoid cyst
Struma ovarii
Carcinoid tumor and strumal carcinoid
Sex cord-stromal tumors
Granulosa cell tumor
Thecoma, fibroma, and related tumors
Endometriala bnormalitiesa ssociatedw ith granulosa
cell tumor, thecoma, and related tumors
Small cell carcinoma
Sertoli-Leydig cell tumor --
Lipid (lipoid, steroid) cell tumor
Other types
Germ cell-sex cord-stromal tumors
Tumors not specific to ovary
Malignant lymphoma and leukemia
Sarcoma
Other primary tumors
Metastatic tumors
Placenta
NORMAL ANATOMY
ABORTION
GESTATIONAL TROPHOBLASTIC DISEASE
Hydatidiform mole
Complete mole
Partial mole
Invasive mole
Choriocarcinoma
Placental site trophoblastic tumor and related lesions
of intermediate trophoblast
Epithelioid trophoblastic tumor

Estrogen therapy Progestational agents Tamoxifen ENDOMETRITIS METAPLASIA ADENOMYOSIS AND ENDOMETRIOSIS DYSFUNCTIONAL UTERINE BLEEDING AND HYPERPLASIA Relationship with carcinoma TUMORS Endometrial polyps Endometrial carcinoma General and clinical features Pathologic features Variants and other microscopic types Cytology Histochemical and immunohistochemical features Molecular genetic features Spread and metastases Coexistent uterine and ovarian carcinoma Treatment Prognosis Endometrial stromal tumors Malignant mixed mullerian tumor (carcinosarcoma) Mullerian adenosarcoma and related tumors Leiomyoma Leiomyoma variants Leiomyosarcoma Clinical and gross features Microscopic features Electron microscopic immune histochemical a nd molecular genetic features Leiomyosarcoma variants Spread. Metastases, treatment, and prognosis Prediction of behavior in uterine smooth muscle tumors Other tumors and tumor like conditions	Tumorlike conditions of intermediate trophoblast NON-NEOPLASTIC LESIONS OF TERM PLACENTA TUMORS AND TUMORLIKE CONDITIONS OF TERM PLACENTA
BREAST: Normal anatomy Ectopia Inflammatory and related lesions Mammary duct ectasia Fat necrosis Other inflammatory diseases Benign proliferative breast disease Fibroadenoma	Lobular carcinoma insitu Evolution Invasive carcinoma Invasive ductal carcinoma Cytoarchitectural variants Spread related variants Invasive lobular carcinoma Mixed ductal and lobular carcinoma Undetermined carcinoma

Malignant transformation Adenoma Intraductal papillomas Nipple adenoma Adenosis Blunt duct adenosis Sclerosing adenosis Nodular adenosis Microglandular adenosis Fibrocystic disease Ductal and lobular hyperplasia Sclerosing ductal lesions Atypical ductal and lobular hyperplasia Relationship with carcinoma and treatment Carcinoma General features Incidence Risk factors Genetic predisposition Location Multicentricity Bilaterality Diagnosis Clinical examination Mammaography Cytology Needle core biopsy Open biopsy and frozen section Microscopic types Insitu carcinoma Ductal carcinoma in situ Comedocarcinoma Other forms Evolution	Microinvasive breast carcinoma Hormone receptors HER2/neu Spread and metastases Occult breast carcinoma Sentinel lymph node Staging and grading Therapy Effects of therapy on tumor and on normal breast Prognosis Salivary and sweat gland type tumors(including myoepithelial tumors) Stromal tumors and tumor like conditions Phylloides tumor Vascular tumors Other malignant stromal tumors Lymphoid tumors and tumor like conditions Other primary and tumor like conditions Metastatic tumors Breast diseases in children and adolescents Breast diseases in males Gynaecomastia Myofibroblastoma Carcinoma Other lesions
SPLEEN: NORMAL ANATOMY BIOPSY AND FINE NEEDLE ASPIRATION RUPTURE AND SPLENECTOMY CONGENITAL ANOMALIES CYSTS INFLAMMATION HYPERSPLENISM Thrombocytopenic purpuras Hemolytic anemia Congestive splenomegaly OTHER NON-NEOPLASTIC DISORDERS	HEMATOLYMPHOID TUMORS AND TUMORLIKE CONDITIONS Non-Hodgkin's lymphoma Hodgkin's lymphoma leukemias Myelofibrosis Mastocytosis Other hematolymphoid conditions VASCULAR TUMORS OTHER PRIMARY TUMORS AND TUMORLIKE CONDITIONS METASTATIC TUMORS

BONE AND JOINTS: Normal anatomy Metabolic bone diseases Fractures Osteomyelitis Bone necrosis Infarct Aseptic bone necrosis Osteochondritis dissecans Radiation necrosis Paget's disease Osteopetrosis Tumors Classification and distribution **Bone forming tumors** Osteoma Osteoid osteoma and osteoblastoma Osteosarcoma **Cartilage forming tumors** Chondroma Osteochondroma Chondroblastoma Chondromyxoid fibroma and related tumors Chondrosarcoma Chondrosarcoma variants **Giant cell tumor** Malignant giant cell tumor	**Marrow tumors** Ewing's sarcoma Malignant lymphoma and related lesions Vascular tumors Other mesenchymal tumors Fibrous and related tumors Muscle tumors Adipose tissue tumors Chordoma and other notochordal lesions Adamantinoma of long bones Peripheral nerve tumors Xanthoma Fibrocartilagenous mesenchymoma Others Metastatic tumors **Tumor – like lesions** Solitary bone cyst Aneurysmal bone cyst Other cysts Metaphyseal fibrous defect Fibrous dysplasia and related lesions Myositis ossificans Langehan's cell histiocytosis Other histiocytic lesions **Joints and related structures** Normal anatomy Non neoplastic diseases Ganglia and cystic meniscus Bursae and baker's cyst Carpal tunnel syndrome Arthritis Synovial biopsy Degenerative joint disease Rheumatoid arthritis Infectious arthritis Gout and pseudogout Intervertebral disk prolapse Other articular and periarticular diseases **Tumors and tumor like conditions** Tendosynovial giant cell tumor Pigmented villonodular synovitis and bursitis Synovial osteochondromatosis and chondrosarcoma Other tumors
SOFT TISSUE: NORMAL ANATOMY INFECTIONS AND HEMATOMAS TUMORS Classification Clinical features	Tumors of striated muscle Rhabdomyoma Rhabdomyosarcoma Tumors of pluripotential mesenchyme Tumors of metaplastic mesenchyme

Diagnosis and special techniques Grading and staging Prognosis Therapy Pathogenesis Tumors and tumorlike conditions of fibroblasts and myofibroblasts Calcifying aponeurotic fibroma Fibroma of tendon sheath Other types of fibroma Giant cell fibfoblastoma Nodular fasciitis and related lesions Myositis ossificans Elastofibroma Solitary fibrous tumor Fibromatosis Fibrosarcoma Myofibroblastic tumors Fibrohistiocytic tumors Tumors and tumorlike conditions of peripheral nerves Neuroma Schwannoma (neurilemoma) Neurofibroma Perineurioma Nerve sheath myxoma Malignant peripheral nerve sheath tumor (MPNST) Other tumors of peripheral nerves Tumors of adipose tissue lipoma lipoblastoma/lipoblastomasis Hibernoma liposarcoma (including atypical lipomatous tumor) Tumors and tumorlike conditions of blood and lymph vessels Hemangioma Glomus tumor Hemangiopericytoma Hemangioendothelioma Angiosarcoma Lymphangioma and Iymphangiomyoma Lymphangiosarcoma nd related lesions Tumors of smooth muscle Leiomyoma Leiomyosarcoma Clear cell (epithelioid) smooth muscle tumors	Tumors resembling synovial tissue Tumors of extra gonadal germ cells Tumors of neural tissue (other than peripheral nerves) Pigmented neuroectodermal tumor of infancy Other neural tumors Tumors of hematopoietic tissue Tumors of uncertain cell type Fibrous hamartoma of infancy Myxoma Granular cell tumor Alveolar soft part sarcoma Clear cell sarcoma of tendons and aponeuroses (malignant melanoma of soft parts) Epithelioid sarcoma Giant cell tumor of soft parts Ossifying fibromyxoid tumor ExtraskeletaEl wing'ss arcoma/PNET Desmoplastics mall cell tumor Rhabdoid tumor Phosphaturicm esenchymatlu mor Pleomorphic hyalinizing angiectatic tumor of soft parts Myoepithelioma of soft tissue Other tumors Metastatic tumors Other tumorlike conditions

PERITONEUM AND RELATED: Peritoneum NORMAL ANATOMY INFLAMMATION ADHESIONS REACTION TO FOREIGN MATERIALS CYSTS AND LOOSE BODIES HYPERPLASIA AND METAPLASIA TUMORS Mesothelioma Benign mesothelioma Malignant mesothelioma Intra-abdominal desmoplastic small cell tumor Other primary tumors Lesions of the secondary mlillerian system Metastatic tumors Cytology Omentum Mesentery Hernia sacs Umbilicus	Retroperitoneum NORMAL ANATOMY NON-NEOPLASTIC CONDITIONS - TUMORS Soft tissue tumors " Germ cell tumors Other primary tumors and tumorlike conditions Metastatic tumors Sacrococcygeal region DEVELOPMENTAL ANOMALIES GERM CEll TUMORS PilONIDAL DISEASE OTHER TUMORS
CARDIOVASCULAR SYSTEM: **Heart :** Introduction Normal anatomy Myocardial biopsy Heart transplant Cardiac valves Coronary artery by pass Coarctation of aorta **Cardiac tumors** Myxoma Other benign tumors and tumor like conditions Primary malignant tumors Metastatic tumors Pericardium	**Arteries:** NORMAL ANATOMY ARTERIOSCLEROSIS Aneurysms Aortic aneurysms Popliteal artery aneurysms Dissecting aneurysms Diffuse arterial tortuosity and dilatation Arterial substitution Arterial occlusive disease CYSTIC ADVENTITIAL DEGENERATION FIBROMUSCULAR DYSPLASIA MESENTERIC VASCULAR OCCLUSION TRAUMATIC AND IATROGENIC INJURIES Rupture Thrombosis Pulsating hematoma Acquired arteriovenous fistula THROMBOANGIITIS OBLITERANS ARTERITIS Large vessel arteritis Medium-sized vessel arteritis Small vessel arteritis (arteriolitis) TUMORS **Veins;** Thrombophlebitis and thromboembolism Stasis ulcers

	Varicose veins Tumors **Lymph vessels** **Lymphedema** Pathology Treatment Tumors
NEUROMUSCULAR SYSTEM: NORMAL ANATOMY CONGENITAL ABNORMALITIES Craniospinal dysraphism Neuroglial and meningeal heterotopias Choristomas and non-neuroepithelial hamartomas Cysts of the central neuraxis CEREBROVASCULAR DISORDERS Cerebral infarction Intracranial aneurysms Vascular malformations Primary angiitis Cerebral amyloid angiopathy Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) Epidural hematoma Subdural hematoma INFLAMMATORY DISEASES Demyelinating diseases Idiopathic inflammatory and reactive disorders. xanthomatous lesions. and "histiocytoses" INFECTIOUS DISEASES Bacterial infections Mycoses Parasitoses Spirochetal infections Viral infections Herpes simplex encephalitis Progressive multifocalleukoencephalopathy Varicella-Zoster virus encephalitis and cerebral vasculitis HIV-1 encephalomyelitis Prion-associated diseases PRIMARY TUMORS Glial tumors Astrocytic neoplasms Oligodendrogliomas Ependymal tumors Mixed gliomas Astroblastoma Chordoid glioma of the third ventricle	Nerve sheath tumors of the craniospinal axis Lymphoproliferative and myeloproliferative disorders Germ cell tumors Melanocytic tumors Paraganglioma Chordoma Hemangioblastoma (von Hippel-Lindau disease) Other primary tumors SECONDARY TUMORS **Peripheral Nerves** INTRODUCTION NORMAL ANATOMY BASIC PATHOLOGIC MECHANISMS NEUROPATHIES Inherited neuropathy Inflammatory neuropathy Leprous neuritis Vasculitis Amyloidosis Neuropathy of dysproteinemia Toxic-metabolic neuropathy OTHER NEUROPATHIES

Gliomatosis cerebri Pituicytoma Gliomesenchymatlu mors Choroid plexus tumors - Neuronal and glioneuronal tumors~ hamartomas, and related lesions Gangliocytoma and ganglioglioma Desmoplasticin fantile ganglioglioma/desmoplastic infantile astrocytoma Central neurocytoma and extraventricular neurocytic neoplasms Dysembryoplasticn euroepithelial tumor Other glioneuronal neoplasms Hypothalamic neuronal hamartoma Glioneuronal hamartomas,c ortical dysplasiasa, nd other epileptogenic lesions Dys(Lphlaesrtmicgi taten-gDliuocciyotsod misaeo afs teh)e cereb.ellum Embryonal neuroepithelial tumors Medulloblastoma Medulloepithelioma Central neuroblastic tumors Ependymoblastoma Polar spongioblastoma Assorted primitive neuroectodermal tumors Atypical teratoid/rhabdoid tumor Pineal parenchymal tumors Meningiomas Nonmeningothelial mesenchymatlu mors Lipoma and liposarcoma Osseousa nd cartilaginoust umors Fibroblastic and "fibrohistiocytic" tumors Endothelial tumors Meningeal hemangiopericytoma Myogenous tumors Other mesenchymanl eoplasms	
PITUATORY GLANDS: NORMAL ANATOMY PITUITARY ADENOMA General and clinical features Gross features Microscopic features Classification PRL cell adenoma GH cell adenoma	OTHER LESIONS Gangliocytoma Lymphocytic hypophysitis Rathke's cleft cyst Craniopharyngioma Granular cell tumor and pituicytoma Postradiation tumors Metastatic tumors Miscellaneous lesions

Mixed PRL- and GH-producing adenomas Acidophilic stem cell adenoma ACTH cell adenoma Glycoprotein hormone-producing adenomas Plurihormonal adenoma Null cell adenoma and oncocytoma Natural history. spread. and metastases Treatment	
EYE AND OCCULAR ADNEXA: NORMAL ANATOMY EYELIDS Developmental anomalies Inflammation Chalazion Cysts Tumors and tumorlike lesions Tumors and tumorlike lesions of surface epithelium Adnexal tumors Melanocytic tumors Lymphoid tumors and tumorlike conditions Mesenchymal tumors and tumorlike conditions Metastatic tumors LACRIMAL PASSAGES Canaliculitis and dacryocystitis Mucocele Dacryolithiasis Tumors LACRIMAL GLAND Mikulicz's disease Tumors ORBIT Dysthyroid ophthalmopathy Inflammatory processes Primary tumors Mesenchymal tumors and tumorlike conditions Glioma of optic nerve Meningioma Lymphoid tumors and tumorlike conditions Metastatic tumors CONJUNCTIVA Developmental anomalies Cysts Degeneration Graft-versus-host Disease Tumors and tumorlike conditions Tumors of surface epithelium Melanocytic tumors and tumorlike conditions Lymphoid tumors and tumorlike conditions	INTRAOCULAR TISSUES Developmental anomalies Congenital glaucoma Retrolental fibroplasia Phakoma Persistent hyperplastic primary vitreous Retinal dysplasia Other developmental anomalies Trauma Inflammation Acute inflammation Chronic nongranulomatous inflammation Granulomatous inflammation Post-traumatic uveitis Degeneration Phthisis bulbi Glaucoma Diabetes Diffuse uveal melanocytic proliferation Tumors and tumorlike conditions Malignant melanoma Retinoblastoma and related lesions Lymphoid tumors and tumorlike conditions Other primary tumors

Other tumors CORNEA Endothelial decompensation Fibrosis and vascularization Keratoconus Failed previous grafts	
EAR INTRODUCTION Normal anatomy DISEASES OF EXTERNAL EAR Non-neoplastic disorders Tumors and tumorlike conditions Keratotic lesions Basal cell carcinoma Squamous cell carcinoma Adnexal tumors Melanocytic tumors Other tumors	DISEASES OF MIDDLE AND INNER EAR Non-neoplastic disorders Tumors and tumorlike conditions Paraganglioma Meningioma Schwann oma (acousticn euroma) So-called middle ear adenoma and carcinoid tumor Adenocarcinoma ,- Squamous cell carcinoma Rhabdomyosarcoma Other primary tumour

Molecular Pathology (Including Cytogenetics)

I. Cytogenetics	**Skill level I**	**Skill level II**
a. Acquisition of Knowledge of Specific Tests Using Cytogenetic Methods	1. Understand basic cytogenetic concepts. 2. Recognize abnormal karyotyping in prenatal specimens, including, but not limited to, Turner syndrome and trisomy 21. 3. Recognize constitutional and postnatal abnormal karyotyping, such as Robertsonian rearrangements. 4. Be able to correlate chromosomal abnormalities with specific hematologic disorders such as myelodysplastic syndromes, hematologic malignancies, and myeloproliferative disorders	1. Understand the use of fluorescence in situ hybridization (FISH) analysis for common disorders involving aneuploidies, microdeletions, or chromosomal translocations, including hematologic disorders such as acute promyelocytic leukemia and chronic myelogenous leukemia. 2. Understand imprinting disorders such as Prader-Willi and Angelman syndromes and mitochondrial diseases.
b Analytic and Technical Training.	1. Have awareness of sample types, preparation, and storage conditions for cytogenetic tests.	1. Understand the specific applications of different banding techniques.

	2. Understand sample preparation from peripheral blood, bone marrow, amniocytes, chorionic villi, skin, and products of conception for karyotyping. 3. Understand harvesting, slide preparation, banding, and staining. 4. Understand microscopic analysis for karyotyping. 5. Have knowledge of FISH for both single-copy probes and chromosome painting. 6. Understand photomicrography and darkroom techniques. 7. Be familiar with basic cell and tissue culture techniques.	2. Acquire rudimentary abilities in chromosome identification. 3. Understand standard cytogenetic nomenclature. 4. Recognize the major chromosomal abnormalities and their association with congenital syndromes, human malignancies, and spontaneous abortion. 5. Be able to determine band resolution and develop standards to monitor resolution. 6. Be able to develop minimum standards for the numbers of cells to count and/or analyze for karyotyping and FISH. Be able to develop FISH probes and determine their chromosomal localization
II. Molecular Pathology		
a. Acquisition of Knowledge of Specific Tests Using Molecular Biology Methods	***Level I*** 1. Understand basic molecular biology concepts. 2. Know molecular testing methods for inherited causes for thrombophilia, such as factor V Leiden, prothrombin 20210 mutation, MTHFR, and platelet glycoprotein III polymorphisms (PlA 1/2). 3. Understand molecular testing and interpretation for cystic fibrosis diagnosis and screening. 4. Understand molecular testing for hematologic malignancies, including non-Hodgkin's lymphomas (T- and B-cell gene rearrangements) and chronic myelogenous leukemia (*bcr-abl* detection and quantitation for therapeutic monitoring), and other translocation detection or quantitation assays.	

	5. Understand molecular diagnostic tests for detection and speciation of pathogenic organisms, including *C trachomatis*, *N gonorrhoeae*, *M tuberculosis*, high-risk human papillomaviruses, and viruses that cause encephalitis and meningitis (HSV and enteroviruses). 6. Understand qualitative and quantitative methods used to determine viral load in HIV, CMV, EBV, and hepatitis C virus (HCV), as well as HIV and HCV genotyping to direct therapy. 7. Be familiar with molecular testing for trinucleotide repeat diseases, such as fragile X syndrome.	
b. Analytic and Technical Training	1. Have awareness of sample types, preparation, and storage for molecular biology tests. 2. Understand applicability of testing to samples of blood, bone marrow, body fluids (CSF and pleural and peritoneal samples), lymph node, and spleen. 3. Understand storage media and conditions for cells, DNA, and RNA. 4. Understand DNA extraction and purification from a variety of biologic specimens.	

Laboratory Management

	Skill level I	**Skill LevelI**
I. Organizational and Leadership	1. Understand the fundamental principles of human behavior in organizations, of management	Understand human resource systems, including effective processes for recruitment, retention, and performance

Skills	structure and function, and of organizational structures. Compare and contrast the structure of differing practice settings (eg, hospital-based, specialty practice, and independent laboratory). 2. Develop the interpersonal skills required to effectively manage, lead, and motivate others, including professional peers. 3. Develop an understanding of the role of ethics in medical and managerial decision making. 4. Appreciate the conflicting responsibilities and rewards of pathologists, administrators, and technologists, and even the competing interests within each group as necessary to the positive functioning of the laboratory. 5. Understand the nature of the relationships between pathologists, hospitals, and medical staffs, including a basic understanding of contracts, decision making, and effective negotiation. 6. Develop skills to project an environment of patient oriented and ethical service. 7. Understand the organization of the laboratory, including preanalytic sample acquisition, accessioning and processing, structure of analytic units, and postanalytic sample resulting. Recognize the different skill sets required of personnel in all of these areas. Be able to analyze work flow in the laboratory.	management for technical and professional staff
II. Financial Skills	1. Understand the fundamentals of financial data collection and financial statement presentation and analysis. 2. Understand the role of the budget process for operational planning, managing, and control.	1. Understand how to assess the need for new instrumentation and the process of financial justification of capital equipment

		investments such as these. 2. Understand the nature and behavior of costs in the laboratory, including test-cost accounting. 3. Understand the applicable forms and requirements of reimbursement, particularly Medicare reimbursement, for clinical laboratories and pathologists. 4. Understand how to monitor utilization, and become familiar with strategies to effectively manage utilization in a health care organization.
III. Regulatory Skills	1. Become familiar with the accrediting agencies relevant to laboratory certification and licensure (eg, NABL, NABH, NAAC, MCI, Office of The Drug Controller, Pollution Control Board), and participate in at least one NABL "mock" or "self-inspection" of the laboratory. 2. Understand the regulatory and compliance environment for laboratories 3. Understand trainng, certification, licensing, and competency assessment standards for laboratory professionals, including medical technologists and medical laboratory technicians. 4. Understand the importance of a comprehensive laboratory safety policy and program. 5. Understand how standard	1. Understand the role of risk management in the laboratory, and become familiar with the nature of medical malpractice, patient safety initiatives, institutional risk mitigation, and forensic testing. 2. Become familiar with the process of long-range planning and strategic management and the implications that this process has for successful management. 3. Become familiar with the fundamental principles of

	operating procedures (SOPs) are used in the routine operation of clinical laboratories. 6. Understand how SOPs are developed, authored, and reviewed and their importance in mandatory laboratory inspection by various accrediting agencies (eg,. NABL, NABH). **1.**	marketing, sales, and a market-oriented service delivery strategy. 4. Become familiar with the process for creating and/or critically reviewing a business plan for a new or proposed service. 5. Become familiar with the different forms that practice relationships can take (eg, sole proprietorship, partnership, and corporation) and the advantages and disadvantages of each. 6. Participate in the development and authorship and/or review and revision of SOPs.
IV. Quality Assurance, QC, and Preanalytic and Postanalytic Management	1. Understand the role of quality assurance, quality management, and process improvement principles in laboratory operation and planning. 2. Understand the role of interlaboratory proficiency surveys, such as the NABL proficiency surveys. 3. Be able to develop templates for introduction of new analyte testing in the clinical laboratory, with defined responsibilities at each level of personnel function. 4. Know fundamental statistical concepts for laboratory diagnostics, including descriptive methods, inference regarding population means, confidence intervals, parametric	1. Understand the principles involved in determination of reference ranges and the limitations of reference range determinations. 2. Understand how to choose, use, and monitor the performance of reference laboratories.

	and nonparametric statistics, measures of variance and error, sources of analytic error, methodologic bias, receiver operating characteristic (ROC) curves, Bayes theorem, reportable range, analytic range, and linearity. Utilize these methodologies to select and validate new diagnostic tests and analytic methods. 5. Understand principles of specimen collection (eg, phlebotomy technique, safety, and specimen tubes) and specimen processing. 6. Recognize sources of preanalytic variation and the role of biologic variability in laboratory assessment. 7. Know how to use delta checks appropriately in detecting preanalytic, analytic, and postanalytic errors. 8. Understand the principles of postanalytic result processing and data delivery (see also the "Informatics" section). ***1.***	

Competencies Specific to Laboratory Management

Medical Knowledge

1. Understand the most common forms of clinical laboratory organizational structure.
2. Understand management theory and the difference between leadership and management.
3. Understand the general elements of an income statement and balance sheet.
4. Understand the basic approach to creating a budget for the clinical laboratory.
5. Be able to assign correct *CPT* codes for common pathology and laboratory medicine procedures.
6. Understand the basic elements of the laboratory safety program.
7. Understand the essential elements of choosing a reference laboratory.
8. Understand the necessary elements of test cost accounting in the laboratory, and be able to cost-account a common laboratory procedure.
9. Understand how to perform a new instrument evaluation, and prepare a financial justification analysis.
10. Be able to conduct a performance appraisal.
11. Understand the necessary elements of a risk management program, and be able to describe how to effectively manage an incident.

12. Be able to conduct a management meeting within the laboratory.
13. Know how to review external proficiency surveys, and respond to identified problems or questions.
14. Be able to design a program for test evaluation and validation.
15. Be able to participate in a quality process improvement project.
16. Understand how to seek and obtain IRB approval for clinical research studies.

Practice-Based Learning and Improvement

1. Be able to perform a CAP self-inspection or mock inspection.
2. Understand the basic elements of the model compliance plan for laboratories.
3. Understand the basic elements of the strategic planning process.
4. Be able to participate in a quality process improvement process.

Interpersonal and Communication Skills

Understand how to conduct an interview for a new employee.

Systems-Based Practice

1. Understand the differences between different forms of professional practice.
2. Understand the essential elements of professional employment and practice group contracts.
3. Understand how to develop a business plan, together with a marketing and sales plan, for a hospital laboratory outreach program.

Informatics

I. Basic Computer Skills	1. Understand terms and concepts related to computer hardware and software. 2. Understand basic computer networking concepts. 3. Understand how to use word processing, spreadsheet, presentation graphics, and statistical software.	
II. Laboratory Information System Concepts	1. Understand the major features of a laboratory information system. 2. Know the basic data elements of a laboratory information system.	

	3. Demonstrate an awareness of the enterprise information system architecture and how the laboratory information system fits within it. 4. Be able to extract data from the laboratory information system.	
III. Security and Privacy	Understand guidelines for security and privacy of protected health information.	
IV. The Internet and World Wide Web	1. Know Internet-related terms and concepts. 2. Be able to utilize the Internet to do the following: 3. Access Internet-based databases 4. Perform literature searches	
V. Communication and Standards	Develop basic understanding of how the laboratory information system shares data with other networked systems within the enterprise.	1. Develop basic understanding of laboratory instrument interfaces. 2. Understand data standards and encoding schemes, such as *International Classification of Diseases* (*ICD-9* and *ICD-10*).
VI. Emerging Technologies		1. Develop a basic understanding of telepathology systems and concepts. 2. Develop a basic understanding of bioinformatics

		concepts with an emphasis on the critical evaluation of evolving bioinformatics tools. Develop a basic understanding of evolving multiparameter diagnostic approaches
Additional Competencies Unique to Informatics	*Medical Knowledge* • Understand the rudiments of laboratory instrument interfaces and laboratory automation systems. *Professionalism* • Understand HIPAA requirements for security and privacy. *Systems-Based Practice* • Understand how and where laboratory data are shared among information systems within the health care enterprise.	

AUTOPSY PATHOLOGY:

Trainees should begin to understand the level of certainty with which macroscopic features can be interpreted at autopsy and when histological examination of autopsy tissues is important. They should begin to recognise histological changes that occur due to post-mortem artefact.

Systems	**Anatomical features and dissection technique**	**Clinico-pathological knowledge base**
General	Methods for identification of the patient. External examination including breast examination. Removal of organs. Organ weights.	Procedures for obtaining consent for autopsy. Workings of the coroner's (or procurator fiscal's) system. Full details of current practice for retention of organs and tissues. Familiarity with current College Knowledge of normal organ weights.
Cardiovascular	Excision of heart. Master one technique for the dissection of the heart. Anatomy of the coronary arteries, their ostia and branches. Dissection of aorta and major abdominal branches.	Normal, age-related and pathological abnormalities of cardiac valves. Identification of acute and healed myocardial infarcts, macroscopically and histologically. Assessment of ventricular

		thickness and atrial and ventricular dilatation. Pulmonary embolism.
Respiratory System	Removal of lungs from mediastinum. Dissection of pulmonary vessels and major bronchi. Dissection of individual lobes.	Identification of respiratory tract infection and pneumonia. Assessment of chronic bronchitis and emphysema. Appearances of primary and secondary lung tumours.
Upper gastrointestinal tract	Removal and dissection of oesophagus, stomach and duodenum in continuity. Identification of ampulla of Vater.	Range of appearances due to autolysis in stomach. Identification of oesophageal varices, gastric erosions and peptic ulcers. Assessment of pyloric stenosis.
Lower gastrointestinal tract	Identification and dissection of superior mesenteric artery. Examination of intestinal mucosal surface.	Identification of colonic diverticula. Identification of bowel necrosis and distinction from autolysis or post-mortem change
Hepatobiliary System	Removal of liver and its dissection. Identification of portal and hepatic veins. Dissection of gallbladder, common bile duct and pancreatic ducts.	Assessment of hepatic congestion and dilatation of hepatic veins. Appearances of intra- and extrahepatic ducts. Identification of secondary tumours. Identification of hepatic cirrhosis.
Nervous system	Removal of brain. Dissection of Circle of Willis and venous sinuses. One method for sectioning of cerebral and cerebellar hemispheres and brain stem.	Sites of berry aneurysms. Identification of old and recent cerebral infarcts. Assessment of cerebral and cerebellar atrophy. Taking of 'key' blocks for histological examination.
Urogenital system	Dissection of renal arteries and veins and ureters. Removal of kidneys and examination of cut surfaces and renal pelvices. Examination of bladder mucosa and identification of ureteric orifices. Examination of the prostate gland. Examination of the testes and female genital system.	Estimation of degree of cortical atrophy. Identification and assessment of cortical scarring and cyst formation. Hydronephrosis and ureteric dilatation. Prostatic disease.

Endocrine System	Removal of pituitary. Identification of parathyroid glands and dissection of thyroid. Removal of adrenal glands.	Size and overall appearance of thyroid gland. Size of parathyroid glands. Adrenal cortical hyperplasia or adrenal atrophy.
Lymphoreticular System	Examine all lymph node groups (e.g. mediastinal or para-aortic) for evidence of lymphadenopathy. Examination of the spleen. Exposure of vertebral bone marrow.	Significance of lymphadenopathy in different anatomical sites. Clinical explanation for splenic enlargement or atrophy. Identification of secondary deposits in vertebral bone marrow.
Musculoskeletal System	Identify fractures. Explore sites of recent internal fracture fixation.	Osteoporosis.
Report	Preparation of report according to consultant's protocol and with reference to College's *Guidelines on Autopsy Practice,* Include the cause of death in the Office of National Statistics (ONS) format and a clear clinicopathological summary.	Detailed list of all macroscopic abnormalities. Summary relating abnormalities to aspects of clinical history (wherever possible). Appropriate tissue blocks for histology (with appropriate consent).
The paediatric Autopsy	Examination of the heart and vascular connections *in situ*. Removal of the brain; dissection of the thymus. Organ weights and measurements with reference to normal range.	Features of maceration and dysmorphism. Assessment of growth and development.

MICROBIOLOGY SKILLS: I & II

Basic Microbiology	1. Sterilization 2. Disinfectection
Handling of specimens,	1. routine culture and sensitivity tests (Gram's stain, ZN stain).
Serology	1. Immunology techniques like VDRL, Widal and Rheumatoid factor, **2.** ELISA-for HIV, HBsAg, and HCV

BIOCHEMISTRY:

Basic Biochemistry applied to biochemical investigations.

Handling of photocolorimeter.

Spectrophotometer
PH-meter
Flame photometer
Blood gas analysers
Autoanalyser
Electrophoresis.

	Skill Level I	**Skill Level II**
I. Analytic Techniques and Instrumentation	1. Understand the principles and operational characteristics of analytic chemistry techniques, including photometric, electrochemical, enzymatic, electrophoretic, radiometric, chromatographic, mass spectrometric, and immunologic methods. 2. Understand different types of random-access automated analyzers and the measurement principles employed in these systems, including spectrophotometric, ionselective electrode, and electrochemical methods, electrochemiluminescence, enzyme-linked immunoassay (ELISA), turbidimetry, and nephelometry. 3. Understand the basic biology of and analytic methods for determination of qualitative and quantitative changes in blood and fluid proteins and amino acids (enzymes, biomarkers, hormones, and cytokines), carbohydrates, lipids, and lipoproteins and clinically relevant small molecules.	
II. Organ-Based Biochemical Pathophysiology *1. Assessment of Pulmonary Function: Blood Gases and Oxygen Saturation*	1. Understand the principles of partial pressure of gases and the need for an O2 carrier. Be able to describe the alveolar-arterial O2 gradient and anion gap. 2. Know the pathophysiology of ketoacidosis and lactic acidosis. 3. Understand the significance of P50, O2 content, O2 capacity, and O2 saturation, and be able to distinguish	

	between O2 saturation and PO2. 4. Be able to describe the hemoglobin-oxygen dissociation curve and factors that affect the curve and P50. 5. Understand the principle of integrated blood gas, electrolyte, and CO-oximetry systems.	
2. Acid-Base Chemistry, Electrolytes, and Relevant Disorders	1. Define the Henderson-Hasselbach equation. Be familiar with physiologic buffer systems and the role of respiratory and renal compensation. Understand categories of clinical disorders of acid-base balance (metabolic and respiratory acidosis, metabolic and respiratory alkalosis, and mixed disorders). 2. Know the differential diagnosis of common electrolyte disorders.	
3. Assessment of Renal Function	1. Know the basic physiology of renal function. Understand the basic categories of renal diseases (eg, prerenal azotemia, obstructive azotemia, glomerulonephritis, acute vs chronic renal failure, and uremic syndrome) and be familiar with the National Kidney Foundation practice guidelines for these conditions. Know the laboratory analytic methods (eg, Jaffe vs creatinase) for the assessment of renal function (eg, creatinine, urea nitrogen, and glomerular filtration rate) and proteinuria. 2. Understand the concept of "creatinine clearance," how it can be used to estimate glomerular filtration rate, and the various methods employed to measure it. 3. Understand renal handling of electrolytes and key metabolites and the interpretation of urinary electrolyte measurements. 4. Understand the definition of osmolality, molecules in serum that contribute to osmolality, and calculation of osmolal gap, as well as the principle of the osmomete	

	5. Understand the common pitfalls and sources of error during estimation of the osmolal gap (eg, hyperproteinemia, hyperlipidemia, hypermagnesemia) 6. Understand the differential diagnosis of an unexplained, elevated osmolal gap, including alcohol or glycol ingestion, alcoholic or diabetic ketosis or ketoacidosis, osmotherapy (eg, mannitol or glycerol administration), among others. Understand the principles of fluid balance.	
4. Cardiac Biomarkers for the Assessment of Coronary Artery Diseases	1. Know the current definition of myocardial infarction by the European Society of Cardiology/American College of Cardiology guidelines and the New York Heart Association classifications, and understand the interaction of diagnostic modalities in its definition (electrocardiogram, laboratory testing, imaging). 2. Know the diagnostic and prognostic significance and the limitations of current coronary artery disease biomarkers (troponins I and T, creatinine kinase [CKMB index and isoforms], myoglobin). 3. Know the pathophysiology and evaluation of congestive heart failure. Understand the markers of congestive heart failure (eg, brain natriuretic peptide) and their biologic and technical limitations. 4. Understand the utility of markers of inflammation in the evaluation of cardiac risk (eg, homocysteine and C-reactive protein).	
5. Assessment of Liver and Biliary Tract Status	1. Understand the dynamics and mechanisms of liver enzyme release and clinical utility of measuring "hepatic" enzymes (eg, aspartate aminotransferase, alanine aminotransferase, γ-glutamyltransferase, alkaline transferase, and lactate dehydrogenase). 2. Know the biochemial assessment of liver function by nonenzyme analytes such as albumin, ammonia, bile acids, bilirubin, urea nitrogen, cholesterol, total	

	protein, and triglycerides. 3. Understand bilirubin metabolism, fractionation of bilirubin (ie, conjugated, unconjugated, δ-bilirubin, direct vs indirect) and unique aspects of neonatal bilirubin. 4. Understand the conditions and genetic defects that affect bilirubin metabolism, transport, and clearance (eg, Gilbert disease, Dubin-Johnson syndrome). 1. .	
	6. Assessment of Thyroid Function ***Skill Level I*** 1. Understand the structure, biosynthesis, secretion, and metabolism of thyroid hormones (thyroxine [T4], triiodothyronine [T3], and reverse T3 [rT3]). Know thyroid physiology and control of thyroid function (thyrotropin-releasing hormone [TRH] and thyrotropin [thyroid-stimulating hormone; TSH]). 2. Know the common causes of hypothyroidism and hyperthyroidism. 3. Know the laboratory tests for evaluation of thyroid disorders, and be able to interpret these analytes in clinical context with an appreciation for the euthyroid sick state. 4. Be familiar with current analytic methodologies for thyroid testing (TSH methods: first-, second-, and thirdgeneration assays; isotopic and nonisotopic methods; T4; free T3 methods; T3 resin uptake methods; TSH suppression and stimulation tests).	
7. Assessment of Pituitary Function	1. Understand the physiologic action, biochemistry, and regulation of anterior pituitary hormones (adrenocorticotropic hormone [ACTH], growth hormone [GH], prolactin [PRL], luteinizing hormone [LH], and follicle-stimulating hormone [FSH]) and posterior pituitary hormones (antidiuretic hormone [ADH] and oxytocin).	

	2. Understand endocrine tests of hypothalamic-pituitary function (eg, cosyntropin test/rapid ACTH stimulation test, insulin hypoglycemia test, metyrapone test, levodopa test, arginine infusion test, glucose-growth hormone suppression test, TRH test, gonadotropinreleasing hormone [GnRH] test, clomiphene test, corticotropin- releasing hormone [CRH] test, gonadotropinreleasing hormone test, water deprivation test, saline infusion test, and water loading test). Understand the pathophysiology of disorders of the pituitary	
8. Assessment of Adrenal Function	1. Understand the physiologic action, biochemistry, biosynthesis, chemical structure, and metabolism of glucocorticoids and mineralocorticoids. 2. Understand the physiologic regulation of the reninangiotensin- aldosterone system. 3. Understand clinical conditions associated with excess and deficiency of adrenal cortex hormones. Understand testing of the functional status of the adrenal cortex (eg, basal levels vs stimulation tests and suppression tests, circadian rhythm of corticosteroids, morning ACTH, cortisol [ie, urinary, random, and free], rapid ACTH cortisol stimulation test, multiday ACTH stimulation, metyrapone stimulation, CRH stimulation, quantitative serum, and urinary steroid hormone panels). 4. Understand synthesis and metabolism of biogenic amines. including catecholamines and serotonin. 5. Be familiar with the strengths and weaknesses of tests available for evaluation of disorders of the adrenal medulla, such as pheochromocytoma and neuroblastoma.	
9. Assessment of Reproductive Function, Pregnancy, and Prenatal Testing	1. Understand the role of sex hormones in reproduction and the evaluation of pregnancy and reproductive dysfunction, such as menstrual disorders and infertility.	

	2. Understand the importance of demographic data and biochemical assessment in prenatal testing for fetal defects.	
10. Assessment of Gastric, Pancreatic, and Intestinal Function	***Skill Level I*** 1. Understand the clinical manifestations of gastric, pancreatic, and intestinal disease and diagnostic methodologies such as breath tests for *Helicobacter pylori*, fecal occult blood, lipase, and amylase (eg, fractionation of amylase; pancreatic vs salivary and amylase/creatinine clearance ratio). 2. Appreciate the role of gastrointestinal hormones and enzymes in digestion and the evaluation of malabsorption and diarrheal syndromes.	
11. Assessment of Glucose and Evaluation of Diabetes Mellitus	1. Understand the metabolism of carbohydrates (eg, insulin, C-peptide, and other regulatory hormones) and be familiar with the American Diabetes Association definitions of impaired fasting glucose, impaired glucose tolerance, and type 1 and type 2 diabetes mellitus and criteria for diabetic ketoacidosis and hyperosmolar hyperglycemic state and gestational diabetes. Understand the underlying pathophysiology of different forms of diabetes. 2. Understand the diagnosis and laboratory assessment of diabetes (eg, blood glucose, oral glucose tolerance test, hemoglobin A1c, fructosamine, and urinary microalbumin) and its complications. 3. Understand the diagnosis and evaluation of hypoglycemia.	
12. Assessment of Mineral and Bone Metabolism	1. Understand the biochemistry and physiology of calcium, phosphate, and magnesium. 2. Know the hormones that regulate mineral metabolism (eg, parathyroid hormone [PTH], calcitonin, and vitamin D) as well as parathyroid hormone–related protein (PTHrP). Understand various PTH assays,	

	including “bio-intact” PTH and intraoperative PTH. 3. Know the pathophysiology of metabolic bone diseases, such as osteoporosis, osteomalacia, and Paget disease.	
13. Assessment of Porphyrins and Disorders of Porphyrin Metabolism	1. Understand the biochemistry of heme and porphyrins. 2. Understand the porphyrias, and be able to consult on the selection and interpretation of screening and diagnostic tests for each disorder	
14. Tumor Biomarkers	1. Be familiar with the definition, classification, biochemistry, and distribution of tumor markers, both protein and carbohydrate, including, but not limited to, prostate specific antigen (PSA), calcitonin, humanchorionic gonadotropin (HCG), α-fetoprotein (AFP), carcinoembryonic antigen (CEA), CA15-3, CA125, and CA19-9. 2. Know the limitations of laboratory assessment of various tumor markers and the factors affecting the results of different analytic procedures. 3. Understand the conceptual basis of assays used to screen for malignancy, including Bayes theorem. ***Skill Level I*** • Be familiar with ongoing efforts to identify proteomic patterns for cancer detection	
15. Assessment of Fetal Lung Maturity	1. Understand the physiology of respiratory distress syndrome. 2. Understand fetal lung maturity testing (eg, lecithin/sphingomyelin [L/S] ratio, phosphatidyl glycerol [PG], foam stability index [FSI; shake test], fluorescence polarization, and counting of lamellar bodies). Understand the biochemistry, physiology, and diagnostic performance of fetal fibronectin	
16. Trace Element Assessment	1. Understand the biochemistry, physiology, and metabolism of trace elements (eg, iron, magnesium, zinc, copper, selenium, cobalt, and fluoride). Know the biochemistry and clinical significance of metal-binding proteins such as transferrin, ferritin, and	

	ceruloplasmin. 2. Know the clinical assessments of trace elements (eg, serum iron, iron binding capacity, transferrin, transferring saturation, serum ferritin, zinc protoporphyrin, and serum ceruloplasmin).	
17. Vitamin Assessment	1. Know the definition and classification of vitamins: fatsoluble vitamins (ie, A, D, E, and K) and water-soluble vitamins (ie, B1, B2, B6, B12 [cobalamin], C, niacin, nicotinamide, folic acid, biotin, and pantothenic acid). 2. Understand the clinical disorders associated with the deficiency and toxicity of vitamins.	
18. Cholesterol and Lipid Assessment	1. Understand the chemical structures, biosynthesis, classification, function, and metabolism of lipids and lipoproteins. 2. Understand the Fredrickson classification and the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) classification of hyperlipidemia. 3. Understand the pathophysiology of lipid disorders. 4. Know the principles of analytic techniques for laboratory assessment of lipids.	
19. Serum and Fluid Protein and Amino Acid Assessment	1. Understand the principles of protein analysis in body fluids (eg, Kjeldahl and Biuret methods, refractometry, and qualitative dipstick). 2. Know the principles of serum, urine, and cerebrospinal fluid (CSF) protein electrophoresis. Recognize key patterns of dysproteinemias and monoclonal gammopathies. 3. Understand approaches for distinguishing transudates vs exudates in fluids	

MONITORING OF PROGRESS OF STUDENTS

a. Maintain a detailed work diary and checked monthly by Head of section.
b. P.G Microteaching.
c. PG mock examination.
d. Objective Structured Practical Examination(OSPE)

EVALUATION:

A. THEORY :

There shall be four question papers, each of three hours duration. Each paper shall consist of TWO questions each carrying 20 marks & SIX questions of 10 marks each. Total marks for each paper will be 100. Questions on recent advances may be asked in any or all the papers.

Paper I – General Pathology including environmental pathology - 100 Marks

Paper II – Haematology/Clinical Pathology/Cytology - 100 Marks

Paper III – Systemic Pathology - 100 Marks
(Cardiovascular system, Respiratory system, Gastro intestinal System, Hepatobiliary Renal system, Male and female genital system and breast.)

Paper IV – Systemic Pathology - 100 Marks

(Central and Peripheral nervous system, Endocrine system, Musculo-skeletal system, Reticulo-endothelial system, Dermatopathology and Ophthalmic pathology, Bone, Joints and soft tissues.)

B. PRACTICAL :

TECHNIQUES-
Histopathology- Grossing, Block cutting and staining – H & E, Frozen Section and Special stains.
Immuno Histo Chemistry
Hematology and blood banking
Cytology

UNIVERSITY EXAMS (2 DAYS)

Practical:

DAY 1: a. Autopsy/Reconstructed autopsy (organ systems) -25 marks
b. Gross/morbid Anatomy - 15 specimens -25 marks
c. Haematology &. Cytology slides - 9+9 slides - 25 marks
d. Histopathological Techniques: -25 Marks
1. Frozen section,
2. Block cutting and staining - H & E
3. Special stain (minimum of 8 special stains)
4. Cytology stain (minimum of 4 special stains)
e. Lecture topic allotment -

DAY 2: a. Haematology and clinical pathology
(i) Clinical case/History/clinical data discussion -25 Marks
(ii) Haematology exercise including Blood Banking -25 Marks
b. Histopathology slides - 20 slides -50 Marks
(Autopsy final report)

VIVA VOCE

1. Viva-Voce examination -80marks

(Students will be examined by all the examiners together about students comprehension, analytical approach, expression and interpretation of data. Student shall also be given case reports, charts for interpretation. It includes discussion on dissertation)

2. Pedagogy Exercise(presentation for 10 minutes) -20marks

Maximum marks for M.D. (Pathology)	**Theory**	**Practical**	**Viva**	**Total**	
	400	200	100	700	

Final marking scheme for MD examination in Pathology

Heads of Passing	**'Maximum Marks'**	**Minimum marks for passing**
Theory	**400**	**200**
Practical	**200**	**100**
Viva	**100**	**50**
Total marks	**700**	**350**

RECOMMENDED TEXT BOOKS AND JOURNALS:

BOOKS(Latest edition)

1. Cotran, Kumar, Robbins. **Pathologic Basis of Disease**, Published by W.B. Saunders & Company. Also available in PRISM Indian Edition.
2. John. M. Kissane Edited, **Anderson's Pathology**, Published by C.V. Mosby Company.
3. Mc. Gee, Isaacson and Wright Edited, **Oxford Text Book of Pathology Vol.1,2a,2b**, Published by Oxford University Press.
4. J.B. Walter, M.S. Israel. **General Pathology**, Published by Churchill Livingstone.
5. Emeritus Editor: W.st. Symmers, **Systemic Pathology 16 Volumes**, Published by Churchill Livingstone.
6. Edited by Jaun Rosai. **Ackerman's Surgical Pathology**, Published by C.V. Mosby company.
7. Walter F Coalson. **Surgical Pathology**, Published by Lippincott.
8. Enzinger and Weiss. **Soft Tissue Tumours**, Published by B.I. Publications (India) C.V. Mosby company.
9. Stacey .E. Millis. **Sternbergs Diagnostic pathology.**Published by Jaypee brothers medical publishers.
10. WF Lever – GS Lever.**Histopathology of the skin**, Published J.B. Lippincott Company.
11. David J.B. Ashley EVAN'S Edited. **Histological Appearances of Tumors**, Published by Churchill Livingstone.
12. Novak & Woodruff Edited. **Novak's Gynecologic and Obstetric Pathology**, Published by- Kiaku Shoin/ Saunders.
13. Robert J. Kurman. **Blasteins pathology of female genital tract.**Published by Spinger-Verley. Newyork Inc.
14. Leopold G Koss. **Diagnostic Cytology and Its Histopathologic Basis**, Published by JG. Lippincott Company.
15. Marluce Bibbo. **Comprehensive Cytopathology** Published by W.B Sauders and Company.
16. Winnifred Grey Edited, **Diagnostic Cytopathology**, Published Churchill Livingstone.
17. Orell, Sterrett, Walters & Whittaker. **Fine Needle Aspiration Cytology (Manual & Atlas)**, Published by Churchill Livingstone.
18. Daniel M Knowles Edited. **Neoplastic Haematopathology**, Published by Williams & Wilkins.
19. Maxwell M Wintrobe. **Clinical Haematology**, Published by K.M. Varghese & Company.
20. Shirlyn B. Mekenzie**. Clinical Laboratory Haematology.** Published by Julie Levin alekander IARC press.
21. A Victor Hoffbrands , John E.Petit. **Clinical Haematology.** Published by Churchill Living stone .
22. De Gruchy's, Edited by Firkin, Chesterman, Penington & Rush. **Clinical Haematology In Medical Practice**, Published by Oxford University Press.
23. Todd, Sanford, Davidson Edited. **Clinical Diagnostis and Management by Laboratory Methods**, Published by W.B. Saunders and Company.
24. Jacques Wallach M.D. **Interpretation of Diagnostic tests.**Published by Walters Kumar(Ind) Pvt. Limited.

25. Dr. Shameem Sharif Edited. **Surgical Pathology And Laboratory Techniques**, Published by Prism publications.
26. Christopher D.M. Fletcher Edited. **Diagnostic Histopathology of Tumors Vol.1 & 2**, Published by Churchill Livingstone.
27. Blue book series. **WHO Classification of tumors.** Published by WHO press, Geneva.
28. Harrison's, Principles and practice of internal medicine

JOURNALS :

1. **British Journal of Haematology.** Published by Blackwell Science.
2. **Cancer.** International Journal of the American cancer society, Published by John Wiley and sons. Inc.
3. **Journal of Clinical Pathology.** Publishing Group BMJ.
4. **Haematology/Oncology Clinics of North America.** Published by W.B. Saunders and company.
5. **Histopathology.** Journal of the British division of the international academy of pathology published by Blackwell Science.
6. **The American Journal of Surgical Pathology.** Published by Lippincott –Raven.
7. **American journal of clinical pathology.**Published by Pool Press Inc.
8. **Acta Cytologica.** The journal of Clinical cytology and cytopathology.
9. **Archives of Pathology and Laboratory medicine.** Published by the American Medical Association.
10. **The Indian Journal of Cancer.** Published by Indian Cancer Society.
11. **Indian journal of pathology and microbiology.** Published by Medknow.Ghatkopar Mumbai.
12. **Indian Journal of Cytology.** Published by Medknow.Ghatkopar Mumbai.
13. **Human Pathology.** Published by W.B. Saunders Company.

CURRICULUM FOR DIPLOMA IN CLINICAL PATHOLOGY (DCP)

GOAL:

After completing, post graduate medical education in pathology, should be capable of directing and managing laboratory services and be able to:

Serve as a consultant to physicians on cost-effective test strategies and interpretation of results

Select, evaluate, and apply laboratory instruments and procedures appropriate to the screening, diagnostic, and monitoring needs of clinical decision making

Plan, organize, staff and direct laboratory resources

Use the techniques of medical informatics to acquire and manage data, translate data to clinically useful information, and communicate that information in support of patient care and educational programs

Play an influential role in medical staff and health-care delivery activities that reach beyond the confines of the laboratory

Recognize the health needs of the community and carry out professional obligation ethically and in keeping with the objectives of the national health policy.

Should master most of the competencies, pertaining to the specialty, that are required to be practiced at the secondary and tertiary levels of the healthcare delivery system.

Should be aware of contemporary advances and developments in the discipline concerned.

Should have acquired a spirit of scientific inquiry and oriented to the principles of research methodology and epidemiology.

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OBJECTIVES:

At the end of the course a candidate must be able to

Understand and explain factors in causation of disease.

Understand processes involved in the gross and microscopic changes of organs and tissues and explain these changes.

Understand and explain the pathologic basis of clinical signs and symptoms.

Should be able to perform diagnostic procedures designed for Laboratory detection of diseases.

Should be able to recognize and report morphological changes in cells, tissues and organs.

Should be able to identify, plan, perform and report specific research projects.

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Should be aware of Telepathology &recent advances**.**

Patient care

1. Gather essential and accurate information about patients using all relevant available modalities
2. Act as a skilled consultant to other clinicians to develop a diagnostic plan based on specific clinical questions and relevant clinical and pathological information
3. Consult, as part of a multidisciplinary health care team, in developing a therapeutic plan that includes laboratory monitoring of efficacy and toxicity
4. Provide expert consultation on the interpretation and follow-up of unusual or unexpected test results
5. Consult as a clinical expert in Laboratory Medicine at multidisciplinary conferences

Medical knowledge

1. Be able to use all relevant information resources to acquire and evaluate evidence-based information; demonstrate proficiency in evaluating and presenting findings from appropriate peer-reviewed journals
2. Demonstrate sufficient knowledge to determine clinically optimal yet cost-effective testing and laboratory- based therapeutic strategies, including issues of turnaround time, test menu construction, and in-house versus referral diagnostic testing
3. Use mathematics and statistics as appropriate to laboratory testing; understand and implement quality control (QC) and quality assurance procedures as required
4. Demonstrate awareness and understanding of proficiency programs, such as those provided by NABL and similar organizations
5. Demonstrate knowledge of the principles of clinical research design, implementation, and interpretation; understand the various levels of evidence in medicine and their translation into evidence-based practice
6. Be able to design a study that can be used to validate methodologies and parameters of clinical utility for the implementation and continuing use of new evidence-based analytes in the local setting

Practice-based learning and improvement

1. Demonstrate the ability to critically assess the scientific literature
2. Demonstrate knowledge of evidence-based medicine and apply its principles in practice
3. Use proficiency programs to improve laboratory practices

Interpersonal and communication skills

1. Demonstrate the ability to write an articulate, legible, and comprehensive yet concise consultation note; provide a clear and informative report, including a precise diagnosis whenever possible, a differential diagnosis when appropriate, and recommended follow-up or additional studies, as appropriate
2. Demonstrate the ability to provide direct communication to the referring physician or appropriate clinical personnel when interpretation of a laboratory assay reveals an urgent, critical, or unexpected finding and document this communication in an appropriate fashion
3. Choose effective modes of communication (listening, nonverbal, explanatory, or questioning) and mechanisms of communication (face to face, telephone, email, or written), as appropriate
4. Demonstrate skills in obtaining informed consent, including effective communication to patients about procedures, alternative approaches, and possible complications of laboratory-based patient care diagnostic and therapeutic activities such as those related to transfusion medicine
5. Demonstrate skills in educating colleagues and other health care professionals:

Professionalism

1. Demonstrate compassion: be understanding and respectful of patients, their families, and the staff and physicians caring for them
2. Interact with others without discriminating based on religious, ethnic, sexual, or educational differences
3. Demonstrate positive work habits, including punctuality, dependability, and professional appearance

4. Demonstrate a responsiveness to the needs of patients and society that supersedes self-interest
5. Demonstrate principles of confidentiality with all information transmitted both during and outside a patient encounter
6. Demonstrate knowledge of regulatory issues pertaining to the use of human subjects in research
7. Demonstrate a commitment to excellence and ongoing professional development
8. Demonstrate interpersonal skills in functioning as a member of a multidisciplinary health care team

Systems-based practice

1. Demonstrate understanding of the role of the clinical laboratory in the health care system
2. Demonstrate the ability to design resource-effective diagnostic plans based on knowledge of best practices in collaboration with other clinicians
3. Demonstrate knowledge of basic health care reimbursement methods
4. Demonstrate knowledge of the laboratory regulatory environment, including licensing authorities; federal, state, and local public health rules and regulations; regulatory agencies such as the Food and Drug Administration; and accrediting agencies such as the NABL
5. Understand and implement policies to continually improve patient safety as they relate to clinical laboratory testing at all levels

I. Basic sciences:

1. Anatomy – Histology – of all structures in the human body / organ.
2. Physiology – Biochemistry – basic aspects of various metabolisms and functioning of endocrines.
3. Genetics – Fundamental / Applied aspects.
4. Biostatistics.
5. Bio-medical ethics – Ethical issues related to medical practice and research involving human subjects and animals.

II. Pathology :

- Historical aspects.
- General pathology including immunopathology.
- Systemic pathology.
- Haematopathology.
- Blood banking including transfusion medicine.
- Cytopathology.
- Genetic disorders: molecular pathology.
- Recent advances in all fields.
- Organization of laboratory including quality control.

METHODS OF TRAINING

Duration of course – 02 years.

A. On job training

PATHOLOGY

Knowledge::

General pathology including Immunopathology.
Systemic pathology.
Haematology.
Blood banking including transfusion medicine.
Cytopathology.
Laboratory organization including quality control.

Skills:

1.Histopathology including techniques and reporting
2. Cytology including FNAC (direct and guided), fluid cytology ,exfoliative cytology- techniques and
reporting
3.Haematology including blood banking and transfusion medicine- techniques and reporting
4.Clinical pathology- techniques and reporting
5. Museum techniques
6. Autopsy techniques and interpretation
7. Microbiology –Serology, Handling of hazardous material
8.Undergraduate teaching
9. Clinico Pathological Correlation
10.Biomedical waste management

MICROBIOLOGY:

1. Hands on experience in techniques, its interpretation and reporting.
    a. Simple staining
    b. Grams
    c. Alberts
    d. Zeihl Neelson
    e. Hanging drop preparation
    f. KOH / Lactophenol preparation.
2. Staining and reporting of peripheral blood smear for MP/Microfilaria.
3. Sterilization techniques, culture method, identification and reporting- Training only.
4. Hands on experience and interpretation of serological tests like Widal, VDRL, HIV, CRP, RF, ASO and pregnancy tests.
5. Microscopic examination of stool and reporting.
6. Collection and dispatching of samples to laboratory.
   Clinical Biochemistry
   Procedures for all biochemical estimations including electrolytes.
   Handling all equipment.

B.Group teaching sessions

Any three /week

1. Slide seminar including histopathology ,haematology, and cytopathology
2 Journal review
3. Subject seminar
4. Grossing discussions for autopsies and surgical material
5 Clinical case- group discussion

6 Interdepartmental seminars
7. Theory classes for post graduates
8. Training in answering model questions- on one topic every month

POSTING SCHEDULE:

	I Year	**II Year**
Histopathology – 4 months	**02**	**02**
Cytopathology – 4 months	**02**	**02**
Hematology and Blood bank – 8 months	**04**	**04**
Biochemistry – 4 months	**02**	**02**
Microbiology – 4 months	**02**	**02**
	12	**12**

TOTAL **24 Months**

POSTINGS:

TEACHING METHODS:
On the job training in various sections.

PATHOLOGY:

TRAINING FOR HEMATOLOGY SKILLS

	Skill Level I	**Skill Level II**
Automated hematology	11. Understand clinical indications for peripheral blood cell enumeration and differential analysis 12. Know the components of a complete blood count and understand the information provided by each 13. Understand the principles of automated cell counting including red blood cell (RBC) indices and their derivation 14. Understand how "absolute values" are determined and how they differ from	4. Interpret results of automated and manual cell counts and understand relevant technical limitations 5. Recommend appropriate steps for abnormal sample processing, analysis, and result reporting 6. Review abnormal results and correlate results with peripheral blood smear findings and clinical history

	"relative percent" 15. Identify spurious white blood count (WBC), RBC, Hgb, and platelet and be able to propose a course of action to be followed for reporting results 16. Understand appropriate WBC correction for the presence of nucleated RBC 17. Understand automated differential analysis and manual review criteria 18. Understand the absolute neutrophil count and its clinical utility, as well as problems associated with band counts 19. Understand QC procedures specific to cell counters, such as Rumke limits on differential cell counts and Bull analysis of indices 20. Understand principles of automated and manual reticulocyte enumeration and respective technical limitations	
Peripheral blood smear analysis	4. Know proper preparation and handling of peripheral blood smears, including standard stains and special stains used to identify cellular structures and inclusions 5. Understand normal RBC, WBC, and platelet morphology 6. Be able to estimate WBC and platelet counts	6. Recognize abnormal RBC, WBC, and platelet morphology; formulate a differential diagnosis; and suggest appropriate laboratory testing for follow-up 7. Recognize technical artifacts in WBC, RBC, and platelet morphology 8. Recognize infectious disorders that can be diagnosed by blood smear 9. Recognize storage disorders and congenital disorders that have morphological manifestations in the peripheral blood smear 10. Correlate peripheral blood smear findings with bone marrow morphology
Red blood cell disorders	9. Learn the clinical indications for laboratory tests involved in the assessment of intrinsic and extrinsic RBC	Interpret Hgb electrophoretic patterns & ancillary tests for the diagnosis of the following.

	defects/disorders 10. Know the pathophysiology and characteristic laboratory findings of the major disorders causing normocytic, microcytic, and macrocytic anemia 11. Describe iron metabolism and laboratory tests for iron depletion 12. Understand Hgb synthesis and degradation 13. Understand the principles of Hgb screening by highperformance liquid chromatography and electrophoresis at acid and alkaline pH 14. Understand the principle and clinical utility of screening tests for the presence of Hgb S 15. Know the pathophysiology and laboratory features of intravascular and extravascular hemolysis 16. Understand the principle and clinical utility of Kleihauer Betke and/or flow cytometric analysis for fetal Hgb	7. Major Hgb opathies 8. RBC disorders related to enzyme defects 9. Hereditary spherocytosis and other RBC membrane/ cytoskeletal defects 10. Paroxysmal nocturnal hemoglobinuria; 11. Hemolytic anemia 12. Congenital dyserythropoietic anemias
White blood cell disorders	**Flow Cytometry** 12. Understand clinical indications for flow cytometric evaluation of blood, marrow, solid tissue, or fluid cells. 13. Understand the physical components and operating principles of a flow cytometer. 14. Understand QC procedures unique to flow cytometry assays (eg, nature of controls and accounting for all lymphocyte subsets in a blood sample). 15. Understand the principles of routine flow cytometry evaluation of leukocytes, including surface and	7. Evaluate and interpret results of flow cytometry in conjunction with cytochemical, immunocytochemical, and immunohistochemical studies and lymph node pathology as related to hematopoietic and lymphoproliferative diseases. 8. Understand the characteristic clinical, morphologic, immunophenotypic, cytochemical, and cytogenetic/molecular features of acute myeloid leukemia, acute lymphoid leukemia, myelodysplastic syndromes, paroxysmal nocturnal hemoglobinemia, multiple myeloma and monoclonal

	intracellular markers and recognition of clonal abnormalities. 16. Understand principles of tests designed to evaluate DNA content (ploidy) and cell cycle as used in the evaluation of products of conception and other tissues. 17. Understand platelet antibody testing by flow cytometry and its clinical applications. 18. Understand the diagnostic and prognostic information provided by flow cytometry. 19. Understand the principles of lymphocyte subset analysis: know the commonly used antigens to defineT-cell subsets and natural killer (NK) and B cells. 20. Appreciate the effect of age on lymphocyte subset normal ranges. 21. Observe/perform a lymphoma-leukemia panel on blood and/or bone marrow. 22. Observe/perform lymphoma panel on lymph node or spleen specimens.	gammopathy of undetermined significance, non-Hodgkin and Hodgkin lymphoma, neuroblastoma, chronic lymphoproliferative disorders, lymphomatoid granulomatosis, posttransplant lymphoproliferative disorder, polymorphic and lymphomatoid papulosis, and histiocytic disorders. 9. Interpret specific flow cytometric abnormalities associated with immunodeficiency syndromes. 10. Interpret CD34 counts for stem cell transplantation and for prognostication in myeloproliferative disorders. 11. Understand the principles and interpretation of reticulated platelet analysis. 12. Understand the principles of and interpret analyses for minimal residual disease.
	Lymph Nodes 3. Understand principles of gross examination of lymphnodes and the indications and procedures for proper specimen preparation of lymph node tissue for special studies. 4. Recognize normal lymph node and spleen morphology,and understand normal patterns of lymphocyte development and trafficking in lymph nodes.	4. Recognize and be able to diagnose changes in lymph node morphology associated with lymphoma and other lymphoproliferative disorders. Understand the relative value of different diagnostic modalities in this setting. 5. Recognize and be able to diagnose reactive autoimmune and infectious lymphadenopathies, storage disease, and histiocytic disorders in lymph nodes; the changes associated with these disorders in bone marrow; and the approach to effective differential diagnosis involving all available modalities (eg, molecular studies, immunohistochemistry, flow

		cytometry, cytogenetics, and others as indicated). 6. Recognize the presence of metastatic disease in lymph nodes and bone marrow, and understand the ancillary diagnostic modalities that may be useful in this setting.
Platelet disorders	Understand the pathophysiology of thrombocytopenia and thrombocytosis Demonstrate competency in taking a bleeding history Understand the clinical utility of platelet function testing Understand general principles of platelet function testing Understand the pathophysiology of acquired and congenital platelet function disorders Understand the pathophysiology leading to major von Willebrand disease subtypes and expected laboratory results Recognize acquired platelet function abnormalities associated with antiplatelet therapy	Interpret platelet function studies including screening tests, platelet aggregation, and platelet secretion studies Interpret studies performed for the evaluation of von Willebrand disease
Coagulation disorders	Understand the clinical utility of coagulation and thrombosis testing Develop basic understanding of hemostatic and thrombotic disorders Understand the pathophysiology of arterial and venous thrombosis Understand the general principles of screening coagulation tests (eg, prothrombin time, activated partial thromboplastin time, fibrinogen, or thrombin time) Understand the international normalized ratio derivation and its clinical significance Understand the effect of hematocrit and blood drawing technique on anticoagulation of blood samples for coagulation testing Demonstrate competency in taking bleeding and thrombosis history Understand results of mixing studies and factor assays to guide further coagulation testing	Interpret results of coagulation and hypercoagulability testing and recommend further studies as needed Summarize laboratory evidence for hemostatic and thrombotic disorders and be able to assess and explain bleeding and thrombosis risk Interpret results of Bethesda assays for factor inhibitors Interpret results of coagulation tests in the setting of fibrinolytic therapy Interpret results of heparin-induced thrombocytopenia testing (ELISA tests versus serotonin release assay/ platelet aggregation studies) in the appropriate clinical context Understand monitoring and complications of biologics as drugs (eg, recombinant Activated Protein C or Recombinant F VIIa)

	Understand the principles of tests involved in the identification of lupus anticoagulant and antiphospholipid antibody syndromes Recognize the effect of circulating anticoagulants on coagulation testing Understand the monitoring of anticoagulation therapy Understand the method of action of direct thrombin inhibitors and their effect on coagulation testing Understand the principles of molecular analysis of thrombotic risk factors Understand the principles of functional and antigenic assays for proteins of the anticoagulation and fibrinolytic Systems	
. ***Bone Marrow***	**Hematopathology** 14. Understand the clinical indications for bone marrow evaluation. 15. Understand the diagnostic limitations of bone marrow aspirate and biopsy sections. 16. Learn technical aspects of performing and analyzing bone marrow aspiration and biopsy.;Encourage performance of bone marrow aspiration and biopsy. 17. Identify sites for the acquisition of bone marrow in children and adults. 18. Learn handling, preparation, and interpretation of bone marrow specimens including special stains (eg, silver stain, Prussian blue). 19. Correctly assess bone marrow cellularity and myeloid/erythroid ratio. 20. Recognize effects of chemotherapy and growth factor stimulation on blood and bone marrow. 21. Understand common drug effects leading to benign	7. Understand the pathophysiology, clinical findings,etiology, and expected bone marrow morphology for vitamin deficiency anemias, hemoglobinopathies,thalassemias , aplastic anemia, red cell aplasia,leukemias, myeloproliferative disorders, myelodysplastic syndromes, plasma cell dyscrasias, and mast cell diseases. 8. Integrate morphology, cytochemistry,immunophenotype ,and molecular ancytogenetics in the differential diagnosis of acute and chronic leukemia, lymphoma, and myeloproliferative and myelodysplastic diseases. 9. Integrate peripheral blood smear and bone marrow findings,and render a preliminary diagnosis. 10. Know the posttherapy findings seen after treatment for leukemia and the temporal relationships to marrow regeneration posttherapy. 11. Recognize the bone marrow manifestations of infections a. (eg, viral, fungal, and hemophagocytic

TRAINING IN CLINIAL PATHOLOGY

	cytopenias. 22. Correctly identify storage iron, and assess adequacy. 23. Understand hematopoiesis, and distinguish the stagesfor cells in each hematopoietic cell series. 24. Know the major hematopoietic regulatory factors and cytokines. 25. Recognize normal WBC, RBC, and platelet maturation,as well as cellular dysplasia. 26. Understand diagnostic principles involved in distinguishing transient myeloproliferative syndromes (such as those associated with Down syndrome), transient cytopenias, and transient lymphocytoses from clonal disorders.	syndromes). 12. Recognize the bone marrow manifestations of noninfectious systemic diseases (eg, alcoholism, collagen vascular disease, and nonhematologic malignancies).
Additional competencies Specific to Haematology	**1.Appreciate special considerations in pediatric hematology and coagulation and hematopathology.** **2.Understand the different types of hematopoietic stem cell transplants.**	
Based on	Am J Clin Pathol 2006;125(Suppl 1):S3-S37	

Section	Skill Level I	Skill Level II
Body fluid analysis (CSF, ascetic fluid, pleural fluid)	5. Understand clinical conditions for body fluid analysis 6. Understand hemocytometer cell counting 7. Understand cytocentrifuge sample preparation and slide saying 8. Identify body fluid cell morphology	4. Interpret results of body fluid analysis in appropriate clinical context 5. Recognize malignant cells & recommend appropriate confirmation tests 6. Correlate abnormal body fluid cell morphology with cytology, flow cytometry
Manual Hematological Methods	4. Understand principles of microhematocrit determination and its limitation 5. Understand the principles of ESR 6. Understand the principles of supravital stains including Reticulocyte stains, Hb H preparation and Heinz body preparation	
Urine analysis	4. Understand the clinical indications for & utility of urine analysis 5. Understand principles of methods involved in urine chemistry and urine sediment analysis 6. Understand the limitations of manual and automated urine chemistry and sediment analysis	1. Interpretation of urine chemistry results and identify abnormal cells and organisms, provide clinical follow up as appropriate

TRAINING IN TRANSFUSION MEDICINE		
	SKILL LEVEL 1	SKILL LEVEL 2
TRANSFUSION SERVICES	1. Demonstrate knowledge of the principles of patient	1. Identify clinically significant RBC antibodies from an

	identification and pre transfusion testing ABO Rh typing , RBC antibody screen and antibody identification. 2. Recognize the symptoms & signs of haemolytic and nonhaemolyte transfusion reactions and demonstrate knowledge of pathophysiology, treatment and prevention of these complication. 3. Identify major infectious complications of blood transfusions. The current risk of these infections and explain how these infections can be prevented. 4. Identify major non infectious complications of blood transfusions. The risk of these complications and strategies to prevent them. 5. Choose appropriate blood components and derivatives based on a thorough knowledge of indications of transfusion. 6. Demonstrate knowledge of pathophysiology, prevention and treatment of haemolytic disease of newborn. Recognize these antibodies in pregnant patients who are clinically significant. And make appropriate recommendations blood products. 7. Demonstrate knowledge of pathophysiology and treatment of allo-neonatal ITP. 8. Demonstrate proficiency in the evaluation and appropriate transfusion therapy for thrombocytopenic patients. 9. Apply principles pf massive transfusion protocol 10. Demonstrate a working knowledge of principles of haemostasis and coagulation and proficiency in the initial treatment of patients with	antibody panel including multiple alloantibodies and a mixture of allo – antibodies and auto antibodies. 2. Demonstrate proficiency in evaluating and recommending treatment plans for complex transfusion reactions. 3. Demonstrate familiarity with appropriate use of highly specialized blood products. Like HLA matched antigens. 4. Demonstrate familiarity with the requirements of all regulatory accrediting agencies. 5. Compare and contrast the various means performing blood utilization review. 6. Demonstrate various methods of blood conservation, including pre and perioperative autologous blood collection and approaches to bloodless surgery. 7. Demonstrate proficiency in evaluating patients refractory to platelet transfusions. Outline the principles of histocompatibility testing and platelet crossmatching. 8. Demonstrate proficiency in the evaluation of the patients with immune mediated and non immune mediated hemolytic anaemia and appropriate transfusion management of these patients.

	bleeding disoders. 11. Demonstrate knowledge of he trnasfusion requirements of special patient populations(hematology, oncology, pediatrics, gediatrics, transplantation or burn, trauma). 12. Demonstrate knowledge in land mark published studies in transfusion medicine.	
Blood collection/ blood center/ cell processing responsibilities	9. Compare and contrast the eligibility requirements for allogenic and autologous blood donations. 10. Demonstrate knowledge of the indications for therapeutic phlebotomy. 11. Demonstrate proficiency in evaluating and treating adverse reactions associated with blood donation , phlebotomy, whole blood and aphaeresis donations. 12. Outline the assay principles of required donor blood tests and the associated confirmatory testing and prescribe donor reentry algorithm. 13. Demonstrate professionalism in interactions with prospective donors. 14. Summarize steps in blood component and blood derivative preparation. 15. Describe factors that influence the motivation of volunteers to donate blood. 16. Explain operation logistics required for determining appropriate blood inventory for a geographic region and the process of meeting daily, weekly and monthly collection goals.	1. Outline the necessary steps in donor notification and counseling associated with positive infectious disease testing results and donor lookback process. 2. Demonstrate knowledge concerning the requirements of all applicable regulatory and accrediting agencies. 3. Demonstrate knowledge of principles of hematopoetic stem cell transplantation including collection. 4. Demonstrate understanding of the elements of current good tissue, good manufacturing practices and current good tissue. 5. Develop an understanding of emerging area of cellular therapy

	Skill Level I	Skill Level II
Therapeutic apheresis	5. Summarize the principles of apheresis technology 6. Demonstrate knowledge of indications for therapeutic apheresis and of a appropriate replacement fluids. 7. Demonstrate proficiency in evaluating and preparing patients for therapeutic apheresis. 8. Communicate effectively with clinicians and house staff regarding therapeutic apheresis procedures	1. Demonstrate proficiency in evaluating and treating adverse reactions associated with therapeutic apheresis. 2. Demonstrate proficiency in the treatment
ADDITIONAL COMPETENCIES SPECIFIC TO TRANSFUSION MEDICINE		

SECTION	**Skill Level I**	**Level II**
Medical knowledge	Demonstrate understanding of and ability to interpret major regulations and guidelines that are applicable to collection, storage, and release of blood and other cellular therapeutic products.	
Practice based learning and improvement	Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of literature or issuance of new guidelines by regulatory agencies	

GENERAL	5. Understands various cytological investigations 6. Understands preparation of cytological stains & methods 7. Understand use of imaging modalities to obtain material for cytology and histology 8. Understand cytological appearances in various conditions	**5.** Performs various FNAC, guided FNAC under supervision **6.** Interpret cytological findings in the background of clinical and radiological findings **7.** Effectively communicates for further approach in management **8.** Uses Cytochemistry for interpretations

CYTOPATHOLOGY

GYNAECOLOGICAL CYTOPATHOLOGY		
Smear taking	Smear-taking technique. Technical aspects of spreading and fixing a smear. Liquid-based cytopathology (LBC) techniques, if appropriate.	Ability to access teaching material and expertise of staff outside the pathology department.
Microscopy	Setting up a microscope for screening. How to screen a smear.	Screening. Marking appropriate cells for discussion. Photomicrography.
Use of Bethesda Nomenclature	Understanding of Bethesda Nomenclature.	Able to categorise abnormalities
Specimen adequacy	Understanding of criteria for adequacy.	Ability to diagnose inadequate smear.
Infections	Knowledge of features of infections in cervical smears.	Ability to recognise infections. Ability to formulate appropriate management advice.
Borderline nuclear Change	Understanding of criteria for diagnosis	Ability to diagnose borderline change.
Dyskaryosis	Knowledge of criteria for diagnosis of mild, moderate and severe	Ability to diagnose these abnormalities. Ability to formulate appropriate management advice.

	dyskaryosis. Knowledge of criteria for diagnosis of glandular abnormality. Knowledge of criteria of diagnosis of possibly invasive lesions. Knowledge of features of common pitfalls in the diagnosis of dyskaryosis (e.g. transmission electron microscopy [TEM], follicular cervicitis, metaplasia).	Ability to take and weigh advice on diagnosis from screening staff.
New technologies	Knowledge of liquid-based cytopathology, HPV testing and other new developments.	Keeping up with new developments through journals and other media.

NON-GYNAECOLOGICAL CYTOPATHOLOGY **Technical aspects**	Basic knowledge of preparation and staining techniques for common specimen types. Knowledge of use of special techniques, e.g. immunocytochemistry.	Able to recognise faults and artefacts of preparation, e.g. air-drying. Panels of antibodies for particular diagnostic applications, e.g. mesothelioma.
Diagnosis	Features of malignancy in sites commonly investigated with cytopathology. Features of specific non-malignant diagnoses, e.g. infection.	Able to diagnose malignancy with confidence in specimens from breast, gastro intestinal (GI) tract, respiratory tract, urinary tract, head and neck, lymphoreticular system, and serous fluids. Ability to integrate clinical information and histology or other

		investigations into diagnosis. Ability to recognise when definitive diagnosis is beyond capability.
Reporting	Requirements for a report. Relevant datasets.	Ability to write an accurate report that gives clinicians the information they need. Knowledge of the likely outcome in terms of further investigation or management of the patient.

HISTOPATHOLOGY

Subject	Knowledge	Skills and knowledge application	Attitudes
Basic knowledge	Possess sufficient general clinical knowledge including major changes in trends of diagnosis and treatment. Possess sufficient knowledge of normal anatomy, physiology and pathophysiology. Possess sufficient knowledge of molecular techniques as applied within clinical medicine and particularly within surgical pathology.	Develop the ability to solve complex clinical [and research, when applicable] problems by applying sound knowledge of basic principles without the requirement always to rely on 'pattern matching'. Develop the skills to interpret data from molecular analyses in the context of the clinical situation and morphological appearances when undertaking diagnostic surgical pathology.	Understand importance of integration of clinical and pathological data for accurate diagnosis. Understand the increasing need to combine morphological opinions with data from molecular analyses in diagnostic surgical pathology. Be prepared to communicate closely with colleagues undertaking molecular analyses when appropriate
Surgical cut-up ['General']	Understand principles of specimen dissection, macroscopic description and block selection in neoplastic and nonneoplastic disease. Stages B-D: understand principles of dissection of all major cancer resection specimens and tissue sampling to enable completion of RCPath's *Standards and Datasets for Reporting Cancers*.	Possess sufficient manual dexterity to perform dissection safely and accurately, without damage to tissues.	Understand importance of accuracy and requirement for attention to detail during specimen description and block selection. Understands importance of ensuring that request form and specimen identification is accurate and the requirement to identify and resolve any errors or discordance

	Stage A: See *Appendix 1*		
Laboratory processes	Understand the principles of laboratory processing within surgical pathology and cytopathology.	Stage A: one week's or equivalent experience of laboratory processing including section cutting.	Respect the work of the technical staff in preparing slides for viewing.
Surgical reporting ['General']	Understand the principles of microscopy. Knowledge of the microscopic features of the range of normality within tissues as well as the major common pathological processes and patterns of disease Stage A: See *Appendix 1*. Stages B-D: develop a special interest in one or more diseases or organ systems. May remain generalised or become specialised in one or more areas [e.g. neuropathology, paediatric pathology].	Be able to set up a microscope with ergonomic safety and operate it effectively. Be able to recognise the microscopic features of tissue structure in normality and disease, as appropriate to one's level of experience. Able to complete RCPath *Standards and Datasets for Reporting Cancers*.	Understand requirement for attention to detail during surgical reporting and the need for correlation with the clinical situation. Demonstrate an understanding of the importance of surgical pathology to clinicians and patients [e.g. timeliness and accuracy of reporting].
Special techniques	Understand principles of 'special' histochemical and immunohisto-chemical methods. Understand principles of common molecular pathology techniques. Understand principles of electron microscopy.	Know when to resort to special techniques. Be able to recognise histological features of histochemical and immunohistochemical stains in normal and diseased tissues.	Understand cost-benefit issues when considering the use of additional techniques. Stages B-D: initiate special techniques in preparation of cases.

Microbiology skills

III. Susceptibility Testing

Skill Level I

1. Describe the mechanism of action of the major classes of antimicrobial agents used to treat bacterial, fungal, viral, and parasitic infections.
2. Understand the basic principles of in vitro susceptibility testing, including achievable serum drug concentrations, MIC (minimum inhibitory concentration), MBC (minimum bactericidal concentration), and breakpoints.
3. Compare and contrast susceptibility testing methods that may be used in the clinical laboratory, including broth dilution methods, disk diffusion testing, and agar dilution testing.

4. Understand the disk approximation test used to detect a "D zone," and describe when it should be performed.
5. Describe methods used for screening and confirmation of extended-spectrum β-lactamases in gram-negative bacteria.

Mycobacteriology

Skill Level I

1. Understand the major characteristics of diseases caused by mycobacteria, including clinical presentation, transmission, pathophysiology, epidemiology, infection control issues, and public health concerns.
2. Describe decontamination/concentration procedures used to process specimens sent for culture of acid-fast bacilli (AFB).
3. Describe the staining methods for AFB, including fluorochrome and carbolfuchsin stains.
4. Read and interpret fluorochrome- and carbolfuchsin stained smears.
5. Understand the advantages and disadvantages of liquid and solid media used to culture AFB organisms.
6. Define rapid grower, scotochromogen, photochromogen, and nonchromogen, and provide examples of mycobacteria in each category.
7. Demonstrate knowledge of hybridization probes used for culture identification.
8. Understand safety issues associated with culture of AFB.
9. Compare and contrast the Mantoux skin test and the Quantiferon test (Cellestis, Carnegie, Australia) for detection of latent tuberculosis.
10. Name the primary antituberculosis agents and the most important drug used in treatment of disease due to *Mycobacterium avium* complex.

V. Mycology

Skill Level I

1. Understand the major characteristics of infectious diseases caused by fungal pathogens, including clinical presentation, transmission, pathophysiology, and epidemiology.
2. Describe fungal pathogens that cause disease in specific patient populations, including children, immunocompromised patients, and transplant patients.
3. Describe methods for detection of fungal pathogens in clinical specimens, including methods for direct examination of specimens (eg, KOH [potassium hydroxide] smears, vaginal wet preps, and calcofluor white stain).
4. Understand the benefits and limitations of the following nonculture tests for diagnosis of invasive fungal infections: cryptococcal antigen test, urine *Histoplasma* antigen test, *Candida* antigen tests, and galactomannan enzyme immunoassay.
5. Describe appropriate specimen collection and processing methods for fungal cultures.
6. Become familiar with commonly used plating media for fungal cultures, including antimicrobial agents used in primary plates for specimens from nonsterile sites.
7. Understand testing algorithms for fungal identification, including colony morphology on standard media, the germ tube test, cornmeal agar, slide cultures, special agars, and biochemical tests.
8. Identify *Pneumocystis jiroveci* in respiratory specimens, and describe available staining methods for this organism.
9. Identify the following fungi based on colony morphology and microscopic appearance: *Aspergillus* spp, *Penicillium* spp, *Histoplasma capsulatum,*

Coccidioides immitis, Fusarium spp, *Penicillium marneffei, Pseudallescheria boydii,* and *Zygomycetes.*

10. Identify the following fungi based on their appearance in tissue*: C immitis, Blastomyces dermatitidis, H capsulatum,* and *P jiroveci.*
11. List the major classes of antimicrobial agents used to treat fungal infections.

VI. Parasitology

Skill Level I

1. Understand the major characteristics of diseases caused by parasites, including clinical presentation, transmission, pathophysiology, and epidemiology.
2. Describe the life cycles of intestinal, tissue, and blood parasites.
3. Describe clinical presentation and the morphologic characteristics used to identify *Plasmodium* spp (*Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale,* and *Plasmodium malaria*e) and *Babesia* spp.
4. Understand proper specimen collection, transportation of specimens, and processing methods for optimum ova and parasite examinations.
5. Understand advantages and disadvantages of preservatives, reagents, and stains used in the ova and parasite examination.
6. Be able to recognize important morphologic characteristics used to identify pathogenic and nonpathogenic parasites in stool ova and parasite permanent smears and concentrates.
7. Demonstrate knowledge of available immunoassays for detection of parasites, and describe advantages and disadvantages associated with the use of these assays.

VII. Virology

Skill Level I

1. Understand the major characteristics of diseases caused by viral pathogens, including clinical presentation, transmission, pathophysiology, and epidemiology.
2. Describe viral pathogens that cause disease in specific patient populations, including children, immunocompromised patients, and transplant patients.
3. Demonstrate an understanding of proper specimen collection, specimen transportation, and processing methods used for viral culture.
4. Demonstrate knowledge of tissue culture techniques and cell types used to grow viral pathogens.
5. Describe the hemadsorption test and immunofluorescent staining techniques used for identification of viruses grown in tissue culture.
6. Demonstrate knowledge of the serologic testing methods used to detect HIV antibodies (eg., enzyme immunoassay, Western blot, and immunofluorescent assay), and describe appropriate HIV testing strategies for adults, children, and neonates.
7. Describe advantages and limitations of rapid serologic tests used to detect HIV and respiratory viruses.
8. Be able to interpret results of antibody tests for hepatitis viruses, herpes viruses, and other important viral pathogens.

BIOCHEMISTRY:

Basic Biochemistry applied to biochemical investigations.
Handling of photocolorimeter.
Spectrophotometer
PH-meter
Flame photometer
Blood gas analysers
Autoanalyser
Electrophoresis.

	Skill Level I
I. Analytic Techniques and Instrumentation	4. Understand the principles and operational characteristics of analytic chemistry techniques, including photometric, electrochemical, enzymatic, electrophoretic, radiometric, chromatographic, mass spectrometric, and immunologic methods. 5. Understand different types of random-access automated analyzers and the measurement principles employed in these systems, including spectrophotometric, ionselective electrode, and electrochemical methods, electrochemiluminescence, enzyme-linked immunoassay (ELISA), turbidimetry, and nephelometry. 6. Understand the basic biology of and analytic methods for determination of qualitative and quantitative changes in blood and fluid proteins and amino acids (enzymes, biomarkers, hormones, and cytokines), carbohydrates, lipids, and lipoproteins and clinically relevant small molecules.
2. Acid-Base Chemistry, Electrolytes, and Relevant Disorders	3. Define the Henderson-Hasselbach equation. Be familiar with physiologic buffer systems and the role of respiratory and renal compensation. Understand categories of clinical disorders of acid-base balance (metabolic and respiratory acidosis, metabolic and respiratory alkalosis, and mixed disorders). 4. Know the differential diagnosis of common electrolyte disorders.
3. Assessment of Renal Function	7. Know the basic physiology of renal function. Understand the basic categories of renal diseases (eg, prerenal azotemia, obstructive azotemia, glomerulonephritis, acute vs chronic renal failure, and uremic syndrome) and be familiar with the National Kidney Foundation practice guidelines for these conditions. Know the laboratory analytic methods (eg, Jaffe vs creatinase) for the

	assessment of renal function (eg, creatinine, urea nitrogen, and glomerular filtration rate) and proteinuria. 8. Understand the concept of "creatinine clearance," how it can be used to estimate glomerular filtration rate, and the various methods employed to measure it. 9. Understand renal handling of electrolytes and key metabolites and the interpretation of urinary electrolyte measurements. 10. Understand the definition of osmolality, molecules in serum that contribute to osmolality, and calculation of osmolal gap, as well as the principle of the osmometer. 11. Understand the common pitfalls and sources of error during estimation of the osmolal gap (eg, hyperproteinemia, hyperlipidemia, hypermagnesemia) 12. Understand the differential diagnosis of an unexplained, elevated osmolal gap, including alcohol or glycol ingestion, alcoholic or diabetic ketosis or ketoacidosis, osmotherapy (eg, mannitol or glycerol administration), among others. Understand the principles of fluid balance.
4. Cardiac Biomarkers for the Assessment of Coronary Artery Diseases	5. Know the current definition of myocardial infarction by the European Society of Cardiology/American College of Cardiology guidelines and the New York Heart Association classifications, and understand the interaction of diagnostic modalities in its definition (electrocardiogram, laboratory testing, imaging). 6. Know the diagnostic and prognostic significance and the limitations of current coronary artery disease biomarkers (troponins I and T, creatinine kinase [CKMB index and isoforms], myoglobin). 7. Know the pathophysiology and evaluation of congestive heart failure. Understand the markers of congestive heart failure (eg, brain natriuretic peptide) and their biologic and technical limitations. 8. Understand the utility of markers of inflammation in the evaluation of cardiac risk (eg, homocysteine and C-reactive protein).
5. Assessment of Liver and Biliary Tract Status	5. Understand the dynamics and mechanisms of liver enzyme release and clinical utility of measuring "hepatic" enzymes (eg, aspartate aminotransferase, alanine aminotransferase, γ-glutamyltransferase,

	alkaline transferase, and lactate dehydrogenase). 6. Know the biochemial assessment of liver function by nonenzyme analytes such as albumin, ammonia, bile acids, bilirubin, urea nitrogen, cholesterol, total protein, and triglycerides. 7. Understand bilirubin metabolism, fractionation of bilirubin (ie, conjugated, unconjugated, δ-bilirubin, direct vs indirect) and unique aspects of neonatal bilirubin. 8. Understand the conditions and genetic defects that affect bilirubin metabolism, transport, and clearance (eg, Gilbert disease, Dubin-Johnson syndrome). 2. .
	6. Assessment of Thyroid Function 5. Understand the structure, biosynthesis, secretion, and metabolism of thyroid hormones (thyroxine [T4], triiodothyronine [T3], and reverse T3 [rT3]). Know thyroid physiology and control of thyroid function (thyrotropin-releasing hormone [TRH] and thyrotropin [thyroid-stimulating hormone; TSH]). 6. Know the common causes of hypothyroidism and hyperthyroidism. 7. Know the laboratory tests for evaluation of thyroid disorders, and be able to interpret these analytes in clinical context with an appreciation for the euthyroid sick state. 8. Be familiar with current analytic methodologies for thyroid testing (TSH methods: first-, second-, and thirdgeneration assays; isotopic and nonisotopic methods; T4; free T3 methods; T3 resin uptake methods; TSH suppression and stimulation tests).
7. Assessment of Pituitary Function	3. Understand the physiologic action, biochemistry, and regulation of anterior pituitary hormones (adrenocorticotropic hormone [ACTH], growth hormone [GH], prolactin [PRL], luteinizing hormone [LH], and follicle-stimulating hormone [FSH]) and posterior pituitary hormones (antidiuretic hormone [ADH] and oxytocin). 4. Understand endocrine tests of hypothalamic-pituitary function (eg, cosyntropin test/rapid ACTH stimulation test, insulin hypoglycemia test, metyrapone test, levodopa test, arginine infusion test, glucose-growth hormone suppression test, TRH test, gonadotropinreleasing

	hormone [GnRH] test, clomiphene test, corticotropin- releasing hormone [CRH] test, gonadotropinreleasing hormone test, water deprivation test, saline infusion test, and water loading test). Understand the pathophysiology of disorders of the pituitary
8. Assessment of Adrenal Function	6. Understand the physiologic action, biochemistry, biosynthesis, chemical structure, and metabolism of glucocorticoids and mineralocorticoids. 7. Understand the physiologic regulation of the reninangiotensin-aldosterone system. 8. Understand clinical conditions associated with excess and deficiency of adrenal cortex hormones. Understand testing of the functional status of the adrenal cortex (eg, basal levels vs stimulation tests and suppression tests, circadian rhythm of corticosteroids, morning ACTH, cortisol [ie, urinary, random, and free], rapid ACTH cortisol stimulation test, multiday ACTH stimulation, metyrapone stimulation, CRH stimulation, quantitative serum, and urinary steroid hormone panels). 9. Understand synthesis and metabolism of biogenic amines. including catecholamines and serotonin. 10. Be familiar with the strengths and weaknesses of tests available for evaluation of disorders of the adrenal medulla, such as pheochromocytoma and neuroblastoma.
	9. Assessment of Reproductive Function, Pregnancy, and Prenatal Testing ***Skill Level I*** 3. Understand the role of sex hormones in reproduction and the evaluation of pregnancy and reproductive dysfunction, such as menstrual disorders and infertility. 4. Understand the importance of demographic data and biochemical assessment in prenatal testing for fetal defects.
10. Assessment of Gastric, Pancreatic, and Intestinal Function	***Skill Level I*** 3. Understand the clinical manifestations of gastric, pancreatic, and intestinal disease and diagnostic methodologies such as breath tests for *Helicobacter pylori*, fecal occult blood, lipase, and amylase (eg, fractionation of amylase; pancreatic vs salivary and amylase/creatinine clearance ratio).

	4. Appreciate the role of gastrointestinal hormones and enzymes in digestion and the evaluation of malabsorption and diarrheal syndromes.
11. Assessment of Glucose and Evaluation of Diabetes Mellitus	4. Understand the metabolism of carbohydrates (eg, insulin, C-peptide, and other regulatory hormones) and be familiar with the American Diabetes Association definitions of impaired fasting glucose, impaired glucose tolerance, and type 1 and type 2 diabetes mellitus and criteria for diabetic ketoacidosis and hyperosmolar hyperglycemic state and gestational diabetes. Understand the underlying pathophysiology of different forms of diabetes. 5. Understand the diagnosis and laboratory assessment of diabetes (eg, blood glucose, oral glucose tolerance test, hemoglobin A1c, fructosamine, and urinary microalbumin) and its complications. 6. Understand the diagnosis and evaluation of hypoglycemia.
12. Assessment of Mineral and Bone Metabolism	4. Understand the biochemistry and physiology of calcium, phosphate, and magnesium. 5. Know the hormones that regulate mineral metabolism (eg, parathyroid hormone [PTH], calcitonin, and vitamin D) as well as parathyroid hormone–related protein (PTHrP). Understand various PTH assays, including "bio-intact" PTH and intraoperative PTH. 6. Know the pathophysiology of metabolic bone diseases, such as osteoporosis, osteomalacia, and Paget disease.
13. Assessment of Porphyrins and Disorders of Porphyrin Metabolism	3. Understand the biochemistry of heme and porphyrins. Understand the porphyrias, and be able to consult on the selection and interpretation of screening and diagnostic tests for each disorder
14. Tumor Biomarkers	***Skill Level I*** 4. Be familiar with the definition, classification, biochemistry, and distribution of tumor markers, both protein and carbohydrate, including, but not limited to, prostate specific antigen (PSA), calcitonin, humanchorionic gonadotropin (HCG), α-fetoprotein (AFP), carcinoembryonic antigen (CEA), CA15-3, CA125, and

	CA19-9. 5. Know the limitations of laboratory assessment of various tumor markers and the factors affecting the results of different analytic procedures. 6. Understand the conceptual basis of assays used to screen for malignancy, including Bayes theorem. ***Skill Level I*** • Be familiar with ongoing efforts to identify proteomic patterns for cancer detection
15. Assessment of Fetal Lung Maturity	3. Understand the physiology of respiratory distress syndrome. 4. Understand fetal lung maturity testing (eg, lecithin/sphingomyelin [L/S] ratio, phosphatidyl glycerol [PG], foam stability index [FSI; shake test], fluorescence polarization, and counting of lamellar bodies). Understand the biochemistry, physiology, and diagnostic performance of fetal fibronectin
16. Trace Element Assessment	3. Understand the biochemistry, physiology, and metabolism of trace elements (eg, iron, magnesium, zinc, copper, selenium, cobalt, and fluoride). Know the biochemistry and clinical significance of metal-binding proteins such as transferrin, ferritin, and ceruloplasmin. 4. Know the clinical assessments of trace elements (eg, serum iron, iron binding capacity, transferrin, transferring saturation, serum ferritin, zinc protoporphyrin, and serum ceruloplasmin).
17. Vitamin Assessment	***Skill Level I*** 3. Know the definition and classification of vitamins: fatsoluble vitamins (ie, A, D, E, and K) and water-soluble vitamins (ie, B1, B2, B6, B12 [cobalamin], C, niacin, nicotinamide, folic acid, biotin, and pantothenic acid). 4. Understand the clinical disorders associated with the deficiency and toxicity of vitamins.
18. Cholesterol and Lipid Assessment	5. Understand the chemical structures, biosynthesis, classification, function, and metabolism of lipids and lipoproteins. 6. Understand the Fredrickson classification and the National Cholesterol Education Program Expert Panel on Detection,

	Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) classification of hyperlipidemia. 7. Understand the pathophysiology of lipid disorders. • Know the principles of analytic techniques for laboratory assessment of lipids.
19. Serum and Fluid Protein and Amino Acid Assessment	4. Understand the principles of protein analysis in body fluids (eg, Kjeldahl and Biuret methods, refractometry, and qualitative dipstick). 5. Know the principles of serum, urine, and cerebrospinal fluid (CSF) protein electrophoresis. Recognize key patterns of dysproteinemias and monoclonal gammopathies. 6. Understand approaches for distinguishing transudates vs exudates in fluids

Informatics

	Skill Level I	**Skill Level II**
I. Basic Computer Skills	4. Understand terms and concepts related to computer hardware and software. 5. Understand basic computer networking concepts. 6. Understand how to use word processing, spreadsheet, presentation graphics, and statistical software.	
II. Laboratory Information System Concepts	5. Understand the major features of a laboratory information system. 6. Know the basic data elements of a laboratory information system. 7. Demonstrate an awareness of the enterprise information system architecture and how the laboratory information system fits within it. 8. Be able to extract data from the laboratory information system.	
III. Security and Privacy	Understand guidelines for security and privacy of protected health information.	

IV. The Internet and World Wide Web	5. Know Internet-related terms and concepts. 6. Be able to utilize the Internet to do the following: 7. Access Internet-based databases 8. Perform literature searches	
V. Communication and Standards	Develop basic understanding of how the laboratory information system shares data with other networked systems within the enterprise.	3. Develop basic understanding of laboratory instrument interfaces. 4. Understand data standards and encoding schemes, such as *International Classification of Diseases* (*ICD-9* and *ICD-10*).
VI. Emerging Technologies		3. Develop a basic understanding of telepathology systems and concepts. 4. Develop a basic understanding of bioinformatics concepts with an emphasis on the critical evaluation of evolving bioinformatics tools. Develop a basic understanding of evolving multiparameter diagnostic approaches
Additional Competencies Unique to Informatics	*Medical Knowledge* • Understand the rudiments of laboratory instrument interfaces and laboratory automation systems. *Professionalism* • Understand HIPAA requirements for security and privacy. *Systems-Based Practice* • Understand how and where laboratory data are shared among information systems within the health care enterprise.	

EVALAUATION:

A. THEORY (Written)

There shall be three question papers, each of three hours duration. Each paper shall consist of two long essay questions each question carrying 20 marks and 6 short essay questions each carrying 10 marks. Total marks for each paper will be 100.
Question on recent advances may be asked in any or all the papers.

PAPER I	- General pathology including Basic Microbiology	- 100 Marks
PAPER II	- Systemic pathology	- 100 Marks
PAPER III	- Hematology, Cytology, Clinical pathology	- 100 Marks

B. PRACTICAL:

DAY 1:	1. Microbiology Exercise.	- 25 Marks
	2. Clinical case/data of examination/discussion	
	Hematology exercise	
	Biochemistry exercise	
	Urine Analysis .	- 50 Marks
	3. Histopathology Techniques	
	Section cutting	
	Hematoxylin and Eosin stain	
	Cytology stain	- 25 Marks
DAY 2:	1. Reporting on Microbiology exercise	
	2. Histopathology slides – 8	
	3. Cytology slide – 8	
	4. Haemathology slides – 8	-50 Marks

C. VIVA-VOCE:

Viva-voce examination: (50 Marks)
Students will be examined by all the examiners together about students comprehension, analytical approach, expression and interpretation of data. Students shall also be given case reports, charts for interpretation.

Maximum marks for D.C.P	**Theory**	**Practical**	**Viva**	**Grand Total**
	300	150	50	500

RECOMMENDED TEXT BOOKS AND JOURNALS:
BOOKS:[LATEST EDITIONS]

1. Cotran, Kumar, Robbins. **Pathologic Basis of Disease**, Published by W.B. Saunders & Company. Also available in PRISM Indian Edition.
2. John. M. Kissane Edited, **Anderson's Pathology**, Published by C.V. Mosby Company.
3. Mc. Gee, Isaacson and Wright Edited, **Oxford Text Book of Pathology Vol.1,2a,2b**, Published by Oxford University Press.
4. J.B. Walter, M.S. Israel. **General Pathology**, Published by Churchill Livingstone.
5. Emeritus Editor: W.st. Symmers, **Systemic Pathology 16 Volumes**, Published by Churchill Livingstone.
6. Edited by Jaun Rosai. **Ackerman's Surgical Pathology**, Published by C.V. Mosby company.
7. Walter F Coalson. **Surgical Pathology**, Published by Lippincott.
8. Enzinger and Weiss. **Soft Tissue Tumours**, Published by B.I. Publications (India) C.V. Mosby company.
9. Stacey .E. Millis. **Sternbergs Diagnostic pathology.**Published by Jaypee brothers medical publishers.
10. WF Lever – GS Lever.**Histopathology of the skin**, Published J.B. Lippincott Company.
11. David J.B. Ashley EVAN'S Edited. **Histological Appearances of Tumors**, Published by Churchill Livingstone.
12. Novak & Woodruff Edited. **Novak's Gynecologic and Obstetric Pathology**, Published by- Kiaku Shoin/ Saunders.
13. Robert j. Kurman. **Blasteins pathology of female genital tract.**Published by Spinger-verley. Newyork Inc.
14. Leopold G Koss. **Diagnostic Cytology And Its Histopathologic Basis**, Published by JG. Lippincott Company.
15. Marluce Bibbo. **Comprehensive Cytopathology** Published by W.B Sauders and Company.
16. Winnifred Grey Edited, **Diagnostic Cytopathology**, Published Churchill Livingstone.
17. Orell, Sterrett, Walters & Whittaker. **Fine Needle Aspiration Cytology (Manual & Atlas)**, Published by Churchill Livingstone.
18. Daniel M Knowles Edited. **Neoplastic Haematopathology**, Published by Williams & Wilkins.
19. Maxwell M Wintrobe. **Clinical Haematology**, Published by K.M. Varghese & Company.
20. Shirlyn B. Mekenzie**. Clinical Laboratory Haematology.** Published by Julie Levin alekander IARC press.
21. A Victor Hoffbrands , John E.Petit. **Clinical Haematology.** Published by Churchill Living stone .
22. De Gruchy's, Edited by Firkin, Chesterman, Penington & Rush. **Clinical Haematology In Medical Practice**, Published by Oxford University Press.
23. Todd, Sanford, Davidson Edited. **Clinical Diagnostis and Management By Laboratory Methods**, Published by W.B. Saunders and Company.
24. Jacques Wallach M.D. **Interpretation of Diagnostic tests.**Published by Walters Kumar(Ind) Pvt. Limited.

25. Dr. Shameem Sharif Edited. **Surgical Pathology And Laboratory Techniques**, Published by Prism publications.
26. Christopher D.M. Fletcher Edited. **Diagnostic Histopathology of Tumors Vol.1 & 2**, Published by Churchill Livingstone.
27. Blue book series. **WHO Classification of tumors.** Published by WHO press, Geneva.

JOURNALS

01. **British Journal of Haematology.** Published by Blackwell Science.

02.Cancer. International Journal of the American cancer society, Published by John Wiley and sons. Inc.

03.Journal of Clinical Pathology. Publishing Group BMJ.

04.Haematology/Oncology Clinics of North America. Published by W.B. Saunders and company.

05.Histopathology. Journal of the British division of the international academy of pathology published by Blackwell Science.

06.The American Journal of Surgical Pathology. Published by Lippincott –Raven.

07.American journal of clinical pathology. Published by Pool Press Inc.

08.Acta Cytologica. The journal of Clinical cytology and cytopathology.

09.Archives of Pathology and Laboratory medicine. Published by the American Medical Association.

10.The Indian Journal of Cancer. Published by Indian Cancer Society.

11.Indian journal of pathology and microbiology. Published by Medknow.Ghakopar Mumbai.

12.Indian Journal of Cytology. Published by Medknow.Ghakopar Mumbai.

13.Human Pathology. Published by W.B. Saunders Company.

SECTION III

Additional reading

1.Compondium of Recommendations of Various committees on Health and Development (1943-1975) DGHS, 1985 Central Bureau of Health Intelligence,Directorate General of Health Services,Min.Of Health and Family Welfare,Govt.of India,Nariman Bhawan New-Delhi,P-335

2.National Health Policy:Min.of Health & Family Welfare,Nirman Bhawan,New Delhi,1983

3.Santosh Kumar:The elements of Research,writing and editing 1994,Dept.of Urology,JIPMER,Pondicherry.

4.Srinivasa D K et al : Medical Education Principles and Practice,1995.National Teacher Training Centre, JIPMER,Pondicherry.

5.Ethical guidelines for biomedical research on human participants I.C.M.R. New Delhi 2006.

6.Code of Medical Ethics framed under Section 33 of the Indian Medical Council Act, 1956.Medical Council of India, Kotla Road,New Delhi.

7.Francis C.M: Medical Ethics, Jaypee Publications,Bangalore,2nd Edn-2004.

8.Indian National Science Academy, Guidelines for care and use of animals in Scientific Research, New Delhi,1994.

9.Interntional Committee of Medical Journal Editors,Uniform requirements for manuscripts submitted to biomedical journals, N England Journal of Medicine. 1991,424-8

10.Kirkwood B.R. Essentials of Medical Statistics,1st Ed. Oxford, Blackwell Scientific Publications 1988.

11.Mahajan B.K.: Methods in Bio-statistics for Medical students,5th Edition new Delhi, Jaypee Brothers Medical Publishers,1989.

12.K.R.Sundaram,S.N.Dwivedi,V.Srinivas.Medical Statistics.Principles & Methods .B.I.Publications,New Delhi,2010

13.R.K.Chaube: Consumer Protection Act and Medical Profession, 1st Edition, 1999,Jaypee Brothers.

SECTION IV

Check List – I

MODEL CHECK-LIST FOR EVALUATION OF JOURNAL REVIEW PRESENTATIONS

Name of the Student: **Name of the Faculty/Observer:** **Date:**
Title and author
Source

SI. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Article chosen was					
2.	Extent of understanding of scope & objectives of the paper by the candidate					
3.	whether cross references have been consulted					
4.	Whether other relevant publications consulted					
5.	Ability to respond to questions on the paper/subject					
6.	Audio-Visual aids used					
7.	Ability to defend the paper					
8.	Clarity of presentation					
9.	Any other observation					
	Total Score					

Check List – II

MODEL CHECK-LIST FOR EVALUATION OF SEMINAR REVIEW PRESENTATIONS

Name of the student: **Name of the Faculty/Observer :** **Date :**

Topic
Guide

Sl. No.	Items for observation during Presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Whether other relevant publications consulted					
2.	whether cross references have been consulted					
3.	Completeness of preparation					
4.	Clarity of Presentation					
5.	Understanding of subject					
6.	Ability to answer questions					
7.	Time scheduling					
8.	Appropriate use of Audio-Visual aids					
9.	Overall performance					
10.	Any other observation					
	Total Score					

Check List – III

MODEL CHECK-LIST FOR EVALUATION OF TEACHING SKILL PRACTICE

Sl. No.		Strong Point	Weak Point
1.	Communication of the purpose of the talk		
2.	Evokes audience interest in the subject		
3.	The introduction		
4.	The sequence of ideas		
5.	The use of practical examples and/or illustrations		
6.	Speaking style (enjoyable, monotonous, etc., specify)		
7.	Attempts audience participation		
8.	Summary of the main points at the end		
9.	Asks questions		
10.	Answers questions asked by the audience		
11.	Rapport of speaker with his audience		
12.	Effectiveness of the talk		
13.	Uses AV aids appropriately		

Check List-IV

MODEL CHECK LIST FOR DISSERTATION PRESENTION

Name of the Student: **Name of the Faculty:** **Date:**

Sl. No.	Points to be considered divine	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Interest shown in selecting a topic					
2.	Appropriate review of literature					
3.	Discussion with guide & other faculty					
4.	Quality of Protocol					
5.	Preparation of Proforma					
6.	Title • Appropriateness • Clarity and brevity • Focus on topic					
7.	Introduction • Purpose of study • Mention of lacuna • Hypothesis, if any					
8.	Review of literature • Relavance • Completeness • Is up to date?					
9.	Methods • Mention type of study • Details of subjects & control • Details of material • Procedure for data collection • Statistical methods employed • Mention ethical issues					
	Total Score					

Check List-V

CONTINUOUS EVALUATION OF DISSERTATION WORK BY GUIDE / CO-GUIDE

Name of the Student: **Name of the Faculty:** **Date:**

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Periodic consultation with guide/co-guide					
2.	Regular collection of case material					
3.	Depth of analysis / discussion					
4.	Departmental presentation of findings					
5.	Quality of final output					
6.	Others					
	Total Score					

Check List-VI

MODEL CHECK LIST FOR SLIDE SEMINAR/TEST

Name of the Student: Name of the Faculty: Date:

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Analysis of history					
2.	Analysis of clinical presentation					
3.	Quality of report writing skills					
4.	Depth of analysis / discussion					
5.	Diagnosis					
6.	Quality of final output					
7.	Remarks					
	Total Score					

Check List-VII

MODEL CHECK LIST FOR GROSS SPECIMEN DISCUSSION/TEST

Name of the Student: Name of the Faculty: Date:

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Analysis of history					
2.	Analysis of clinical presentation					
3.	Quality of gross techniques skills					
4.	Depth of analysis / discussion					
5.	Quality of report writing skills					
6.	Diagnosis					
7.	Quality of final output					
8.	Remarks:					
	Total Score					

Check List-VIII

MODEL CHECK LIST FOR AUTOPSY TECHNIQUES/TEST

Name of the Student: **Name of the Faculty:** **Date:**

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Analysis of history & clinical presentation					
2.	Quality of Grossing/ Dissection					
3.	Quality of report writing skills					
4.	Depth of analysis / discussion					
5.	Diagnosis					
6.	Quality of final output					
7.	Others					
	Total Score					

Check List-IX

MODEL CHECK LIST FOR TECHNICAL SKILLS ON JOB-OSPE

Name of the Student: **Name of the Faculty:** **Date:**

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Analysis of history & clinical presentation					
2.	Quality of report writing skills					
3.	Depth of analysis / discussion					
4.	Diagnosis					
5.	Quality of final output					
6.	Others					
	Total Score					

LOG BOOK

Table I : Academic activities attended

Name: **Admission Year :**

College:

Date	Type of Activity Specify Seminar, Journal Club, Presentation, UG teaching	Particulars

LOG BOOK

Table 2 : Academic presentations made by the student

Name: **Admission Year :**

College :

Date	Topic	Type of Presentation Specify Seminar, Journal Club, Presentation, UG teaching etc.

REGISTRAR
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