BLDE UNIVERSITY

PG CURRICULUM 2016-17

MD Pathology

Published by

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[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

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The Constituent College

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

BLDEU/REG/PG/2016-17/ 505 June 18, 2016

NOTIFICATION

Subject: Revised Curriculum for the Post Graduate Degree and Diploma Course-2016

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 29, 2016.
3. Minutes of the meeting of the BOM of the University held on June 18, 2016.

The Board of Management of University is pleased to approve the Curriculum for Post Graduate Degree and Diploma Course at its meeting held on June 18, 2016.

The revised curriculum shall be effective, from the Academic Session 2016-17 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, Vijayapura.

REGISTRAR

REGISTRAR
BLDE University, Vijayapura.

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

Copy to:-

- The Secretary, UGC, New Delhi
- The Controller of Examinations
- Prof. & HODs of Pre, Para and Clinical Departments.
- PS to Hon'ble President
- PS to Hon'ble Vice-Chancellor

Vision & Mission

- Excellence in all our endeavours.

- Committed to provide globally competitive quality medical education.

- 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 as stated in the Post Graduate Medical Education Regulations 2000 and its amendments thereof [May2013]

(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, pertaining 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
- Teaching skills to the undergraduates, juniors and support teams

Source: Medical Council of India, Regulations on Postgraduate Medical Education, 2000. [amended upto May2013]

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 ranging from 30-70% 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 superspeciality 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. Exposure to applied aspects of their learning should be addressed Similarly, clinical subjects' students should be posted to basic medical sciences and allied specialty departments or institutions.
Training of superspecialty should follow similar pattern. In addition, they have to be trained in advanced techniques of diagnosis and treatment pertaining to their specialty, participate actively in surgical operations [M.Ch] as well.

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, assessment of 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 pursuing 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, skills of performing necessary tests/experiments
- Teaching skills.

Personal Attitudes:

The essential items are:

- Caring attitude, empathy
- Initiative in work and accepting responsibilities
- Organizational ability
- Potential to cope with stressful situations and undertake graded 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. Any appropriate methods can be used to assess these. It is appreciated that these items require a degree of subjective assessment by the guide, supervisors and peers. However every attempt should be made to minimize subjectivity.

Acquisition of Knowledge:

Lectures: Lectures/theory classes as necessary may be conducted. It is preferable to have one class per week if possible. They may, 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.
- Bio medical waste

These topics may preferably taken up in the first few weeks of the 1st year commonly for all new postgraduates. The specialty wise topics can be planned and conducted at departmental level.

b) Integrated teaching: These are recommended to be taken by multidisciplinary teams for selected topics, eg. Jaundice,Diabetes mellitus,thyroid diseases etc. They should be planned well in advance and conducted.

Journal Review Meeting (Journal Club):

The ability to do literature search, in depth study, presentation skills, use of audio – visual aids, understanding and applying evidence based medicine are to be focused and 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.

Group discussions: Group discussions are one of the means to train and assess the student's ability to analyse the given problem or situation, apply the knowledge and make appropriate decisions. This method can be adopted to train and assess the competency of students in analyzing and applying knowledge.

Death review meetings/Mortality meetings: Death review meetings are important method for reflective learning. A well conducted morbidity and mortality meetings bring about significant reduction in complications, improve patient care and hospital services. They also address system related issues. Monthly meetings should be conducted with active participation of faculty and students. Combined death review meetings may be required wherever necessary.

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/Log Book 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, conducted by the candidate. A well written and validated Log Book reflects the competencies attained by the learner and points to the gaps which need address. This Log Book 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.

Adequate number of copies as per norms and a soft copy 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. Acceptance 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 and its amendments thereof. 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 minimum. However additional assessment methods can be adopted which will test the necessary competencies reasonably well.

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.

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.

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 8 per day
Diploma Course: Maximum of 8 per day
DM/M.Ch 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. Perform diagnostic procedures designed for Laboratory detection of diseases.
5. Recognize and report morphological changes in cells, tissues and organs.
6. Identify, plan, perform and report specific research projects.
7. Perform clinical autopsy and present a CPC (Clinico Pathological Conference).
8. Plan and teach pathology for Laboratory technicians, Nursing, Dental and Medical students.
9. Understand 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 and articulate, legible, and comprehensive yet concise consultation note.
2. 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
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 towards 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, cytospin technology - techniques and reporting
3. Haematology including blood banking, transfusion medicine- techniques and reporting and Flow cytometry.
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
15. Cytogenetics

B. Group teaching sessions

Any four /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 (Clinicopathological case), Pre conference presentation, SARS presentation.

6. Interdepartmental seminars
7. Theory classes for post graduates
8. Theory test on one topic every month, Slide test, Surgical path test.

SUGGESTED TOPICS FOR INTEGRATED TEACHING (POST GRADUATE)

Time limit for integrated teaching 2-4 hours

S.NO	Topic	Subtopic	Integrated disciplines
1	Wound healing	• Pathophysiology of wound healing • Clinical features complications management and recent advances in healing of surgical wound • Healing of fracture • Healing of wound & OBGY perspectives	Pathology Surgery Orthopedics OBGY
2	Cancer of breast	• Pathogenesis, Pathology of breast carcinoma • Imaging findings in breast carcinoma • Clinical features ,staging and management of cancer of breast	Pathology Radiology Surgery
3	Inflammatory bowel disease	• Pathogenesis and Pathology of IBD • Clinical features diagnosis surgical management of IBD	Pathology Surgery
4	Mal absorption syndrome	• Physiology of digestion and absorption • Pathology and Pathogenesis of MAS • Biochemical investigations in diagnosis of MAS • Medical management of MAS • Surgical management of MAS	Physiology Pathology Biochemistry Medicine Surgery
5	Carcinoma of colon	• Aetiopathogenesis of cancer colon • Clinical features diagnosis and management of cancer colon	Pathology Surgery
6	Periampulary	• Etiopathogenesis of Periampulary cancinoma	Pathology

	cancinoma	• Imaging diagnosis of Periampulary cancinoma • Clinical features diagnosis and management of Periampulary cancinoma	Radiology Surgery
7	Diabetes mellitus	• Physiology of carbohydrate met abolism • Pathogenesis of DM & its complications • Lab diagnosis of DM • Clinical features diagnosis and management & complications of DM	Physiology Pathology Biochemistry Medicine
8	Lymphoma / Leukemia	• Normal hematopoiesis and lymph node architecture • Classification of lymphoma / Leukemia • Medical management of adult lymphoma / Leukemia • Management of Pediatric lymphoma/Leukemia • Surgical management of lymphoma / Leukemia	Physiology Pathology Medicine Pediatric Surgery
9	Alcoholic Liver disease	• Pathogenesis of Alcoholic liver disease • Clinical features ,laboratory diagnosis &management of Alcoholic liver disease	Pathology Medicine
10	Viral hepatitis	• Pathology of hepatitis etiology & Pathogenesis of infect liver disease • Serological diagnosis of viral hepatitis • Clinical features diagnosis ,complication & management of infective liver disease	Pathology Microbiology Medicine
11	Hemolytic Anaemia	• RBC morphology • Classification & pathology of various hemolytic Anemia • Clinical features diagnosis and management of hemolytic anemia	Physiology Pathology Pediatrics
12	Endometrial biopsy	• Physiology of menstrual cycle • Endometrial biopsy interpretation • Causes ,clinical features & management of Abnormal	Physiology Pathology OBGY

		uterine bleeding	
13	Endometriosis	• Definition ,etiopathology of endometriosis • Clinical features ,diagnosis & management of endometriosis	Pathology OBGY
14	Infertility	• Physiology of ovulation & spermatogenesis • Causes of male & female infertility • Evaluation & management of a case of female infertility • Evaluation & management of case of male infertility	Physiology Pathology OBGY Urology
15	Cancer Cervix	• Etiopathogenesis & cytological & histological diagnosis of carcinoma of cervix • Clinical features ,diagnosis & management of cancer cervix	Pathology OBGY
16	Ovarian tumor	• Classification & Pathological features of ovarian carcinoma • Clinical features ,diagnosis & management of ovarian cancer	Pathology OBGY
17	Bone tumors	• Classification of bone tumors • Imaging diagnosis of bone tumors • Clinical features diagnosis & management of bone tumors	Pathology Radiology Orthopaedics
18	Head & Neck Tumors	• Classification, etiology & pathogenesis of head & neck Tumors • Clinical features diagnosis & management of head neck tumors	Pathology ENT
19	Renal function tests	• Diagnostic biochemical parameters of renal diseases • Interpretation of clinical pathology tests for renal diseases	Biochemistry Pathology
20	Liver function test	• Interpretation & biochemical workup in liver disorders • Serological tests for liver disorders • Interpretation , correlation of biochemistry & serological tests for diagnosis of liver	Biochemistry Microbiology Pathology

		disorders	
21	Thyroid function test	• Physiology of thyroid hormone secretion • Biochemical test for diagnosis of thyroid diseases • Interpretation , correlation of biochemical tests for diagnosis of thyroid disorders	Physiology Biochemistry Pathology
22	HIV & AIDS	• Biology of HIV virion • Epidemiology of HIV infection • Pathogenesis & Pathology of HIV infection • Clinical feature diagnosis & management of AIDS	Microbiology Community Medicine Pathology Medicine
23	Malaria	• Life cycle of malarial parasite • Pathogenesis & Pathology of malarial infection • Clinical features ,diagnosis & management of malaria	Microbiology Pathology Medicine
24	Hospital Acquired infection	• Aetiology of Hospital acquired infections • Pathology & Pathogenesis Hospital acquired infections • Management hospital acquired infections	Microbiology Pathology Community Medicine
25	Drug toxicity	• Pathogenesis of drug (injury) toxicity • Lab tests and diagnosis of drug injury	Pharmacology Pathology
26	Metabolic Syndromes	• Physiology of fat metabolism • Pathology of obesity • Biochemical diagnostic tests for obesity • Clinical features,diagnosis & management of childhood obesity • Clinical features,diagnosis & management of adult obesity	Physiology Pathology Biochemistry Pediatrics Medicine

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**

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, Hb, 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	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

	10. Understand principles of automated and manual reticulocyte enumeration and respective technical limitations	
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 Hb synthesis and degradation 5. Understand the principles of Hb 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 Hb 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 Hb	Interpret Hb electrophoretic patterns & ancillary tests for the diagnosis of the following. 1. Major Hemoglobinopathies 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	1. Evaluate and interpret results of flow cytometry in conjunction with cytochemical,

	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, 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.	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 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	1. Recognize and be able to diagnose changes in lymph node morphology associated with lymphoma and other lymphoproliferative disorders. Understand the

	of lymphocyte development and trafficking in lymph nodes.	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. 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	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 bleeding and thrombosis risk 3. Interpret results of Bethesda assays for factor inhibitors 4. Interpret results of

	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 antigenic assays for proteins of the anticoagulation and fibrinolytic systems	coagulation tests in the setting of fibrinolytic therapy 5. Interpret results of heparin-induced thrombocytopenia testing (ELISA tests versus serotonin release assay/ platelet aggregation studies) in the appropriate clinical context 6. Understand monitoring and complications of biologics as drugs (eg, recombinant Activated Protein C or Recombinant F VIIa)
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. Learn handling, preparation, and interpretation of bone marrow specimens including special stains (eg, silver stain, Prussian blue). 5. Recognize effects of chemotherapy and growth factor stimulation on blood and bone marrow. 6. Understand common drug effects leading to benign cytopenias. 7. Correctly identify storage iron, and assess adequacy. 8. Understand hematopoiesis, and distinguish the stagesfor cells in each hematopoietic cell series. 9. Know the major hematopoietic regulatory factors and cytokines. 10. Recognize normal WBC, RBC, and platelet	1. Understand the pathophysiology, clinical findings,etiology, and expected bone marrow morphology for various hematological disorders. 2. Integrate morphology, cytochemistry,immunophenotype,and molecular cytogenetics in the differential diagnosis of acute and chronic leukemia, lymphoma, and myeloproliferative and myelodysplastic diseases. 3. Integrate peripheral blood smear and bone marrow 4. findings and render a preliminary diagnosis. 5. Know the post therapy findings seen after treatment for leukemia and the temporal relationships to marrow regeneration post therapy.

	maturation,as well as cellular dysplasia. 11. Understand diagnostic principles involved in distinguishing transient myeloproliferative syndromes (such as those associated with Down syndrome), transient cytopenias, and transient lymphocytoses from clonal disorders.	6. Recognize the bone marrow manifestations of infections 7. (eg, viral, fungal, and hemophagocytic syndromes). 8. 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 CLINICAL PATHOLOGY

Body fluid analysis (CSF, ascitic fluid, pleural fluid)	1. Understand clinical conditions for body fluid analysis 2. Understand hemocytometer cell counting 3. Understand cytocentrifuge sample preparation and slide staining 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	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

	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 of massive transfusion protocol 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.	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.
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	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

	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.	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

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	• Ability to diagnose

	criteria for adequacy.	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 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 diagnose these abnormalities. • Ability to formulate appropriate management advice. • 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 definitivediagnosis 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	1) Performs grossing of biopsy tissue 2) Performs fetal autopsy 3) Correlate histological and gross findings with clinical findings to arrive at biopsy diagnosis 4) Performs special staining procedures on histological tissue

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) 7) Understands the role of specialized techniques like frozen section, immuno histochemistry in tissue diagnosis	sections. 5) Correlate special stains, immunochemistry findings with histological and clinical findings 6) - 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 Approach to epidermal lesions Approach to skin adnexal tumors	Approach to dermatoses Approach to me lanocytic tumors Approach to vesiculobullous lesions Approach to neuroendocrine cell tumors Approach to dermal lesions Recent advances
Oral cavity and oropharynx: Normal anatomy Congenital abnormalities Inflammatory diseases Other non-neoplastic lesions Tumors and tumorlike conditions of surface Epithelium	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 Recent advances
Mandible and maxilla: Normal anatomy Inflammatory diseases Simple bone cyst Central giant cell granuloma and other giant Cell-containing lesions Benign fibro-osseous lesions	Epithelial cysts Odontogenic tumors Other tumors and tumorlike Conditions Diseases of the temporomandibular joint Recent advances
Mediastium: Generalities Inflammatory diseases Cysts (other than thymic) Thyroid and parathyroid lesions Approach to lesions of thymus	Germ cell tumors Malignant lymphoma Neurogenic tumors Tumors of paraganglia Mesenchymal tumors Metastatic tumors Recent advances
Thyroid gland: Normal anatomy Congenital abnormalities Thyroiditis Hyperplasia Tumors	Neuroendocrine lesions Epithelial tumors-general features Lymphoid tumors and tumorlike conditions Mesenchymal tumors Other primary tumors and tumorlike Conditions

Epithelial tumors-specific types Medullary carcinoma and related	Metastatic tumors Recent advances
Parathyroid glands: Normal gross anatomy and embryology Normal histology Normal physiology Adenoma Chief cell hyperplasia	Water clear cell hyperplasia Carcinoma Other lesions Hyperparathyroidism Frozen section Recent advances
Gastrointestinal tract: **Esophagus** Normal anatomy Atresia and related anomalies Heterotopia Diverticula Cysts Rings and webs Achalasia and related motor disorders Lye strictures Reflux esophagitis Other types of esophagitis Squamous cell carcinoma 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 Well-differentiated neuroendocrine tumors ("carcinoid tumors") Stromal tumors (gists and related lesions) Lymphoid tumors and tumorlike conditions Other tumors	**Small bowel** Normal anatomy Congenital defects Malabsorption Ulcers Vascular diseases Crohn's disease Aids-related inflammatory diseases Other inflammatory diseases Irradiation effect Intussusception Other non-neoplastic diseases Tumors **Appendix** Normal anatomy Acute appendicitis Chronic appendicitis Other inflammatory processes Tumors Other lesions **Large bowel** Normal anatomy Hirschsprung's disease and related Disorders Diverticulosis Colitis Other non-neoplastic lesions Tumors **Anus** Normal anatomy Embryologic defects Inflammatory diseases Hypertrophied papillae Hemorrhoids Tumors Recent advances
Salivary glands: Normal anatomy Heterotopia Sialolithiasis Sialadenitis	Irradiation effect Other non-neoplastic lesions Epithelial tumors Malignant lymphoma Other primary neoplasms

Benign lymphoepithelial cysts and hiv-related Lesions Mikullcz's disease and sjogren's syndrome	Metastatic tumors General features of salivary gland tumors Recent advances
Liver: Normal anatomy Biopsy Viral hepatitis Viral hepatitis caused by hepatotropic Viruses Hepatitis caused by "nonhepatitis" viruses cirrhosis Drug-induced and toxic liver injury Steatosis and steatohepatitis Cholestasis and biliary diseases Childhood disorders and disorders of Metabolism Disorders of copper and iron metabolism Fibropolycystic diseases (ductal plate Malformation) Vascular disorders Nodular regeneration	Liver disease in pregnancy Liver involvement in other organ and systemic Diseases Liver pathology in organ transplantation Echinococcus cyst (hydatid cyst) Abscess Heterotopia Liver cell tumors and tumorlike conditions Bile duct tumors and tumorlike Conditions Mesenchymal tumors and tumorlike conditions Malignant lymphoma and related lesions other primary tumors and tumorlike conditions Metastatic tumors Recent advances
Gall bladder and extrahepatic bile ducts: Normal anatomy Congenital abnormalities Non neoplastic lesions Tumors Benign tumors and tumor like conditions	Carcinoma of gall bladder Carcinoma of extrahepatic bile ducts Other malignant tumors
Pancreas and periampullary region: **Pancreas** Normal anatomy Congenital abnormalities Pancreatitis Pancreatic transplantation Abscess	Pseudocysts True cysts Tumors Ampullary carcinoma and precursor lesions Other lesion Recent advances
Adrenal gland and paraganglia: Normal anatomy Biopsy and cytology Lesions of adrenal cortex Lesions of adrenal medulla	Other adrenal lesions Tumors and tumorlike lesions of other Paraganglia Recent advances
Urinary tract: **Kidney, renal pelvis & ureter** Non-neoplastic diseases The renal biopsy Normal structure of the glomerulus Classification of glomerular disease	**Bladder** Normal anatomy Congenital abnormalities Diverticulosis Lithiasis

Glomerular lesions associated with the Nephrotic syndrome Glomerular lesions associated with the Syndrome of acute nephritis Glomerular lesions associated with vascular Diseases Renal diseases of pregnancy Hereditary glomerular diseases Renal transplant rejection Tubulointerstitial nephritis Renal vascular disease Radiation nephropathy Cystic diseaseso f the kidney Wilms' tumor Mesoblastic nephroma	Endometriosis and related mullerian-type Changes Amyloidosis Cystitis Metaplastic conditions Tumorlike conditions Benign tumors Transitional cell (urothellal) carcinoma Other primary carcinomas Other malignant tumors Recent advances
Male reproductive system: **Prostate and seminal vesicles** **Prostate** Normal anatomy Ectopia Nodular hyperplasia Infarct Prostatitis Calculi Tumorlike conditions of prostate and Prostatic urethra Carcinoma Other tumors **Seminal vesicles and cowper's glands** **Testis** Normal embryology and anatomy Cryptorchidism Atrophy and infertility Other non-neoplastic lesions Tumors **Testicular adnexa-** lesions	**Penis and scrotum** Normal anatomy Non-neoplastic lesions Tumors Normal anatomy Non-neoplastic lesions Tumors
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 Paget's disease Other epithelial tumors ~ Melanocytic tumors	**Uterine – corpus** Normal anatomy Curettagea nd biopsy Effects of hormone administration Endometritis Metaplasia Adenomyosis and endometriosis Dysfunctional uterine bleeding and Hyperplasia Tumors **Fallopian tube:** non-neoplastic& neoplastic lesions **Ovary:**

Aggressive angiomyxoma and 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 Other tumors and tumorlike conditions	Normal anatomy Gonadal dysgenesis Cystss, tromal hyperplasia, and other Non-neoplastic lesions Inflammation Endometriosis Ovarian biopsy Tumors **Placenta** Normal anatomy Abortion Gestational trophoblastic disease Non-neoplastic lesions of term placenta Tumors and tumorlike conditions of term Placenta Recent advances
BREAST: Normal anatomy Non neoplastic lesions Premalignant lesions Carcinoma Microscopic types Insitu carcinoma Hormone receptors Sentinel lymph node Staging and grading	Therapy Effects of therapy on tumor and on normal breast Prognosis Other tumors Breast diseases in children and adolescents Breast diseases in males Gynaecomastia Needle core biopsy Open biopsy and frozen section
Spleen: Normal anatomy Biopsy and fine needle aspiration Rupture and splenectomy Congenital anomalies Cysts Inflammation Hypersplenism Other non-neoplastic disorders	Hematolymphoid tumors and tumorlike Conditions Vascular tumors Other primary tumors and tumorlike Conditions Metastatic tumors Recent advances
Bone and joints: Bone forming tumors Cartilage forming tumors Giant cell tumor	Marrow tumors Tumor – like lesions Joints and related structures Tumors and tumor like conditions Recent advances
Soft tissue: Normal anatomy Infections and hematomas Tumor like conditions	

Tumors Recent advances	
Peritoneum and related: **Peritoneum** Normal anatomy Inflammation Adhesions Reaction to foreign materials Cysts and loose bodies Hyperplasia and metaplasia Tumors	**Retroperitoneum** Normal anatomy developmental anomalies Non-neoplastic conditions - tumors Germ cell tumors Pilonidal disease Other tumors Recent advances
Cardiovascular system: **Heart :** Cardiac tumors **Arteries:** Normal anatomy Arteriosclerosis Cystic adventitial degeneration Fibromuscular dysplasia Mesenteric vascular occlusion Traumatic and iatrogenic injuries Thromboangiitis obliterans Arteritis Tumors	**Veins:** lesions **Lymph vessels** **Lymphedema** **Tumors** Recent advances
Neuromuscular system: Normal anatomy Muscular dystrophies & myopathies **Central nervous system:** Normal anatomy Congenital abnormalities Cerebrovascular disorders Inflammatory diseases Infectious diseases Primary tumors Secondary tumors	**Peripheral nerves** Introduction Normal anatomy Basic pathologic mechanisms Neuropathies Other neuropathies Recent advances
Pituatory glands: Normal anatomy Pituitary adenoma	Other lesions Recent advances
Eye and occular adnexa: Normal anatomy Eyelids Lacrimal passages Lesions of lacrimal gland Lesions of orbit	Intraocular tissues Recent advances

Lesions of conjunctiva Lesions of cornea	
Ear Introduction Diseases of external ear	Diseases of middle and inner ear Recent advances

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. 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.	1. Understand the specific applications of different banding 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

	7. Be familiar with basic cell and tissue culture techniques.	resolution. 6. Be able to develop minimum standards for the numbers of cells to count and/or analyze for karyotyping and FISH. 7. 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 Skills	1. Understand the fundamental principles of human behavior in organizations, of management 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.	1. Understand human resource systems, including effective processes for recruitment, retention, and performance management for technical and professional staff

	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. 8. Recognize the different skill sets required of personnel in all of these areas. 9. Be able to analyze work flow in the laboratory.	
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.	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. 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 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).	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 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 and nonparametric	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.

	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).	

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	1. 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. 3. 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	Range of appearances due to autolysis in stomach. Identification

	in continuity. Identification of ampulla of Vater.	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
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.Know the pathophysiology of ketoacidosis and lactic acidosis. 2. Understand the significance of P50, O2 content, O2 capacity, and O2 saturation, and be able to distinguish between O2 saturation and PO2. 3. Be able to describe the hemoglobin-oxygen dissociation curve and factors that affect the curve and P50
2. Acid-Base Chemistry, Electrolytes, and Relevant Disorders	1. Define the Henderson-Hasselbach equation and 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	Know the basic physiology of renal function and laboratory analytic methods
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).
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 2. Know the biochemial assessment of liver function by different tests.
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 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.
7. Assessment of Pituitary Function	*1.* Understand the physiologic action, biochemistry, and regulation of anterior pituitary hormones and tests to determine hypothalamic-pituitary function 2 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.
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 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. 2. Understand the diagnosis and laboratory assessment of diabetes and its complications.
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. 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.. 4. 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 pathophysiology of lipid disorders and classification of hyperlipidemia. 3. 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.(Log Book)
b. P.G Microteaching.
c. PG mock examination.
d. Objective Structured Practical Examination(OSPE)
e. Post seminar test

EVALUATION:

UNIVERSITY EXAMINATION

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.

Paper I – General Pathology - 100 Marks

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

Paper III – Systemic Pathology - 100 Marks

Paper IV – Recent advances in pathology - 100 Marks

B). PRACTICAL: (2 DAYS)

DAY 1:

a. Haematology and clinical pathology
- (i) Clinical case/History/clinical data discussion - 25 Marks
- (ii) Haematology exercise including Blood Banking - 25 Marks

b. Autopsy/Reconstructed autopsy (organ systems) - 50 Marks
c. Gross/morbid Anatomy - 15 specimens - 50 Marks
d. Haematology &. Cytology slides – 7+8 slides - 45 Marks
e. Lecture topic allotment

DAY 2:

a. Histopathological Techniques: - 25 Marks
1. Staining - H & E
2. Special stain (1 out of panel of 8 special stains)
3. Cytology stain 1 out of panel of 4 special stains)

a. Histopathology slides - 20 slides - 80 Marks
(Autopsy final report)

B. VIVA VOCE

1. Viva-Voce examination - 80 Marks
(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) - 20 Marks

	Theory	**Practical**	**Viva**	**Total**	
Maximum marks for M.D. (Pathology)	400	300	100	800	

Final marking scheme for MD examination in Pathology

Heads of Passing	'Maximum Marks'	Minimum marks for passing
Theory	**400**	**200**
Practical	**300**	**150**
Viva	**100**	**50**
Total marks	**800**	**400**

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. J.B. Walter, M.S. Israel. **General Pathology**, Published by Churchill Livingstone.
4. Edited by Jaun Rosai. **Ackerman's Surgical Pathology**, Published by C.V. Mosby company.
5. Walter F Coalson. **Surgical Pathology**, Published by Lippincott.
6. Enzinger and Weiss. **Soft Tissue Tumours**, Published by B.I. Publications (India) C.V. Mosby company.
7. Stacey .E. Millis. **Sternbergs Diagnostic pathology.**Published by Jaypee brothers medical publishers.
8. WF Lever – GS Lever.**Histopathology of the skin**, Published J.B. Lippincott Company.
9. Robert j. Kurman. **Blausteins pathology of female genital tract.**Published by Spinger-verley. Newyork Inc.
10. Leopold G Koss. **Diagnostic Cytology And Its Histopathologic Basis**, Published by JG. Lippincott Company.
11. Marluce Bibbo. **Comprehensive Cytopathology** Published by W.B Sauders and Company.
12. Winnifred Grey Edited, **Diagnostic Cytopathology**, Published Churchill Livingstone.
13. Orell, Sterrett, Walters & Whittaker. **Fine Needle Aspiration Cytology (Manual & Atlas)**, Published by Churchill Livingstone.

14. Daniel M Knowles Edited. **Neoplastic Haematopathology**, Published by Williams & Wilkins.
15. Maxwell M Wintrobe. **Clinical Haematology**, Published by K.M. Varghese & Company.
16. Shirlyn B. Mekenzie**. Clinical Laboratory Haematology.** Published by Julie Levin alekander IARC press.
17. A Victor Hoffbrands , John E.Petit. **Clinical Haematology.** Published by Churchill Living stone.
18. De Gruchy's, Edited by Firkin, Chesterman, Penington & Rush. **Clinical Haematology In Medical Practice**, Published by Oxford University Press.
19. Todd, Sanford, Davidson Edited. **Clinical Diagnostis and Management By Laboratory Methods**, Published by W.B. Saunders and Company.
20. Jacques Wallach M.D. **Interpretation of Diagnostic tests.**Published by Walters Kumar(Ind) Pvt. Limited.
21. Dr. Shameem Sharif Edited. **Surgical Pathology And Laboratory Techniques**, Published by Prism publications.
22. Christopher D.M. Fletcher Edited. **Diagnostic Histopathology of Tumors Vol.1 & 2,** Published by Churchill Livingstone.
23. Blue book series. **WHO Classification of tumors**. Published by WHO press, Geneva.
24. Pattern recognition series. **Practical breast pathology.** Published by Elsevier Saunders
25. A volume in the series Foundations in diagnostic pathology. **Gastrointestinal and liver pathology**. Published by Elsevier Saunders.
26. Susan C. Lester. **Manual of surgical pathogy.** Published by Elsevier Saunders
27. Dabbs. **Diagnostic immunohistochemistry**
28. Guy orchard & Brian Nation**. Histopathology.** Published by Oxford university press.
29. Richard L. Kradin. **Diagnostic Pathology of infectious diseases**. Published by Elsevier Saunders.
30. Crum. Nucci. Lee. Diagnostic Gynecologic and Obstetric Pathology. Published by Elsevier Saunders
31. Enid Gilbert-Barness.**Potters Pathology of fetus, infant and child.** Published by Elsevier.
32. Harrison's, **Principles and practice of internal medicine**

JOURNALS:

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

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.

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 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, cytospin techniques- techniques and reporting.
3. Haematology including blood banking and transfusion medicine, flow cytometry- techniques and reporting
4. Clinical pathology- techniques and reporting
5. Cytogenetics
6. Museum techniques
7. Autopsy techniques and interpretation
8. Microbiology –Serology, Handling of hazardous material
9. Undergraduate teaching
10. Clinico Pathological Correlation
11. 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 four /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, CPC (clinic pathological case), pre conference presentation, SARS presentation.
6. Interdepartmental seminars
7. Theory classes for post graduates
8. Training in answering model questions- on one topic every month (Theory test), slide test, surgical pathology test

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	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	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

	derivation 4. Understand how "absolute values" are determined and how they differ from "relative percent" 5. Identify spurious white blood count (WBC), RBC, Hb, 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	
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 Understand normal RBC, WBC, and platelet morphology 2. 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 1. Recognize technical artifacts in WBC, RBC, and platelet morphology 2. Recognize infectious disorders that can be diagnosed by blood smear 3. Recognize storage disorders and congenital disorders that have morphological manifestations in the peripheral blood smear 4. Correlate peripheral blood smear findings with bone marrow morphology
Red blood	1. Learn the clinical indications	Interpret Hb electrophoretic patterns &

cell disorders	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 Hb synthesis and degradation 5. Understand the principles of Hb 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 Hb 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 Hb	ancillary tests for the diagnosis of the following. 1. Major Hb 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	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 myeloid leukemia, acute lymphoid leukemia, myelodysplastic syndromes, paroxysmal nocturnal

	of routine flow cytometry evaluation of leukocytes, 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 inthe 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.	hemoglobinemia, multiple myeloma and monoclonal gammopathy of undetermined significance, non-Hodgkin and Hodgkin lymphoma, neuroblastoma,chronic lymphoproliferative disorders, lymphomatoid granulomatosis, posttransplant lymphoproliferativedisorder, 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	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

	lymphocyte development and trafficking in lymph nodes.	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. 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	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

	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 antigenic assays for proteins of the anticoagulation and fibrinolytic systems.	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)
. ***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	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,

	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.	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	

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
TRANSFUSION 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	1. Identify clinically significant RBC antibodies from an antibody panel including multiple alloantibodies and a mixture of allo – antibodies and auto antibodies.

	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 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.	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.
Blood collection/ blood center/ cell processing	1. Compare and contrast the eligibility requirements for allogenic and autologous	1. Outline the necessary steps in donor notification and counseling associated with

responsibilities	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.	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

SECTION	Skill Level I	Level II
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

	Skill Level I	Skill Level II
Therapeutic apheresis	1. Summarize the principles of	1. Demonstrate

	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	proficiency in evaluating and treating adverse reactions associated with therapeutic apheresis. 2. Demonstrate proficiency in the treatment
ADDITIONAL COMPETENCIES SPECIFIC TO TRANSFUSION MEDICINE		
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	

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	1. Knowledge of criteria for diagnosis of mild, moderate and severe dyskaryosis. 2. Knowledge of criteria for diagnosis of glandular abnormality. 3. Knowledge of criteria of diagnosis of possibly invasive lesions. 4. Knowledge of features of common pitfalls in the diagnosis of dyskaryosis (e.g. 5. transmission electron microscopy [TEM], follicular cervicitis, metaplasia).	1. Ability to diagnose these abnormalities. 2. Ability to formulate appropriate management advice. 3. Ability to take and weigh advice on diagnosis from screening staff.
New technologies	1. Knowledge of liquid-based 2. cytopathology, HPV testing and other new developments.	1. Keeping up with new developments through journals and other media.

NON-GYNAECOLOGICAL CYTOPATHOLOGY **Technical aspects**	1. Basic knowledge of preparation and staining techniques for common specimen types. 2. Knowledge of use of special techniques, e.g. immunocytochemistry.	1. Able to recognise faults and artefacts of preparation, e.g. air-drying. 2. Panels of antibodies for particular diagnostic applications, e.g. mesothelioma.
Diagnosis	1. Features of malignancy in sites commonly investigated with cytopathology. 2. Features of specific non-malignant diagnoses, e.g. infection.	1. 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. 2. Ability to integrate clinical informationand

		histology or other investigations into Diagnosis. 3. Ability to recognise when definitive diagnosis is beyond capability.
Reporting	1. Requirements for a report. 2. Relevant datasets.	1. Ability to write an accurate report that gives clinicians the information they need. 2. 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	1. Possess sufficient general clinical knowledge including major changes in trends of diagnosis and treatment. 2. Possess sufficient knowledge of normal anatomy, physiology and pathophysiology. 3. Possess sufficient knowledge of molecular techniques as applied within clinical medicine and particularly within surgical pathology.	1. 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'. 2. Develop the skills to interpret data from molecular analyses in the context of the clinical situation and morphological appearances when undertaking diagnostic surgical pathology.	1. Understand importance of integration of clinical and pathological data for accurate diagnosis. 2. Understand the increasing need to combine morphological opinions with data from molecular analyses in diagnostic surgical pathology. 3. Be prepared to communicate closely with colleagues undertaking molecular analyses when appropriate
Surgical cut-up ['General']	1. Understand principles of specimen dissection, macroscopic description and block selection in neoplastic and nonneoplastic disease. 2. Stages B-D: understand	1. Possess sufficient manual dexterity to perform dissection safely and accurately, without damage to tissues.	1. Understand importance of accuracy and requirement for attention to detail during specimen description and block selection. 2. Understands

	principles of dissection of all major cancer resection specimens and tissue sampling to enable completion of RCPath's *Standards and Datasets for Reporting Cancers*. Stage A: See *Appendix 1*		importance of ensuring that request form and specimen identification is accurate and the requirement to identify and resolve any errors or discordance
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']	1. Understand the principles of microscopy. 2. Knowledge of the microscopic features of the range of normality within tissues as well as the major common pathological processes and patterns of disease 3. Stage A: See *Appendix 1*. 4. Stages B-D: develop a special interest in one or more diseases or organ systems. 5. May remain generalised or become 6. specialised in one or more areas [e.g. **7.** neuropathology, paediatric pathology].	1. Be able to set up a microscope withergonomic safety and operate it effectively. 2. Be able to recognise the microscopic features of tissue structure in normalityand disease, as appropriate to one's level of experience. *3.* Able to complete RCPath *Standards and* 4. *Datasets for Reporting Cancers*.	1. Understand requirement for attentionto detail during surgical reporting and the need for correlation with the clinical situation. 2. Demonstrate an understanding of the importance of surgical pathology to clinicians and patients [e.g. timeliness and accuracy of reporting].
Special techniques	1. Understand principles of 'special' histochemical and immunohisto-chemical methods. 2. Understand principles of common molecular pathology techniques. 3. Understand principles of electron microscopy.	1. Know when to resort to special techniques. 2. Be able to recognise histological features of histochemical and immunohistochemical stains in normal and diseased tissues.	1. Understand cost-benefit issues when considering the use of additional techniques. 2. 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	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.
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 osmometer. 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).
	6. Assessment of Thyroid Function 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). 3. 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.
	Assessment of Reproductive Function, Pregnancy, and Prenatal Testing ***Skill Level I*** 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	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. 4. 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	***Skill Level I*** 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

Informatics

	Skill Level I	Skill Level II
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	**1.** 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	1. 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. **3.** 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:

UNIVERSITY EXAMINATION

A. THEORY (Written)

There shall be three 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.

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	- 75 Marks
	Hematology exercise	
	Biochemistry exercise	
	Urine Analysis	
	3. Histopathology Techniques	- 25 Marks
	Hematoxylin and Eosin stain	
	Cytology stain	
DAY 2:	1. Reporting on Microbiology exercise	- 75 Marks
	2. Histopathology slides – 8	
	3. Cytology slide – 8	
	4. Haemathology slides – 8	

C. VIVA-VOCE:

Viva-voce examination: (100 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.

D.

Maximum marks for D.C.P	**Theory**	**Practical**	**Viva**	**Grand Total**
	300	200	100	600

Final marking scheme for DCP examination in Pathology

Heads of Passing	**'Maximum Marks'**	**Minimum marks for passing**
Theory	**300**	**150**
Practical	**200**	**100**
Viva	**100**	**50**
Total marks	**600**	**300**

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.
28. Pattern recognition series. **Practical breast pathology.** Published by Elsevier Saunders
29. A volume in the series Foundations in diagnostic pathology. **Gastrointestinal and liver pathology**. Published by Elsevier Saunders.
30. Susan C. Lester. **Manual of surgical pathogy.** Published by Elsevier Saunders.
31. Dabbs. **Diagnostic immunohistochemistry**
32. Guy orchard & Brian Nation**. Histopathology.** Published by Oxford university press.
33. Richard L. Kradin. **Diagnostic Pathology of infectious diseases**. Published by Elsevier Saunders.
34. Crum. Nucci. Lee. Diagnostic Gynecologic and Obstetric Pathology. Published by Elsevier Saunders
35. Enid Gilbert-Barness.**Potters Pathology of fetus,infant and child.** Published by Elsevier.

JOURNALS

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.

12. **Human Pathology.** Published by W.B. Saunders Company.

SECTION - III

MEDICAL ETHICS & MEDICAL EDUCATION

Sensitization and Practice

Introduction

There is now a shift from the traditional individual patient, doctor relationship, and medical care. With the advances in science and technology and the needs of patient, their families and the community, there is an increased concern with the health of society. There is a shift to greater accountability to the society. Doctors and health professionals are confronted with many ethical problems. It is, therefore necessary to be prepared to deal with these problems. To accomplish the Goal (i), General Objectives (ii) stated in Chapter II (pages 2.1 to 2.3), and develop human values it is urged that **ethical sensitization** be achieved by lectures or discussion on ethical issues, clinical case discussion of cases with an important ethical component and by including ethical aspects in discussion in all case presentations, bedside rounds and academic postgraduate programs.

Course Contents

1. Introduction to Medical Ethics

   What is Ethics?
   What are values and norms?
   Relationship between being ethical and human fulfillment
   How to form a value system in one's personal and professional life
   Heteronymous Ethics and Autonomous Ethics
   Freedom and personal Responsibility

2. Definition of Medical Ethics
   Difference between medical ethics and bio-ethics
   Major Principles of Medical Ethics 0
   Beneficence = fraternity
   Justice = equality
   Self determination (autonomy) = liberty

3. Perspective of Medical Ethics
   The Hippocratic Oath
   The Declaration of Helsinki
   The WHO Declaration of Geneva
   International code of Medical Ethics (1993)
   Medical Council of India Code of Ethics

4. Ethics of the Individual
   The patient as a person
   The Right to be respected
   Truth and confidentiality
   The autonomy of decision
   The concept of disease, health and healing
   The Right to health
   Ethics of Behavior modification
   The Physician – Patient relationship
   Organ donation

5. The Ethics of Human life
   What is human life?
   Criteria for distinguishing the human and the non-human
   Reasons for respecting human life
   The beginning of human life
   Conception, contraception
   Abortion
   Prenatal sex-determination
   In vitro fertilization (IVF), Artificial Insemination by Husband (AIH)
   Artificial Insemination by Donor (AID)
   Surrogate motherhood, Semen Intra fallopian Transfer (SIFT),
   Gamete Intra fallopian Transfer (GIFT), Zygote Intra fallopian Transfer (ZIFT),
   Genetic Engineering

6. The family and society in Medical Ethics
   The Ethics of human sexuality
   Family Planning perspectives
   Prolongation of life
   Advanced life directives – The Living Will
   Euthanasia
   Cancer and Terminal Care

7. Profession Ethics
   Code of conduct
   Contract and confidentiality
   Charging of fees, Fee-splitting
   Prescription of drugs
   Over-investigating the patient

Low – Cost drugs, vitamins and tonics
Allocation of resources in health cares
Malpractice and Negligence

8. Research Ethics
   Animal and experimental research / humanness
   Human experimentation
   Human volunteer research – Informed Consent
   Drug trials\
   ICMR Guidelines for Ethical Conduct of Research – Human and Animal
   ICH / GCP Guidelines
   Schedule Y of the Drugs and Cosmetics Act.

9. Ethical work -up of cases
   Gathering all scientific factors
   Gathering all human factors
   Gathering value factors
   Identifying areas of value – conflict, setting of priorities,
   Working our criteria towards decisions

Recommended Reading

1. Francis C. M., **Medical Ethics**, 2nd Ed, 2004Jaypee Brothers, Bangalore/-
2. Ethical guidelines for biomedical research on human participants, ICMR publication 2006
3. Santosh Kumar: the elements of research, writing and editing 1994, Dept of Urology, JIPMER, Pondicherry
4. Srinivas D.K etal, Medical Education Principles and Practice, 1995, National Teacher Training Centre, JIPMER, Pondicherry
5. Indian National Science Academy, Guidelines for care and use of animals in scientific Research, New Delhi, 1994
6. International committee of Medical Journal Editors, Uniform requirements for manuscripts submitted to biomedical journals, N Engl G Med 1991
7. Kirkwood B.R, Essentials of Medical Statistics, 1st Ed.,Oxford: Blackwell Scientific Publications 1998
8. Mahajan B.K. Methods in bio statistics for medical students, 5th Ed, New Delhi, Jaypee, Brothers Medical Publishers, 1989
9. Raveendran, B. Gitanjali: A Practical approach to PG dissertation, New Delhi, Jaypee Publications, 1998.

10. John A Dent. Ronald M Harden, A Practical guide for medical teacher, 4th Edition, Churchill Livingstone, 2009.
11. Tejinder Singh Anshu, Principles of Assessment in Medical Education, Jaypee Brothers
12. Dr. K.Lakshman, A Hand Book on Patient Safety, RGUHS & Association of Medical Consultants, 2012
13. Bernard Mogs, Communication skills in health & social care, 3rd Edition, (S) SAGE, 2015
14. Manoj Sharma , R. Lingyak Petosa, Measurement and Evalution for Health Educators, Jones & Bartlett Learning.
15. David E. Kern, Particia A, Thomas Mark T, Hughes, Curriculum Development for Medical Education. A six-step approach, The Johns Hopkins University press/Baltimore.
16. Tejinder Singh Piyush Gupta Daljit Singh, Principles of Medical Education (Indian Academy of Paediatrics), 4th Edition, Jaypee Brothers, 2013.
17. Robert Reid, Torri Ortiz Linenemann, Jessica L.Hagaman, Strategy Instruction for Students with learning disabilities, 2nd Edition, The Guilford Press London.
18. Lucinda Becker Pan Demicolo, Teaching in higher education, (S) SAGE, 2013.
19. C.N. Prabhakara, Essential Medical Education (Teachers Training), Mehta publishers.
20. Tejinder Singh Piyush Gupta, Principles of Evaluation & Research for health care programmes, 4th Edition, IAP National Publication House (Jaypee Brothers).
21. R.L.Bijlani, Medical Research, Jaypee Brothers, 2008
22. Stephen Polgar Shane A Thomas, Introduction to Research in the Health Sciences, Churchill Livingstone Elsevier, 2013.
23. Amar A,Sholapurkar. Publish & Flourish -A practical guide for effective scientific writing, Jaypee Brothers, 2011
24. Charles R.K.Hind, Communication Skills in Medicine, BMJ, 1997.

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: **Date:**

Name of the Faculty/Observer:

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: **Date:**

Name of the Faculty:

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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