

MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed To Be University U/S 3 OF UGC ACT, 1956)
12, Vembuliamman Koil Street, West K.K. Nagar, Chennai – 600 078

**MEENAKSHI MEDICAL COLLEGE HOSPITAL AND RESEARCH
INSTITUTE,
ENATHUR, KANCHIPURAM**



MASTER OF PATHOLOGY –M.D

FACULTY OF MEDICINE

REGULATIONS AND SYLLABUS (REGULATIONS – 2019)

Effective from the Academic Year 2020-2021



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**PROFESSOR & H.O.D.,
DEPARTMENT OF PATHOLOGY,
M.M.C.H. & R.I.,
ENATHUR. KANCHIPURAM-681559**

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**MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH
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MEENAKSHI MEDICAL COLLEGE & RESEARCH INSTITUTE

MASTER OF DEGREE IN PATHOLOGY

REGULATIONS -2019

I.VISION AND MISSION OF MAHER

VISION

To be a world-class institution, transforming society through value-based diverse programs and healthcare advancements, leading to the all-around development of human resources, knowledge, innovation, entrepreneurship, and research.

MISSION

To become an institute of eminence by developing world-class professionals in the field of healthcare, science, liberal arts, technology and research with a focus on the societal good.

To create an enabling state-of-the-art infrastructure, intellectual capital and provide best-in-class learning experience with a freedom to innovate and invent.

To foster values and ethics so as to develop students and learners into responsible citizens of the Nation and the world.

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II. VISION AND MISSION OF MMCHRI

VISION

To provide global leadership in human development, excellence in education and quality health care.

MISSION

To train competent, compassionate and caring physicians through excellence in teaching, patient care and medical research

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VISION AND MISSION – DEPARTMENT OF PATHOLOGY

VISION

1. Our vision for the future is to make our department a state of the art facility with a well developed molecular pathology laboratory where molecular techniques are not only used as research tool but also to give a meaningful diagnosis on a day to day basis for the patients to facilitate effective and successful treatment.
2. Telepathology is also a vision where difficult cases are seen by eminent pathologists worldwide to give the patient our best. Serving the patients to the best of our ability is our final goal.
3. Motivate the faculties to specialize in sub specialties of pathology by undertaking training in reputed institutions in India.
4. Encourage faculty to undergo basic research.
5. To bring about high level of excellence in both undergraduate and postgraduate teaching and training.
6. To achieve NABL accreditation for both clinical pathology and histopathology laboratory.

MISSION

1. To provide excellent, efficient diagnostic services in anatomic pathology and laboratory medicine to those who utilize our services
2. To develop and implement outstanding instructional programs for medical and other health care students, graduate students.
3. To promote the professional and personal growth of our faculty, students and staff.

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IV. PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

PEO 1	To able to diagnose, perform tests, interpret and correlate routine and complex clinical problems on the basis of Histopathology (Surgical Pathology) and Cytopathology specimens, Blood and Bone Marrow examination and various tests under the domain of Laboratory Medicine (Clinical Pathology, Clinical Biochemistry/Chemical Pathology) as well as Blood Banking (Transfusion Medicine).
PEO 2	Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.
PEO 3	Carry out research, systematically write a paper and publish in a journal. Able to present a paper in a conference through an oral presentation and poster presentation.
PEO 4	Should be able to function as a part of a team, provide leadership and inspire members of the team
PEO 5	Always adopt ethical principles and develop communication skills

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V. PROGRAM OUTCOMES (PO's)

PO1	Diagnostic knowledge: The students able to diagnose routine and complex clinical problems on the basis of histopathology (surgical pathology) and Cytopathology specimens, blood and bone marrow examination and various tests of Laboratory Medicine (clinical pathology, clinical biochemistry) as well as Blood Banking (Transfusion Medicine).
PO2	Interpret and correlate: The students able to interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.
PO3	Research: The students able to plan, execute, analyze and present research work.
PO4	Teaching and training: Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.
PO5	Record maintenance: Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.
PO6	Health care team: Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
PO7	Ethics: Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
PO8	Communication skill: Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.
PO9	Skill: Able to perform routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen sections, making smears, and staining.

Signature

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VI. COURSE OUTCOMES (CO's)

CO1	Capable of offering a high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis and overall well being of the ill.
CO2	Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
CO3	Capable of pursuing clinical and laboratory based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.
CO4	The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
CO5	The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
CO6	The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
CO7	The student should pursue knowledge in Surgical pathology Skill.
CO8	The student should pursue knowledge in Cytopathology Skill
CO9	The student should pursue knowledge in Hematology Skill
CO10	The student should pursue knowledge in Laboratory Medicine Skill
CO11	The student should pursue knowledge in Transfusion Medicine Skill
CO12	The student should pursue knowledge in Immunohistochemistry Skill

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VI. PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1	Understand and explain about the factors in causation of disease.
PSO 2	Understand processes involved in the gross and microscopic changes of organs and tissues and explain these changes
PSO 3	Understand and explain the basis of evolution of clinical signs and symptoms.
PSO 4	Should be able to perform procedures designated for laboratory detection of diseases
PSO 5	Should be able to process and accurately interpret the representative materials obtained from the patients in order to arrive at a correct diagnosis.
PSO 6	Should be able to recognize and report morphological changes in cells, tissues and organs.
PSO 7	Should be able to plan, perform and report specific research projects.
PSO 8	Should be able to perform clinical autopsy and present CPC (Clinico Pathological Correlation)

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VII. REGULATIONS -2019

In exercise of the powers conferred by the Board of Management, Meenakshi academy of higher education and research, deemed to be University, Chennai hereby makes the following regulations:

1. SHORT TITLE

These Regulations shall be called "THE REGULATIONS FOR THE MASTER OF PATHOLOGY PROGRAM OF MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH" deemed to be University.

2. COMMENCEMENT

- They shall come into force from the academic year 2020- 21 onwards.
- The Regulations and the Syllabus are subject to modification by the Academic council and board of studies from time to time.

3. TITLE OF THE PROGRAM

It shall be called Master of PATHOLOGY

4. SYLLABUS

The syllabus is as prescribed according to the norms given by NMC and finalised with board of studies management by the university

5. ELIGIBILITY FOR ADMISSION

- Candidates who have obtained minimum eligibility in qualifying exam
- The reservation of seats and relaxation in the qualifying marks for SC/ST/OBC and other categories shall be as per the rules of the Central Government/State Government, whichever is applicable.

6. CRITERIA FOR SELECTION

Students for M.D PATHOLOGY Degree Program shall be admitted based on performance at the Competitive Examinations held by the government.

7. ADMISSION PROCEDURE

Admission shall be made as per the NMC and University norms.

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8. ELIGIBILITY CERTIFICATE

No candidate shall be admitted to the MD PATHOLOGY Program unless the candidate has obtained and produced an Eligibility Certificate issued by this University. The candidate has to make an application to the University with the Original and Xerox copies of the following documents along with the prescribed fee:

- 1) 10th and Higher Secondary or equivalent Examination Mark Sheets.
- 2) Transfer Certificate
- 3) MBBS Under graduate degree certificate and mark sheets.
- 4) Post graduate diploma PATHOLOGY certificate if any and mark sheets
- 5) Candidates should obtain an Eligibility Certificate before the last date for admission as notified by the University.

9. REGISTRATION

A candidate admitted to the M.D PATHOLOGY Program of this University shall register by remitting the prescribed fees along with the application form for registration duly filled-in and forwarded to this University through the Head of the Institution within the stipulated date.

10. DURATION OF THE PROGRAM

The programme shall be of duration of three academic years.

11. FEES

The institution shall charge only such a fee as prescribed by the university

12. COMMENCEMENT OF THE PROGRAM

The program shall commence from 1st May of the Academic year.

13. CUT-OFF DATES FOR ADMISSION TO EXAMINATION

- The candidates admitted from 1st May to 30th September of the academic year will be registered to take up their Final examination in May at the completion of 3rd year.
- There will not be any admission after 30th September for the academic year.

14. LEAVE DAYS IN AN ACADEMIC YEAR

There shall be maximum of 15 days in a year exclusive of the period of admission and examination

15. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATIONS

- a) No candidate shall be permitted to write any one of the papers of M.D PATHOLOGY examination unless he/ she has attended all the courses in the subject for the prescribed period and produces the necessary certificates of study and attendance from the Head of the Institution.

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b) A candidate is required to put in a minimum of 80% of attendance in both theory and clinical separately in each year before admission to the examination.

c) A candidate, who has not completed the program and not submitted the dissertation signed by the Head of the Department, will not be permitted to appear for the exam.

d) Attendance earned by the student should be displayed on the Notice Board of the department every month and a copy of the same sent to the University for computerization and parents shall be informed regarding the shortage of attendance of their wards through email (if available) or by post by the Institution.

16. SUBMISSION OF LOG BOOK

a. At the time of practical examination each candidate shall submit to the Examiners his / her log book duly certified by the Head of the Department as a bonafide record of the work done by the candidate.

b. The log book shall be evaluated by the concerned member of the faculty and the external examiner (Internal and external Evaluation) the practical record marks shall be submitted to the University prior to the commencement of the theory examinations.

17. COMMENCEMENT OF THE EXAMINATIONS

a. There shall be examinations at the end of 3rd year in the month of April/May. A candidate who does not pass the examination in any of the 4 papers shall be permitted to appear in all the final year papers in the subsequent examinations to be held in September or April/May.

b. Candidates should get enrolled/register for the first semester examination. If enrolment/registration is not possible owing to shortage of attendance beyond condition limit/rules prescribed OR belated joining OR on medical grounds, such candidates shall redo the lost academic days in the subsequent term of shall be admitted to appear for exams, if he/she has successfully kept the term in first year or the university rules are followed.

18. EVALUATION

Attendance shall be taken as a component of continuous assessment. The students should have a minimum 80% attendance in each year. In addition to the continuous evaluation component, the end of program examination, which will be a written type examination of at least 3 hours duration, would also form an integral component of the evaluation. The evaluation of practical work will be at end of the program.

19. REVALUATION OF ANSWER SCRIPTS

There shall be no revaluation of answer papers of failed candidates in the examination

However re-totalling of answer papers is allowed once upon request by the students.

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20. RE-ADMISSION AFTER BREAK OF STUDY

- 1) The calculation of the break of study of the candidate for re-admission shall be calculated from the date of first discontinuance of the program instead of from the date of admission.
- 2) Candidates having break of study shall be considered for re-admission provided, they are not subjected to any disciplinary action and no charges are pending or contemplated against them.
- 3) All readmissions of candidates are subject to the approval of the Vice-Chancellor.
- 4) A candidate having a break of study of less than 6 months shall apply for re-admission for condonation to the Academic Officer of this University. The candidate may be re-admitted in the corresponding program of study. The candidate has to fulfil the attendance requirements of the University
- 5) A candidate having a break of study of more than 6 months but less than 2 years shall apply for re-admission for condonation to the Academic Officer of this University. The candidate may be re- admitted to the beginning of the academic year of the program. The candidate has to fulfil the attendance requirements of the University
- 6) A candidate having a break of study of more than 2 years and up to 5 years shall apply for the re- admission for condonation to the Academic Officer of this University. The candidates may be re- admitted in the corresponding program of study. The candidate has to fulfil the attendance requirements of the University and shall not be granted exemption in the subjects he has already passed.
- 7) Candidates having a break of study of 5 years and above from the date of discontinuance and more than two spells of break will not be considered for re-admission.

21. TRAINING PROGRAMME

Tentative Schedule for three years of MD training:

S.no.	Section/Subject	Duration in months
1.	Surgical Pathology and Autopsy and Pathology Techniques	12
2.	Haematology and Laboratory Medicine	10
3.	Cytopathology	08
4.	Transfusion Medicine/BloodBank	02
5.	Museum techniques and record management	01
6.	Basic Sciences including Immunopathology, Electron microscopy, MolecularBiology, Research Techniques and cytogenetics etc	02

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Teaching/learning activities

- Collection of specimens including Fine Needle Aspiration of lumps.
- Grossing of specimens.
- Performing autopsies.
- Discussion during routine activities such as during signing out of cases.
- Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.
- Clinico-pathological conferences.
- Intradepartmental and interdepartmental conferences related to case discussions.
- Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- Journal Club.
- Research Presentation and review of research work.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Participation in workshops, conferences and presentation of papers etc.
- Laboratory work.
- Use and maintenance of equipment.
- Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

Somanth

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22. MINIMUM PASSING STANDARD

The minimum passing standard for final Examinations shall be 50% i.e., each in theory and practical courses.

THEORY:

There shall be four theory papers 100 marks each.

Paper I: General Pathology, Pathophysiology, Immunopathology and Cytopathology

Paper II: Systemic Pathology

Paper III: Haematology, Transfusion Medicine (Blood Banking) and Laboratory Medicine

Paper IV: Recent advances and applied aspects

Essays : 2 (2X20=40)

Short notes : 10 (10X6=60)

PRACTICALS:

Recommended pattern		
Subject	Time	Marks
Morning Session		
Structured Autopsy (20), Grossing & Gross specimen for diagnosis & discussion (6x2=12) Gross Specimen Biting (8)	1 ½ Hrs	40
Clinical Pathology / Haematology case Blood, Urine and relevant investigation & discussion	2 Hrs	25
Blood Banking Blood Group Cross matching Coomb's Test Interpretation	40 Mins	10
Afternoon Session		
Haematology & Cytology Slides (15 slides =15x4) Study & interpretation	2 Hrs	60
Basic Sciences Charts		15
Day 1 Total Marks		150
Morning Session		
Histopathology slides (15 slides=15x4) Study & interpretation	2 ½ Hrs	60
Histotechnology, H&E, Special stains, Pap stains	45 Mins	20
Afternoon Session		
Pedagogy	1 Hr	20
Viva Voce	2 Hrs	50
Day 2 Total Marks		150
Grand Total		300

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23. GRADE OF MARKS:

>/= 50% of total marks	Pass
>75% of total marks	Distinction
>90 % of total marks	Honours

24. AWARD OF DEGREE

The degree shall be awarded by the university only after the completion of thesis approval and of all four final year theory exams papers and practical examination.

VIII. Program level CO/PO and PSO matrix:

PO/CO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	3	3	3	3	0	0	0	0	0	1	3	1	3	3	3	3	2
CO 2	3	3	2	2	0	2	3	2	3	3	3	3	1	1	1	2	2
CO 3	3	3	3	3	2	3	2	1	3	0	2	1	3	3	3	3	1
CO 4	3	3	3	3	0	3	3	3	3	0	0	1	1	0	1	2	0
CO 5	1	1	3	0	0	1	3	2	0	0	0	0	3	3	0	3	3
CO 6	0	0	1	0	0	1	3	2	2	0	0	0	1	0	1	1	1
CO 7	3	3	3	3	3	3	2	3	3	1	3	1	3	3	3	3	3
CO 8	3	3	3	3	3	3	2	3	3	1	3	1	3	3	3	3	3
CO 9	3	3	3	3	3	3	2	3	3	1	3	1	3	3	3	3	3
CO 10	3	3	3	3	3	3	2	3	3	1	3	1	3	3	3	3	3
CO 11	3	3	3	3	3	3	2	3	3	1	3	1	3	3	3	3	3
CO 12	3	3	3	3	3	3	0	0	3	1	3	1	3	3	3	3	3

1-low, 2-medium, 3-high

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IX. PROGRAM AND COURSE DETAILS

PROGRAM SPECIFIC COMPETENCIES:

By the end of the program, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

A post graduate student upon successfully qualifying in the MD (Pathology) examination should have acquired the following broad theoretical competencies and should be:

1. Capable of offering a high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis and overall wellbeing of the ill.
2. Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
3. Capable of pursuing clinical and laboratory based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.

B. Affective domain

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

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C. Psychomotor domain

At the end of the course, the student should have acquired skills, as described below:

Surgical Pathology Skills:

- Given the clinical and operative data, the student should be able to identify, and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose at least 80% of the lesions received on an average day from the surgical service of an average teaching hospital.
- A student should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.
- The student should be able to identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and
- Correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day.
- Be conversant with automatic tissue processing machine and the principles of its running.
- Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.
- Stain paraffin sections with at least the following:
 1. Hematoxylin and Eosin
 2. Stains for collagen, elastic fibers and reticulin
 3. Iron stain
 4. PAS stain
 5. Acid fast stains
 6. Any other stains needed for diagnosis.
 7. Demonstrate understanding of the principles of:
 8. Fixation of tissues
 9. Processing of tissues for section cutting
 10. Section cutting and maintenance of related equipment
 11. Differential (special) stains and their utility
 12. Cut a frozen section using cryostat, stain and interpret the slide

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in correlation with the clinical data provided.

13. Demonstrate the understanding of the utility of various Immuno- Histochemical stains especially in the diagnosis of tumour subtypes.

Cytopathology Skills:

- Independently prepare and stain good quality smears for cytopathologic examination.
- Be conversant with the techniques for concentration of specimens: i.e. various filters, centrifuge and cytocentrifuge.
- Independently be able to perform fine needle aspiration of all lumps in patients; make good quality smears, and be able to decide on the types of staining in a given case.
- Given the relevant clinical data, he/she should be able to independently and correctly:
- Diagnose at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive and positive.
- Demonstrate ability in the technique of screening and dotting the slides for suspicious cells.
- Indicate correctly the type of tumour, if present
- Identify with reasonable accuracy the presence of organisms, fungi and parasites

Hematology Skills:

- Correctly and independently perform the following special tests, in addition to doing the routine blood counts:
 1. Haemogram including reticulocyte and platelet counts.
 2. Bone marrow staining including stain for iron
 3. Blood smear staining
 4. Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, etc.
 5. Hemolytic anemia profile including HPLC, Hb electrophoresis etc.

Domani-V

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6. Coagulation profile including PT, APTT, FDP.
7. BM aspiration and BM biopsy

- Demonstrate familiarity with the principle and interpretation of results and the utility in diagnosis of the following:
 1. Platelet function tests including platelet aggregation and adhesion and PF3 release
 2. Thrombophilia profile: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (ATIII)
 3. Immunophenotyping of leukaemia
 4. Cytogenetics
 5. Molecular diagnostics
- Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least 90% of the cases referred to the Haematology clinic, given the relevant clinical data.

Laboratory skills:

Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.

- Demonstrate familiarity with and successfully perform:
 1. Routine urinalysis including physical, chemical and microscopic, examination of the sediment.
 2. Macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.
 3. A complete examination: physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid.

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4. Semen analysis.
 5. Examination of peripheral blood for commonly occurring parasites.
- Independently and correctly perform at least the following quantitative estimations by manual techniques and/or automated techniques.
 - i. Blood urea
 - ii. Blood sugar
 - iii. Serum proteins (total and fractional)
 - iv. Serum bilirubin (total and fractional)
 - Demonstrate familiarity with the following quantitative estimations of blood/serum by Automated Techniques:

Serum cholesterol, Uric acid, Serum Transaminases
(ALT and AST/SGOT and SGPT), etc.
 - Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution and buffers.
 - Explain the principles of Instrumentation, use and application of the instruments commonly used in the labs eg. Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, flow cytometer, PCR, chemiluminescence.

Transfusion Medicine skills

The student should be able to correctly and independently perform the following:

- Selection and bleeding of donors
- Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.
- ABO and Rh grouping.
- Demonstrate familiarity with Antenatal and Neonatal workup.
- Direct antiglobulin test
- Antibody screening and titre

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- Selection of blood for exchange transfusion
- Demonstrate familiarity with principle and procedures involved in:
 - (i) Resolving ABO grouping problems.
 - (ii) Identification of RBC antibody.
 - (iii) Investigation of transfusion reaction.
 - (iv) Testing of blood for presence of:
 - HBV (Hepatitis B Virus Markers).
 - HCV (Hepatitis C Virus Markers)
 - HIV (Human Immunodeficiency Virus Testing)
 - VDRL
 - Malaria

Immunohistochemical skills (desirable):

- Be able to perform immuno-histochemical staining using paraffin section with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAP method.

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