**THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY,**

**No.69, Anna Salai, Guindy, Chennai – 600 032.**

# D.M/ M.Ch
# SUPER SPECIALTY DEGREE COURSE

## SYLLABUS AND CURRICULUM

## 2017-2018

# D.M. - CLINICAL HAEMATOLOGY

# THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI
## Syllabus - D.M Clinical Hematology

**AIM:**

The syllabus for DM,(Clinical Hematology) course should comprehensively cover all the aspects of laboratory and clinical Hematology including stem cell transplantation during the three years of study period. The student who undergoes the course should have exposure to all aspects of hematology and develop adequate knowledge and skill to treat the patients with hematological disorders independently and competently after acquiring the degree.

**OBJECTIVE:**

India must produce specialists in Hematology who are able to integrate the laboratory aspects and clinical management of the patient with hematologic disorders. There have been numerous advances in Hematology over the past two decades which makes it necessary for the country to have post-graduate training in the specialty. The Hematology laboratory is now expected to provide rapid, accurate and reproducible results for large numbers of samples and this is possible with automation. Molecular techniques are now no longer research tools but necessary for ante natal diagnosis and clinical decision making. Blood banking has come a long way with component therapy and single donor apheresis. Bone Marrow transplantation now provides a cure for many hitherto incurable diseases and a competent hematologist is necessary to offer this type of treatment. The doctor who undergoes post-graduate training in hematology should possess the necessary clinical and laboratory skills to be able to manage patients with primary hematological problems and interact as a consultant for hematology problems from other specialties and be competent in laboratory hematology and transfusion medicine.

**THEORY SYLLABUS:**

Departments involved in the training program:

i) Clinical Hematology
ii) Immuno Hematology and Transfusion Medicine
iii) Biochemistry
iv) General Pathology
v) Nuclear Medicine
vi) Radiotherapy

## I. Laboratory Hematology:

### A. General Laboratory Hematology:

a) Proper use and care of common laboratory instruments such as the light microscope, Centrifuge, water baths, freezers, weighing balance etc.,

b) Weighing of solids, preparation of molar and Normal solutions, preparation and use of buffers. Familiarization with the practical concepts of pH, molarity, normality, osmolality, normal values and reference ranges.

c) The nature and uses of distilled and deionized water.

d) Blood collection of samples venupuncture and finger prick methods of sample collection, types of anticoagulants, containers and the effects of delay in processing and storage.

e) Determination of blood counts (Hemoglobin, hematocrit, total WBC and platelets) manually and calculation of red cell indices.

i) Use of automated electronic blood cell counters including principles and practice.

ii) Interpretation of peripheral blood counts.

iii) Preparation of blood films - manual and automated techniques.

iv) Staining of peripheral blood films with Romanowsky and other dyes by manual and automated techniques.

v) Review of normal and abnormal blood films with emphasis on

a) Morphology of red cells, White cells and Platelets.

b) Performance of WBC differential count.

c) Subjective assessment of platelet count.

d) Diagnostic interpretation of abnormal films.

vi) Preparation of smears of bone marrow aspirates and biopsy imprints (touch preparations).

vii) Preparation and staining of thin and thick blood films for malaria parasites.

viii) Supravital staining of reticulocytes; manual and automated counting of reticulocytes.

ix) Performance of bone marrow aspiration and trephine needle biopsy.

xi) Staining (Romanowsky dyes and Prussian Blue for iron) and diagnostic valuation of smears of bone marrow aspirate.

xii) Performance and interpretation of HbS (sickle hemoglobin) solubility test, screening for red cell G6PD activity and its interpretation.

xiii) Neutrophil function assays.

**B. Cyto Chemistry:**

Performance of the following staining procedures viz. Kleihauer acid elution technique for HbF: PAS: Sudan Black B, Myeloperoxidase, specific and non-specific and dual esterases, acid phosphatase and iron staining.

**C. Laboratory Investigation of Hemolytic Anemias with particular reference to the Hemoglobinopathies (including the thalassemias) red cell Enzymopathies.**

**(A) Red cell membrane disorders and Immune Hemolytic anemias:**

i) HbS solubility test.

ii) Screening for unstable hemoglobin (heat instability and Isopropanol tests).

iii) Supravital staining for HbH inclusions.

iv) Principles and practice of separation and identification of normal and abnormal hemoglobin by electrophoresis and chromatography.

v) Quantitation of normal HbA, HbF and HbA2 and abnormal HbS, D,E,C etc. by densitometry and chromatography – HPLC.

vi) Quantitation of HbF by alkali destruction and Cellular distribution of HbF by the Kleihauer elution technique.

vii) Heinz body preparation.

viii) Screening for red cell G6PD deficiency and quantitative estimation of red cell G6PD activity.

ix) Screening for red cell pyruvate kinase (PK) Deficiency and assay of red cell pyruvete kinase activity.

x) Screening for other red cell enzymopathies.

xi) Standard hypotonic saline osmotic fragility test, acid Glycerol lysis, time (AGLT) and autohemolysis tests.

xii) Sucrose lysis and Ham's acidified serum tests for PNH, Urine hemosiderin.

xiii) Direct and indirect antiglobulin (Coombs) tests, warm and cold autoantibody (Cold agglutinin) titre, Donath Land-steiner, cold auto antibody screening and titration.

**B) Miscellaneous bio chemical tests on red cells, Plasma and Urine:**

i) Principles of procedures for estimation of plasma bilirubin and hemoglobin and significance of results, screening for methaemalbumin, methaemoglobin and Sulphaemoglobin.

ii) Screening for cryoglobulins and cryofibrinogen; principles of immunoglobulin estimation and immuno electrophoresis.

iii) Examination of urine for Hb, red cells, hemosiderin, urobilinogen and bilirubin.

iv) Principles of estimation and significance of serum ferritin, Iron and TIBC.

v) Principles of estimation and significance of red cell folate, Serum folate and serum cobalamin.

**C) <u>Cytogenetics:</u>**

Familiarization with cytogenetic techniques, understanding the principles of cytogenetics and appreciate the relevance and significance of chromosomal studies in diagnostic hematology, interpreting the results of chromosome preparation of hematopoietic cells.

**D) Laboratory Investigation of Bleeding Disorders:**

a) Platelets

i) Performance of Ivy bleeding time, template bleeding time and platelet count; study of platelet morphology.

ii) Principles, practice and interpretation of platelet aggregometry tests.

iii) Platelet associated immunoglobulin (PlAIg) and circulating antiplatelet antibodies.

b) Screening and coagulation factor abnormalities:

i) Prothrombin time and Stypven time.

ii) Activated partial thromboplastin time.

iii) Thrombin time and reptilase time.

iv) Plasma fibrinogen.

v) Correction studies with normal plasma, adsorbed plasma, aged serum and factor deficient plasmas.

vi) FDP and D- Dimers.

vii) Assays of clotting factors particularly factors viii and ix.

viii) Urea solubility test for factor XIII.

c) Euglobulin lysis time and other relevant tests of plasma, fibrinolytic activity.

**E) Laboratory Investigation of Thrombotic disorders:**

i) Assays of plasma AT III, protein C, protein S.

ii) Screening for lupus anticoagulant and activated protein C resistance ; Principles of screening tests and interpretation of results.

iii) Laboratory monitoring of anticoagulant (heparin and oral anti-coagulant) therapy.

iv) Techniques for the detection of anticardiolipin antibodies;

**F) <u>Transfusion Medicine:</u>**

1. a) ABO blood grouping (forward and reverse), Rh typing (Phenotypes and genotypes), screening of antibody in sera of donors and recipients, antibody identification following elution by various techniques.

b) Blood group compatibility (cross matching testing).

c) Investigation of ABO, Rh and other immunohemolytic diseases of the new born.

d) Investigations of platelet refractoriness.

e) Practical aspects in the selection of blood for normal exchange transfusion.

2. Donor recruitment.

3. Clinical evaluation and laboratory screening of donors prior to phlebotomy.

4. Phlebotomy of donors.

5. Blood component preparation and storage.

6. Practical and administrative procedures involved in issuing and transfusing blood.

7. Principles of the mechanics of the cell separator and its use for blood component preparation and therapeutic apheresis.

8. Practical steps in the laboratory investigation of transfusion reactions.

**G. Flow Cytometry:**

A working knowledge of the principles and practice of flow cytometry, sample preparation and interpretation of the clinical significance of common leucocyte immunophonotypes; its use and relevance in the evaluation of red cell and platelet disorders.

**H) Laboratory Equipment:**

A working knowledge of the mechanics of the various laboratory instruments including their operation, calibration and basic maintenance is desirable.

## I. Laboratory Organizations:

a) Laboratory space distribution, ordering, location and installation of laboratory

equipment; work flow procedures and handling of samples.

b) Staffing - technical and non-technical.

c) Use of computers and generation of laboratory statistics.

d) Health and safety measures - personnel safety.

e) Waste disposal.

f) Quality assurance (Internal and External) measures.

i) Pre-analytical variables : request forms, patient information, patient preparation, effects of medication and blood transfusion, sample collection, anticoagulants, containers, sample labeling, identification, transport, processing and storage.

ii) Analytical variables inter laboratory harmonization, data handling and statistical analysis.

iii) Post analytical variables : computer inter facing security and recording of results, turn around time.

## II. Histopathology module:

Practical laboratory training and related theory should cover the following areas:

a) General processing of tissues.

b) Techniques of cytology including cytospin in relation to body fluid of patients with hematological disorders.

c) Immunocytochemistry relevant to hematology.

d) Electron microscopy of hemopoietic cells.

e) Anatomical pathology of the bone marrow - review of biopsy material.

## III. Bio-chemistry Module:

Laboratory Techniques - Practical hands on experience and related theoretical background in the following:

a) Separative procedures - Electrophoretic techniques, chromatography.

b) Immunochemical methods.

c) Radio Immunoassays.

## IV. HLA module for hematologists:

Demonstration and understanding the principles of:

a) Separation of lymphocytes using density gradient centrifugation.

b) The microlymphocytotoxicity test and its application in HLA typing, cross matching and antibody screening.

c) DNA based HLA typing.

d) HLA antibody identification.

e) Miscellaneous investigations (on request) including mitogen and antigen induced lyphocyte transformation.

## V. Molecular Biology :

Understanding the principles involved in the molecular diagnosis of Hematological disorders:

a) DNA and RNA extraction.

b) PCR - Polymerase Chain Reaction.

c) RT and RQ PCR.

d) RFLP and other techniques to evaluate polymorphisms.

e) Mutation detection principles and techniques.

f) Sequencing.

**VI. Nuclear Medicine:**

a) Measurement of blood volume, red cell mass, red cell survival studies.

b) Screening techniques applicable to blood disorders.

c) Use of PET and gallium scans.

**VII. Medical Statistics:**

a) Study design, statistical methods, survival curves, data collection and storage,

interpretation and analysis.

**II. Clinical Hematology Training:**

With appropriate guidance and under supervision, the post-graduate student will be responsible primarily for the acquisition of knowledge in all areas of Hematology and Transfusion Medicine. Such knowledge will be acquired and demonstrated through Seminars, case presentations, Journal clubs, Tutorials, proper use of the library for Suggested Reading' and formal reviews of selected major topics. Faculty should be present at these various exercises so as to provide the appropriate input. When necessary, faculty may be required to review certain subjects in the form of formal lectures, however lectures will not play a dominant role in the theoretical component of the training Program. Clinical experience will be acquired by the trainee by day to day management of all patients admitted to the hematology service. Faculty will be involved in teaching of trainees in the ward rounds and out-patient clinics.

Red Cell Disorders:

Clinical evaluation of a patient with anemia, history, physical examination, appropriate laboratory investigations and management, Comparative epidemiological significance of `nutritional' and other anemia's in the population and the national program for control.

1. Iron deficiency anemia:

Epidemiology, iron deficiency as a community health program, causes in the population, control strategies in the population. Evaluation of the individual patient interpretation of serum iron, TIBC, transferrin, ferritin, indications for and interpretation of ferrokinetic studies, management including iron replacement.

2. Megaloblastic anaemia:

Clinical and laboratory evaluation, clinical recognition, evaluation and management of complications of vitamin B12 deficiency, investigation of etiology and management.

Understanding the role of Vitamin B12 and folate in cellular metabolism and the interaction of disease and drugs with the metabolism of folate.

3. Hemolytic anemia:

Evaluation of a patient with hemolysis and investigation of its courses;

i) Thalassemia: Principles of control of the thalassemia syndromes in the population, screening strategies, antenatal diagnosis, genetic counselling, clinical and laboratory diagnosis of alpha and beta thalassemia syndromes. Management of thalassemia intermedia and major transfusion regimes, chelation, role of splenectomy and bone marrow transplantation.

ii) Sickle cell disease: Evaluation management of the steady state, management of painful of crises, management of chronic complications, clinical and hematological features of the various sickle cell diseases, clinical and hematological effects of the interaction of thalassemia with sickle cell anemia; therapeutic role of bone marrow transplantation.

iii) Inherited enzymopatheis (Red Cell G6PD deficiency) evaluation and management of acute hemolytic crises.

iv) Acquired hemolytic disorders, immune hemolytic anemia management with immunosuppression, role of intravenous immunoglobulin, plasmapheresis, splenectomy, Clinical and laboratory evaluation (including etiological diagnosis) of patients suffering from acquired intravascular hemolysis.

4. Aplastic anemia:

Etiology, evaluation and management including immunosuppression (antilymphocyte globulin etc) and supportive therapy. Role of bone marrow transplantation in treatment of the individual patient; preparation for bone marrow transplantation.

5. Red Cell Aplasia:
Diagnostic evaluation and treatment of congenital and acquired forms. Transient erythroid aplasia including the pathogenetic role and biology of the human B19 parvovirus.

**III.** White Cell Disorders :

1) Neutropenia : Clinical evaluation of neutropenic patient, role of surveillance microbiology, antimicrobial therapy in neutropenia, role of growth factors, principles in providing a sterile environment for the neutropenic patient.

2) Functional disorders of neutrophils: Neutrophil function, laboratory tests for evaluation and management of patient with chronic neutrophil dysfunction, role of growth factors and bone marrow transplantation.

3) Leukemia: Clinical evaluation, diagnostic confirmation by morphology, immunophenotyping, special stains, cytogenetics and electronmicroscopy. The trainee must be familiar with the principles of leukemia management and the various protocols available. He/she should be familiar with the statistical tools used to evaluate therapy protocols, survival curves etc. He/she should be thoroughly familiar also with the pharmacology of antimitotic drugs and their toxicity and very well versed in the supportive and management of patients with all types of leukaemia.

4) Myeloproliferative neoplasms (MPN):

Classification, systematic diagnostic evaluation of erythrocytosis including polycythemia vera, interpretation of blood volume studies with radionucleotides, familiarity with current management strategies of MPD including the use of interferons.

5) Lymphoma: Classification of lymphomas - principles in staging, Management of the different types of lymphomas.

6) Immuno deficiency disorders: Trainees must be able to order systematically the appropriate investigative scheme for a patient with congenital or acquired immuno-deficiency, they must understand the principles of management with immunoglobulin replacement, interferons, bone marrow transplantation and be familiar with the hematological manifestations (and their therapy) of AIDS.

7) Multiple Myeloma and other paraproteinaemia: Clinical and laboratory evaluation of a patient with a monoclonal gammopathy. Interpretation of quantitative immuno-globulin levels, serum protein electrophoretic strips and immunoelectrophoresis patterns, concept of monoclonal gammopathy of undetermined significance, management of myeloma and Waldenstrom's macroglobulinaemia.

IV) HEMOSTASIS - (Trainees should be thoroughly grounded in the general clinical (history and physical signs) approach to the patient with a bleeding tendency.

1. Thrombocytopenia:

Thorough understanding of platelet kinetics and evaluation with radionucleotides. Evaluation and investigation of the aetiology of thrombocytopenia. The student should be conversant with the spectrum of management including immunosuppression, intravenous immunoglobulin.

2. Inherited platelet function disorders:

Clinical evaluation, laboratory diagnostic strategies and management.

3. Inherited coagulation factor deficiencies:

Laboratory diagnosis of hemophilia, genetics and antenatal diagnosis, principles of factor replacement factor replacement schedule in a patient with hemophilia who needs surgery, management of complications. Principles of management of patients with inhibitors.

4. Acquired bleeding disorders:

Vitamin K deficiency and supplementation; DIC its course and management, management of hemorrhagic complications of liver disease and renal failure.

5. Thrombotic disorders:

Classification and laboratory diagnosis of inherited thrombotic disorders, evaluation of hemostasis in the acquired thrombotic disorders, clinical use and monitoring of anticoagulants.

V. Transfusion Medicine:

1. Blood component preparation and clinical use:

Collection of blood, correct techniques for venupuncture, plastic systems, anticoagulants and additives and their effect on storage stability, centrifugation, preparation of platelets fresh frozen plasma and cryoprecipitate, storage of components, principles of fractionation. Quality assurance in transfusion medicine. A thorough understanding of the clinical indications for the proper use of specific blood components.

2. Diagnosis and management of transfusion - related complications:

Febrile transfusion reactions - laboratory investigations, diagnosis, management of prevention diagnosis and management of hemolytic transfusion reactions. Infections transmitted by transfusion complications of transfusion.

3. Cell Separation principles:

The trainee must be able to perform cell separation and plasmapheresis. Principles of the plasmapheresis. Principles of the machine, continuous versus intermittent flow techniques, replacement fluids for plasmapheresis, current status and indication in various diseases should also be known and understood.

4. Techniques of leucodepletion:

Problems related to white cells in donor and techniques of removal. Principles of filter design and use.

5. Irradiation of blood components:

Biology of irradiation of blood and components; transfusion graft versus host disease (GVHD) indications for irradiation of blood. Use of equipment.

6. Management of alloimmunisation in relation to transfusion :

Techniques for prevention of alloimmunisation; role of ultra violet radiation and photosensitizers, management of patients with red cell and platelet allo antibodies.

## VI. Bone Marrow Transplantation:

1) Current Indications: The student should be familiar with the current indications and results of bone marrow transplantation in various diseases.

2) Donor Selection: HLA typing issues in stem cell transplantation. Issues related to matched unrelated donor, cord blood transplants and haplo-identical stem cell transplants.

3) Conditioning regimens: The trainees must be familiar with the different conditioning regimes, principles of their use in different disorders and complications.

4) Harvesting and manipulation of bone marrow: Bone marrow collection, red cell, or plasma reduction, peripheral blood stem cell mobilization, collection and cryopreservation. Transfusion of marrow, purging of marrow - T cell depletion.

5) Transplantation immunology: Histocompatibility, graft versus host disease – diagnosis and management, Immune reconstitution following transplantation.

6) Management of the post-transplant patient.

VI) Hematological Oncology:

1) Cell Cycle - Cell Kinetics

2) Principles of Chemotherapy

3) Oncogenesis

4) Cytogenetics in relation to hematological malignancy

5) Use of growth factors

VII) Consultation Hematology:

1) Hematological complications of pregnancy and the interactions of the pregnant state with disorders of the Hemopoietic system.

2) Hematological complications of systemic disease.

3) Hematological problems of the intensive care patient.

VIII) Neonatal Hematology:

The candidate should be familiar with hematological problems in the new born and should be able to interact with the neonatologist regarding management.

## **Bioethics**

1. Respect human life and the dignity of every individual
2. Refrain from supporting or committing crimes against humanity and condemn all such acts
3. Treat the sick and injured with competence and compassion and without prejudice and apply the knowledge and skills when needed.
4. Protect the privacy and confidentiality of those for whom we care and breach that confidence only when keeping it would seriously threaten their

health and safety or that of others.

5. Work freely with colleagues to discover, develop, and promote advances in medicine and public health that ameliorate suffering and contribute to human well being
6. Educate the public about present and future threats to the health of humanity
7. Advocate for social, economic, educational and political changes that ameliorate suffering and contribute to human well being.
8. Teach and mentor those who follow us, for they are the future of our caring profession.

**CLINICAL AND LABORATORY TRAINING:**

The students will be clinically trained in parent department during the 3 years course.

Clinical ward training period - 18 months.

Transfusion Medicine and Immunohematology laboratory posting - 6 months (including Blood Bank and HLA laboratory)

Posting in bone marrow transplant unit - 3 months

Long term follow up clinics / outpatient Clinics - 6 months

Peripheral postings (Radiation therapy unit / Biochemistry
Nuclear Medicine / Molecular laboratory / Radiology / Pathology) - 2 months

Exchange visit with another tertiary center in the country - 1 month .

During II year, students are encouraged to undergo special postings for learning new advanced techniques / Procedure / Skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department.

**SKILL TRAINING:**

The student must have acquired certain surgical skills in a structured manner during the three year period of his course. These skills will be achieved by either assisting at the surgery or performing the surgery under the supervision of the teacher.

**I year**

| Should have assisted in following procedures | Should have performed the following procedures |
|---|---|
| Bone marrow harvest<br>Peripheral blood stem cell collection on apheresis machine<br>Preparing chemotherapy schedules and bone marrow transplant protocols<br>Hickman catheter insertion | Bone marrow aspiration and trephine<br>Lumbar puncture<br>Central line insertion |

**II year**

| Should have assisted at the following procedures | Should have performed the following procedures |
|---|---|
| Stem cell enumeration<br>Stem cell cryopreservation<br>Regular apheresis – platelet and stem cell collection | Additional central line insertions<br>Bone marrow aspirations<br>Lumbar punctures<br>Operate flowcytometer<br>Operate automated cell counters<br>Perform routine coagulation assays<br>Confidently report peripheral blood and bone smears<br>Complete coagulation work up perform and prepare report<br>Do all the tests that comprise a complete hemolytic work up |

**III year**

| Should have assisted at the following Procedures | Should have performed the following procedures |
|---|---|
| As in second year | Continue to do all that was done in the previous two years and to increase speed and skill |

## TEACHING METHODOLOGY

1. Teaching session with Faculty – once in a week
2. OP clinics – 4 days/week
3. Ward rounds - 5 days/week
4. BMT clinic - 2 days/week
5. Journal club - 1 day/week
6. Seminar – once in a week
7. Laboratory teaching session – once in a week
8. Case audits and discussion – once in a week
9. Symposium – once in a month
10. Guest lecture – once in 6 months

## RESEARCH WORK

The candidate is introduced to the field of research in medical oncology; both at clinical and laboratory level.

The candidate will be trained in the ability to

- Frame a research question.
- Plan a study to answer the question.
- Collect the relevant information and
- Evaluate appropriately the collected data to draw a conclusion.

The candidate should become conversant with the reporting of these results as a research paper, in journals and as a presentation in conferences.

The activities would consist of:

Planning and organizing relevant studies to be submitted as a Research paper at the end of the course.

Students should compulsorily attend Research Methodology workshop conducted by the University within first six months of D.M.Course.

**LOG BOOK:**

The Postgraduate student of a Postgraduate Degree Course in Super specialties shall maintain Log Book of the work carried out by them and the training program undergone during the period of training including details of procedures assisted or done independently by.

The Log Book shall be checked and assessed by the faculty members imparting the training on a monthly basis.

Periodical evaluation of Log Book to be done by the Head of the Department as per 52nd SAB.

The Evaluation of the candidates in both theory and practical aspects will help the candidate in the improvement of his/her knowledge skills & attitude**.**

**COMPETENCY ASSESSMENT:**

Overall:

| | | |
|---|---|---|
| 1. Communication / Commitment / Contribution / Compassion towards patients and Innovation | - | 10 Marks |
| 2. Implementation of Newly learnt techniques | - | 10 Marks |
| 3. Documentation of case sheets / discharge Summary / Review | - | 10 Marks |
| 4. Number of cases presented in Clinical Meetings/ Journal Clubs / Seminars / Papers presented in Conference. | - | 10 Marks |
| 5. No. Of Medals/ Certificates won in the conference / Quiz competitions and other academic meetings with details. | - | 10 Marks |
| Total | | 50 Marks |

| | | | | |
|---|---|---|---|---|
| Assessment | I | - February | - | First Year |
| | II | - August | - | First Year |
| | III | - February | - | Second Year |
| | IV | - August | - | Second Year |
| | V | - February | - | Third Year |
| | VI | - May | - | Third Year |

VIVA INCLUDING COMPETENCY ASSESSMENT – 100 Marks (50+50)

**THEORY EXAMINATION:**

Paper – I Basic Sciences Structure and function of haemopoietic system, Molecular biology and Genetic aspects of haemopoiesis

Paper – II Laboratory Haematology

Paper – III Clinical Haematology

Paper - IV Recent Advances in Haematology

*Each paper will contain*:

| | | | | |
|---|---|---|---|---|
| 1. Essay questions (2) | - | 2 X 15 | = | 30 Marks |
| 2. Short Notes (10) | - | 10 X 7 | = | 70 Marks |
| | | | | --- |
| Total | | | | 100 Marks |
| | | | | --- |

**PRACTICAL SCHEME:**

| **Particulars** | **Time for candidate to examine the cases** | **Time for examiners to question the candidates** | **Maximum Marks** |
|---|---|---|---|
| Long Case | 1 Case X 60 minutes | 60 Minutes | 100 |
| Short Case | 2 Cases X 15 Minutes | 30 Minutes | 100 |

| | | | |
|---|---|---|---|
| Ward Rounds | 3 Patients X 10Minutes | 30 Minutes | 50 |
| Laboratory Haematology | Immunohematology including interpretation of slides and raw data (75 Marks)<br><br>Wet practicals(25 Marks) | 3 hours<br><br>1 hour | 100 |
| Viva Voce | | 15 Minutes | 100 |
| Log Book | | | 50 |
| **Total Marks** | | | **500** |

As per Medical Council of India Post Graduate Medical Education Regulations 2000 (amended upto 10th August 2016)clause **13.9 A Postgraduate student of a Postgraduate degree Course in broad specialties/Super Specialties 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.**

Apart from Poster/Oral paper presentation in National/State conferences, the Research paper published by the candidate in the University Journal of Medical Sciences will be considered as equivalent to the Research Paper as mentioned in 13.9. clause. Case Reports can also be published in University Journal of Medical Sciences but case reports will not be considered as Research Paper.

The candidate can also present Research Paper as per Clause 13.9 of Post Graduate Education Regulation 2000, and if the article sent for publication by the candidate as primary author or corresponding author

which has not yet been published/accepted for publication, the candidate should submit a letter from the HOD, stating that the article sent for publication is of publishable merit and the proof of the Research Article submitted to the Journal for publication should be sent to the university forwarded through the HOD [as per 53rd SAB]

The student can submit articles for the University journal anytime from the time of registration in the University till 6 months prior to his theory examination.

**REFERENCE BOOKS:**

1. Dacie and Lewis: Practical Haematology
2. Hoffman textbook of Hematology
3. Hoffbrand textbook of Hematology

****Note: The editions are as applicable and the latest editions shall be the part of the syllabi.**

**JOURNALS:**

1. Blood
2. British Journal of Haematology
3. Indian Journal of Hematology and Transfusion Medicine
4. Bone Marrow Transplant
5. Biology of Blood and Marrow Transplant
6. Journal of Thrombosis and Hemaostasis

**********