MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Super Specialty Courses

SYLLABUS
DM – CLINICAL HEMATOLOGY (DM13)

Edition 2022-23

Principal & Controller
Mahatma Gandhi Medical College & Hospital
Sitapura, JAIPUR

NO CHANGE FOR 2023-24

Prof Dr Purvish Parikh
HOD, Clinical Hematology
9th Dec 2022

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
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Notice

1. Amendment made by the National Medical Commission (NMC) in Rules/Regulations of Post Graduate Medical Courses shall automatically apply to the Rules/Regulations of the Mahatma Gandhi University of Medical Sciences & Technology (MGUMST), Jaipur.

2. The University reserves the right to make changes in the syllabus/books/guidelines, fees-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.

3. The Jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

DM-CLINICAL HEMATOLOGY

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

Syllabus of DM / M.Ch. Courses

DM CLINICAL HEMATOLOGY

SELECTION OF CANDIDATES:

There shall be a uniform entrance examination to all medical educational institutions at the Super specialty level namely 'National Eligibility-cum-Entrance Test-SS' for admission to Super specialty courses in each academic year and shall be conducted under the overall supervision of the Ministry of Health & Family Welfare, Government of India.

In order to be eligible for admission to Super specialty Course for an academic year, it shall be necessary for a candidate to obtain minimum of marks at 50th percentile in the 'National Eligibility-Cum-Entrance Test for Super specialty' held for the said academic year. However, in respect of candidates belonging to Scheduled Castes, Scheduled Tribes, and Other Backward Classes, the minimum marks shall be at 40th percentile. In respect of candidates with benchmark disabilities specified under the Rights of Persons with Disabilities Act, 2016, the minimum marks shall be at 45th percentile for General Category and 40th percentile for SC/ST/OBC.

The percentile shall be determined on the basis of highest marks secured in the All India Common merit list in National Eligibility-cum-Entrance Test for Postgraduate courses.

Provided when sufficient number of candidates in the respective categories fail to secure minimum marks as prescribed in National Eligibility-cum-Entrance Test held for any academic year for admission to Super specialty Courses, the Central Government in consultation with Medical council of India may at its discretion lower the minimum marks required for admission to Super specialty Course for candidates belonging to respective categories and marks so lowered by the Central Government shall be applicable for the academic year only.

The reservation of seats in Medical Colleges/institutions for respective categories shall be as per applicable laws prevailing in States/Union Territories. An all India merit list as well as State-wise merit list of the eligible candidates shall be prepared on the basis of the marks obtained in National Eligibility-cum-Entrance Test and candidates shall be admitted to Super specialty Courses from the said merit lists only.

There shall be no admission of students in respect of any academic session beyond 31st August under any circumstances. The Universities shall not register any student admitted beyond the said date.

ELIGIBILITY:

Candidates must meet the eligibility criteria required to get admission to DM courses through NEET-SS.

Common Counseling:

There shall be a common counseling for admission to all Postgraduate Super specialty Courses (DM/ M.Ch.) in all Medical Educational Institutions on the basis of merit list of the National Eligibility-cum-Entrance Test.

Period of Training:

The period of training for obtaining DM/M.Ch Degrees shall be three completed years including the examination period.

Prof. (Dr.) Parmish M. Pandit
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

Migration:
Under no circumstance, Migration/transfer of student undergoing any Super Specialty course shall be permitted by any University/ Authority.

Staff - Faculty:
Only those teachers who possess 6 years teaching experience out of which at least 2 years teaching experience as Assistant Professor gained after obtaining the higher specialty degree shall be recognized post graduate teacher.

No teacher shall be considered as a postgraduate teacher in any other institution during the period till the postgraduate course at the institute which has been granted permission considering him as a postgraduate teacher is recognized u/s 11(2) of the Indian Medical Council Act, 1956.

Minimum staff required (Super-specialty):
1- Professor
1- Associate Professor
1- Assistant Professor
1- Senior Resident
2- Junior Resident

Training Programme:
All the candidates joining the Super specialty training programme shall work as 'Full Time Senior Residents' during the period of training and shall attend not less than 80% (Eighty percent) of the imparted training during each academic term (Academic Term duration- 6 months) including assignments, assessed full time responsibilities and participation in all facets of the educational process.

No candidate shall be permitted to run a clinic/work in clinic/laboratory/nursing home while studying super specialty course. No candidate shall join any other course or appear for any other examination conducted by this university or any other university in India or abroad during the period of registration.

Every institution undertaking Super specialty training programme shall set up an Academic cell or a curriculum committee, under the chairmanship of a senior faculty member, which shall work out the details of the training programme in each specialty in consultation with other department faculty staff and also coordinate and monitor the implementation of these training programmes.

The training programmes shall be updated as and when required. The structured training programme shall be written up and strictly followed, to enable the examiners to determine the training undergone by the candidates and the National Medical Commission inspectors to assess the same at the time of inspection.

Super specialty students shall maintain a record (log) book of the work carried out by them and the training programme undergone during the period of training including details of procedures carried out by the D.M. candidates.

The Record (Log) Books shall be checked and assessed periodically by the faculty members imparting the training.

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MD, DNB, FICP, PHD, CPI
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Mahatma Gandhi Medical College & Hospital

During the training for award of Super specialty degree in clinical disciplines, there shall be proper training in Basic medical sciences related to the disciplines concerned; so also in the applied aspects of the subject; and allied subjects related to the disciplines concerned. In the Super specialty training programmes including both Clinical and Basic medical sciences, emphasis has to be laid on Preventive and Social aspects. Emergency and critical care, facilities for Biopsies, Cytopsies, Imaging etc. shall also be made available for training purposes.

The Super specialty students shall be required to participate in the teaching and training programme of Postgraduate students of relevant specialities.

Training in Medical Audit, Management, Health Economics, Health Information System, basics of statistics, exposure to human behaviour studies, knowledge of pharmaco – economics and introduction to nonlinear mathematics shall be imparted to the Super specialty students.

The teaching and training of the students shall include graded responsibility in the management and treatment of patients entrusted to their care; participation in Seminars, Journal Clubs, Group Discussions, Clinical Meetings, Grand Rounds, and Clinico-Pathological Conferences; practical training in Diagnosis and Medical and Surgical treatment; training in the Basic Medical Sciences, as well as in allied clinical specialitites.

The training programme shall be on the same pattern as for M.D. / M.S. in clinical disciplines; with practical training including advanced Diagnostic, Therapeutic and Laboratory techniques, relevant to the subject of specialization.

A student of a degree course in 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 Super specialty degree examination.

ENROLMENT AND REGISTRATION:

Every candidate who is admitted to DM course in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled and registered with the Mahatma Gandhi University of Medical Sciences & Technology (**MGUMST**) after paying the prescribed eligibility and enrolment fees.

The candidate shall have to submit an application to the MGUMST through Principal of College for the enrolment/eligibility along with the following original documents and the prescribed fees within two months of the last date of admission to the respective program without late fees. Then after, students will have to pay applicable late fees as per prevailing University Rules.

(a) MD/MS pass Marks sheet/Degree certificate issued by the University.
(b) Migration certificate issued by the concerned University (in case the University is other than the MGUMST).
(c) Date of Birth Certificate
(d) Certificate regarding registration with Rajasthan Medical Council / Medical Council of India / Other State Medical Council.

No candidate shall be allowed to appear in University examination without his/her enrolment with the University

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

SCHEME OF EXAMINATIONS:

The examination shall be held at the end of three academic years (six academic terms). The academic term shall mean six months training period. The examination shall consist of: Theory and Clinical/Practical and Oral.

The examinations shall be organised on the basis of 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence.

For passing DM examination as a whole, a candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory (2) Clinical / Practical and Oral examination.

(1) **Theory:**

There shall be four theory papers of 3 hours duration and 100 marks each. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

Paper I and II will be set by one external examiner from outside of the state and paper III and IV by another external examiner from outside of the state. The external examiner, who is paper setter for paper I & II shall evaluate the answer books of paper II. The external examiner, who is paper setter for paper III & IV shall evaluate the answer books of paper III. The answer books of paper I & IV shall be evaluated by internal examiners. The answer books of paper IV shall be evaluated by the Head of the Department and the answer books of paper I shall be evaluated by the second Internal Examiner.

Candidates will be required to attempt all the questions in every question paper. In Paper I, Paper II and Paper III there will be 10 questions. Each question shall carry 10 marks. In Paper IV there will be 5 questions of 20 marks each.

Obtaining a minimum of 40% marks in each theory paper and not less than 50% cumulatively in all the four papers shall be compulsory to pass the examination.

The paper wise distribution of the Theory Examination shall be as follows:

Paper I:	Basic Sciences of Hematology
Paper II:	Clinical Hematology
Paper III:	Clinical Hematology
Paper IV:	Recent advances in Hematology

(2) **Clinical / Practical and Oral:**

Clinical/Practical examination shall be conducted to test / aimed at assessing the knowledge and competence of the candidate for undertaking independent work as a specialist / teacher. Practical examination shall consist of carrying out both case presentation and lab exercises.

Clinical

Two long cases	(200 Marks)
Two short cases	(100 Marks)
Case exercises	(50 Marks)
Skills	(50 Marks)

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
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Laboratory

Blood & B/M morphology	(100 Marks)
Spots-Data analysis	(50 Marks)
Basic Lab data	(50 Marks)
Viva Voce	(100 Marks)

Obtaining of 50% marks in Clinical / Practical and Oral examination shall be mandatory for passing the Clinical / Practical and Oral examination.-

Maximum Marks: 400.

Result:
For passing DM Examination, a candidate will be required to obtain at least 40% marks in each theory paper, 50% marks in the aggregate of all the four theory papers and 50% marks in the aggregate of Clinical / Practical and Oral examination separately. A candidate failing in any theory paper or in the aggregate of all four theory papers or Clinical / Practical and Oral examination shall have to repeat the whole DM examination.

Grace Marks:
No grace marks will be provided in DM examinations.

Revaluation / Scrutiny:
No Revaluation shall be permitted in the DM examinations. However, the student can apply for scrutiny of the answer books as per University Rules

Examiners:
As per the Amendment Notification of the MCI dated June 5, 2017, no person shall be appointed as an internal examiner in any subject unless he/she has three years experience as recognized PG teacher in the concerned subject. For external examiners, he/she should have minimum six years of experience as recognized PG teacher in the concerned subject.

For all Post Graduate Super specialties examinations, the minimum number of Examiners shall be four, out of which at least two (50%) shall be External Examiners, who shall be invited from other recognised universities from outside the State.

Number of Candidates:
The maximum number of candidates to be examined in Clinical / Practical and Oral on any day shall not exceed three for D.M. Examinations.

Number of Examinations:
The university shall conduct not more than two examinations in a year, for any subject, with an interval of not less than 4 and not more than 6 months between the two examinations.

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

GUIDELINES FOR COMPETENCY BASED TRAINING PROGRAMME FOR DM IN CLINICAL HEMATOLOGY

Preamble

Hematological disorders are a major cause of morbidity and mortality among Indians. Such patients need specialized diagnostic skills, laboratory evaluation and management strategies. These disorders have genetic, familial, metabolic, infective, neoplastic immune-mediated and environmental origin. Spectrum of hematological diseases is very wide and variable. These diseases, particularly hematological malignancies, are difficult to manage, have complicated course and poor outcomes. There is need of separate specialists and experts devoted to management of hematological diseases. Moreover with new investigations, therapeutic interventions, newer drugs and techniques, approach to patients with blood disorders have become an independent, time consuming process. Therefore, the branch of Hematology assumes importance as a dedicated specialty to generate skilled manpower to widen the scope of better patient care in India.

Subject Specific Objectives

Theoretical Knowledge: The primary goal of the program is to train academically oriented hematologists. Academic hematologists should be excellent clinicians encompassing highest levels of skills in evaluation, diagnosis and management of blood disorders. They should be active in advancing the field by participating in research and capable enough to impart training/ education.

Practical and Clinical skills: The program is devoted principally to clinical training, with both inpatient and outpatient activities and participation in an active consultation service including emergency and intensive care management. DM fellows should obtain excellence in clinical, intensive care, stem cell transplants and cellular therapies, laboratory hematology and various procedures in patients with blood disorders.

Writing Research articles: The candidate should complete two research projects duly cleared by Ethics Committee. Both the research projects should either be published/accepted for publication as original articles in indexed journals or approved as certified by two external reviewers before appearing for final theory exit examination.

Attitudes including communication skills: Communication skills with the patients are paramount and trainees are expected to master this during their training period. Regular clinical rounds and academic presentations in the teaching programs should help the trainees to develop scientific communicative skills. With round the year presentations in the teaching programs the trainee should develop communicative and research skills. Trainees should be encouraged to review departmental data and present at various conferences.

Training in Research Methodology: In -house research methodology training shall be provided for the trainees from time to time. They shall be encouraged to attend workshops/ courses outside the working institution. As per NMC guidelines, courses in biostatistics and ethics are now mandatory.

Subject Specific Competencies

At the end of the course, the student should be able to acquire the following competencies under the three domains:

Cognitive domain (Knowledge domain)

By the end of the course the DM candidate

- Diagnose and manage all patients with non-malignant and malignant hematological disorders.
- Perform independently different laboratory hematological investigations used to diagnose hematological disorders.
- Interpret laboratory data and synthesize laboratory and clinical data so as to provide rational solutions for patients with hematological problems.
- Supervise the activities of a clinical hematology/laboratory services where ever necessary.
- To provide the state of art therapy to patients with hematological disorders.
- To have knowledge and expertise to do BMT.
- To be able to prepare and perform protocol based therapies for various oncological and hematological disorders.

Affective domain (Attitudes including Communication and Professionalism)

The DM candidate

- should become confident communicators and should be well accomplished professionals.
- should be ready to deliver the knowledge received by them during the course.
- should have developed skills to debate, deliver scientific lecture, participate in panel discussions, and hold group discussions.
- 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.
- 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.

- 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.

Psychomotor Domain (subject specific practice based or practical competencies)

The DM candidate

- should be able to take independent management decisions
- should carry out the Bone marrow aspiration and biopsy procedures, administration of chemotherapies, Central venous access management, and handle emergencies with utmost confidence.
- Conducting and interpreting laboratory tests
- analyses and evaluation of findings of various procedures

The student should be able to perform independently the following procedures:

A. Preparation of peripheral blood smear

B. Interpretation of peripheral blood smear

C. Bone marrow aspirate and biopsy

D. Interpretation of bone marrow aspirate smear

E. Administration of chemotherapy via indwelling vascular access devices and via implanted central nervous system access devices

F. Lumbar puncture for diagnosis and for intrathecal administration of chemotherapy

G. Insertion and Management of indwelling vascular access devices

H. Therapeutic phlebotomy

Syllabus

Course contents:

The student should acquire knowledge in the following areas:

1. Molecular and Cellular Basis of Hematology
2. Cellular Basis of Hematology
3. Immunologic Basis of Hematology
4. Disorders of Hematopoietic Cell Development
5. Red Blood Cells
6. Non-Malignant Leukocytes
7. Hematologic Malignancies
8. Comprehensive Care of Patients with Hematologic Malignancies
9. Cell-Based Therapies
10. Transplantation
11. Transfusion Medicine
12. Hemostasis and Thrombosis
13. Consultative Hematology

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

TEACHING AND LEARNING METHODS

Formal Teaching

a) **Journal Club/Journal Scan:** 1 hour duration - Paper presentation/discussion - once per week.

b) **Seminar:** One seminar every week of one hour duration

c) **Lecture/discussion:** Lectures on newer topics by faculty, in place of seminar as per need.

d) **Case presentation:** Once every week. Post Graduate students will present a clinical case for discussion wherein all PG students and departmental faculty will interact.

e) **Case conference:** Ward rounds would constitute case conference with faculty.

f) **Slide discussion:** Daily discussion of peripheral blood film and bone marrow smears and biopsies with hematopathology division.

g) **Imaging classes**: Once weekly in which the radiological features of various problems are discussed.

h) **Combined Round/Grand Round:** Once a month at the hospital level. This should constitute presentation of unusual or difficult cases, clinical series/research data.

i) **Emergency situation**: Emergency duty by rotation among the fellows with faculty cover.

j) **Ward rounds:** Inpatients admitted in wards should be allotted to DM students. The DM student should take history, conduct examination, clinically evaluate and manage. Ward rounds should be conducted by faculty for appropriate patient care and teaching. This should also cover calls from other specialties and emergency.

k) **Clinical teaching:** In outpatient, ward rounds, emergency and ICU, the DM fellows students shall be required to participate in the teaching and training programme of postgraduate students of related specialities.

l) The Department shall encourage e-learning activities

Clinical postings: Recommended schedule for three years training:

The student is required to work full time in the department, participate in the patient care and academic and research activities as described below.

Responsibilities of post graduate students during proposed training:

Training shallbe styled on residency system for 3 years. The students will be primarily responsible for the care of patients which include clinical, investigative and therapeutic aspects. In addition, they shall pursue research and academic activities in Hematology. The training of a DM student would thus include:

I. Clinical Hematology
II. Lab Hematology
III. Transplant and cellular therapies
IV. Research activities

(I) Clinical training:

Under the guidance of the consultants, the post graduate students will look after:

a) Patients in Hematology outpatient.
b) Inpatients: each Fellow student will be entirely responsible for management of cases and keeping clinical records of allotted patients. This activity should be done under supervision of consultants.
c) Night duties in ICU, wards and emergency wing by rotation as per exigencies of departmental work.

Clinical training by extensive use of clinical rounds and clinical case discussions. Clinical teaching will be imparted by supervision and guidance of the candidate during day to day patient management in outpatient and wards. In addition, clinical case discussions and rounds will be conducted by the senior staff.

- The students should be posted in Departments of Hematopathology, Oncopathology, Molecular and genetic Labs, Immunohematology and Transfusion medicine, Medical/Radiation Oncology and Nuclear medicine.
- Bone marrow transplantation (6 months posting in Bone marrow transplantation unit)

The DM fellow should become familiar with bone marrow transplantation, pre-transplantation assessment, donor and recipient evaluation, stem cell collection,

conditioning regimens, post transplant immunosupression and follow-up.

(II) Lab hematology

Essential investigations as part of the training will include a detailed understanding of hematopathology. The student is expected to be well versed with the principles and be able to conduct independently the following lab work:

1. Proper use and care of common laboratory instruments
   a. light microscope
   b. Centrifuge
   c. Water baths
   d. Freezers
   e. Weighing balance etc.,

2. Collection of blood samples
   a. Venepuncture
   b. Finger prick methods
   c. Types of anticoagulants
   d. Containers
   e. Effects of delay in processing and storage.

3. Manual determination of blood counts
   a. Haemoglobin
   b. Haematocrit
   c. Total WBC
   d. Platelets
   e. Calculation of red cell indices.

4. Automated electronic blood cell counters including principles and practice.
   a. Interpretation of peripheral blood counts
   b. Preparation of blood films - manual and automated techniques.
   c. Staining of peripheral blood films with Romanowsky and other dyes by manual and automated techniques.
   d. Review of normal and abnormal blood films with emphasis on-
      - Morphology of red cells, White cells and Platelets
      - Performance of WBC differential count.
      - Subjective assessment of platelet count
      - Diagnostic evaluation of abnormal films

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

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

7. Supravital staining of reticulocytes; manual and automated counting of reticulocytes.

8. Performance of bone marrow aspiration and trephine needle biopsy.

9. Staining (Romanowsky dyes and Prussian Blue for iron) and diagnostic valuation of smears of

bone marrow aspirate.

10. Performance and interpretation of Hbs (sickle haemoglobin) solubility test, screening for red cell G6PD activity and interpretation.

6. Cyto Chemistry
   a. PAS
   b. Sudan Black,
   c. Myeloperoxidase,
   d. Specific and non-specific and dual esterases,
   e. Acid phosphatase
   f. Iron stain

7. Hb electrophoresis- performing and interpreting

8. Direct and indirect antiglobulin (Combs) tests, warm and cold autoantibody (Cold agglutinin) titre,

9. Flow cytometry
Principles and practice of flow cytometry,
Sample preparation and interpretation of flow cytometry for the diagnosis of
   a. Acute leukemias
   b. Chronic lymphoproliferative diseases
   c. CD34 estimation by ISHAGE protocol
   d. PNH
   e. EMA

10. Cytogenetics :

   a. Familiarisation with Cytogenetic techniques,
   b. Understanding the principles of cytogenetics
   c. Appreciating the relevences and significance of chromomes in diagnostic haematology,
   d. Interpreting the results of chromosome preparation of haemopoletic cells.

11. 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
      iv. Testing for HITT

   b) Screening and coagulation factor abnormalities:

i. Prothrombin 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 deficiency plasmas
vi. FDP and D- Dimers
vii. Assays of clotting factors particularly factors VIII and IX
viii. Urea solubility test for factor XIII
ix. Lupus anticoagulant

12. Transfusion Medicine :

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 immunohaemolytic diseases of the new born.
d. Investigations of platelets refractoriness
e. Practical aspects in the selection of blood for normal exchange transfusion.

f. Donor recruitment.
g. Clinical evaluation and laboratory screening of donors prior to phlebotomy.
h. Phlebotomy of donors
i. Blood component preparation and storage
j. Practical and administrative procedures involved in issuing and transfusing blood
k. Principles of the mechanic of the cell separator and its use for blood component preparation and therapeutic apheresis.
l. Practical steps in the laboratory investigation of transfusion reactions.

13. 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.
j) Analytical variables inter laboratory harmonization, data handling and statistical analysis.
k) Post analytical variables : computer inter facing security and recording of results, turn around time.

14. Histopathology Module:

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

a) General processing of tissues

b) Techniques of cytology including cytopin in relation to body fluid of patients with haematological disorders

c) Immunocytochemistry relevant to haematology

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

15. Molecular Biology :

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

a) DNA and RNA extraction

b) PCR - Polymerese Chain Reaction

c) RT and RQ PCR

Procedures to be carried out independently by DM students during training program

Procedure	*Number*
Bone marrow aspiration and biopsies	300
Intrathecal chemotherapy	300
Apheresis	10
PICC line placement	50
Hickman line placement	10

Research: Protocol submission for two research projects related to the field of Hematology. The students would be required to undertake two research projects with a faculty member as a guide. The candidates are required to submit the research protocol within first 6 months of joining the course. The research projects should be approved by the departmental Research Committee and Ethics Committee. The DM fellow would be eligible for appearing for exit examination provided the research projects are complete: either published/accepted for publication in indexed journals or external peer review of completed manuscripts is certified by two experts.

First Academic Year

1. **Workup of patients in OPD under supervision.** The DM student should become competent in rendering appropriate outpatient care from evaluation through long-term follow- up or discharge from clinic as indicated for each disease process. The DM student should provide care to patients with a broad range of hematological disorders. The DM student should be able to organize outpatient evaluation, diagnostic procedures and treatment, including hospital admissions as necessary. The DM student should perform history and examination, review of outside data and present cases to the attending faculty.

2. **Supervised general and intensive care of admitted patients**

   The DM student should become competent in rendering appropriate inpatient care from evaluation to discharge of a broad range of hematological diseases. The DM student should become competent in the performance of diagnostic and therapeutic invasive procedures. The DM student should learn to evaluate and ameliorate the psychosocial impact of disease, utilize available ancillary services and deliver cost efficient care.

3. **Overall**

   The DM student will participate, with supervision from attending faculty, in all aspects of the care of patients with hepatobiliary diseases. This care includes initial evaluation, formulation of differential diagnosis and evaluation, participation in diagnostic procedures, interpretation of laboratory, radiologic, pathologic and other testing, treatment and discharge planning.

4. **Perform bone marrow aspiration and biopsies, prescribe and administer chemotherapy and perform PICC line placement in first year of residency under supervision.**

   Goals: The DM student should become increasingly proficient in the performance of various procedures: patient assessment for a specific procedure, appropriate local anesthesia, procedures under sedation for young children, and understands procedural techniques and post-procedure monitoring and management. The student should develop skills to become proficient in bone marrow aspiration and biopsies, administration of chemotherapy, CSF examination and intrathecal chemotherapy and PICC line placement and care.

   Objectives: The DM student will review charts of scheduled outpatient procedures daily,

should participate in the consent process, conscious sedation, the procedure, post-procedure management, communication with patients and families and generation of reports. The student should also attend emergency calls.

Second Academic Year

1. Care of admitted and out-patients.
   As already laid out for the first year DM student
2. Supervision of ICUs and Private wards
3. Academic presentation: Seminar, journal club, and clinical case presentation, hematopathology slide discussions, monthly patient data statistics, radiology discussions and multidisciplinary tumor board discussions.

Third Academic Year

1. Care of admitted and out-patients
2. Bone marrow transplant unit related patient care
3. Academic work as before
4. Rotation postings in Hematopathology, Blood centre, Medical/Radiation Oncology
5. Analysis and submission of research projects.

Teaching Schedule as enumerated under "Teaching and learning methods"

Logbook

A copy of the report of all procedures performed, interesting cases, transplanted cases, awards during the course, abstracts in various conferences should be maintained in a log book, which should be seen by the entire available faculty in the specialty. Logbook should be submitted to the Head of the Department at least two months before the exit practical examination. The Log books shall be checked and assessed periodically by the faculty members imparting the training. The Head of the Department will certify the completion of the minimum number of procedures specified. The logbook should be then presented to external examiners at the time of practical exit examination for appraisal.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially and later to be performed under supervision followed by performing independently. There is a provision of skills laboratory in the medical college.

ASSESSMENT

FORMATIVE ASSESSMENT

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

Periodic Evaluation:

DM fellows will be evaluated continuously for their performance in all areas such as clinical and investigative work, case presentations, seminars, journal clubs, procedures etc. Additional periodic assessment will include theory and practical assessment mimicking the final examination and shall be conducted every six months. Such an evaluation will help assessing the progress of the trainees and the quality of the training program. Evaluation will be communicated to trainees and their feedback would be taken into consideration for modifications in training program.

Internal Assessment shall be frequent, cover all domains of learning and will provide feedback to improve learning; it shall also cover professionalism and communication skills.

Quarterly assessment during the DM training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in Postgraduate Student Appraisal form (Annexure I).

SUMMATIVE ASSESSMENT

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The summative assessment examination shall include two heads:

A. Theory examination.
B. Practical, Clinical examination and Viva-voce.

Theory examination and Practical/Clinical, Viva-voce shall be separate heads of passing.

These shall be conducted as described above.

Suggested Books (latest editions)

1. Hematology- Basic Principles and Practice- Hoffman
2. Williams Hematology
3. Wintrobe's Clinical Hematology
4. Hoffbrand's Essential Hematology
5. Dacie and Lewis – Practical Hematology
6. American Society of Hematology Annual Scientific Meeting Education book
7. WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues
8. American Society of Hematology- Self assessment Program
9. Robak's Hematology
10. Rossi's Textbook of Transfusion Medicine, 4th edition.
11. American Association of Blood Banks. Technical Manual, 17th edition
12. Hematology/Oncology Clinics of North America (series)
13. Bain's Bone Marrow Pathology
14. Bain's Haemoglobinopathy Diagnosis
15. Bain's Blood Cells A Practical Guide
16. Thomas- Hematopoietic cell transplantation

Suggested Journals

- Blood
- British Journal of Haematology (BJH)
- Haematologica
- Journal of Clinical Oncology
- Indian Journal of Hematology and Blood transfusion
- New England Journal of Medicine (NEJM)
- Journal of Thrombosis and Haemostasis
- Annals of Hematology
- Blood Reviews
- Bone Marrow Transplantation
- Biology of blood and Marrow Transplantation
- Leukemia

Annexure I

DM fellow Appraisal Form

Name of the Department/Unit :

Name of the Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based / recent advances learning				
2.	Patient based /Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities / CMEs				
6.	Research work				
7.	Log Book Maintenance				

Publications Yes/ No

Remarks*_

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE SIGNATURE OF CONSULTANT SIGNATURE OF HOD

DM-CLINICAL HEMATOLOGY

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

DM13301

MODEL PAPER

Basic.Sc-I

DM Examination Month, Year

CLINICAL HEMATOLOGY

Paper-I

Basic Sciences in Hematology

Time: Three Hours
Maximum Marks: 100

Attempt all questions
All questions carry equal marks
Draw labelled diagrams wherever necessary

1. Immune reconstitution post allogeneic stem cell transplant
2. B cell Ontogeny
3. Role of hepcidin in iron metabolism and its implications
4. Stem cell sources, advantages and disadvantages
5. Complement pathway and therapeutic implications in hematology
6. How will you counsel the parents of a 12 year old boy with Moderate hemophilia A who wishes to choose cricket as his profession?
7. Ribosomopathies in hematology
8. Biology of bone marrow failure syndromes
9. Role of microenvironment in multiple myeloma
10. Molecular pathogenesis and prognostication of Acute lymphoblastic leukemia

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital

MODEL PAPER

DM13302 **Clinical.Hem-II**

DM Examination Month, Year

CLINICAL HEMATOLOGY

Paper-II

Clinical Hematology

Time: Three Hours

Maximum Marks: 100

Attempt all questions
All questions carry equal marks
Draw labelled diagrams wherever necessary

1. Approach to a patient with Eosinophilia and hepatosplenomegaly
2. Significance of MRD in pediatric ALL
3. Heparin induced thrombocytopenia
4. Management options for a 70 year old lady with refractory multiple myeloma with fracture left neck of femur
5. A 28 year old pregnant lady with acute onset pain and swelling of entire left lower limb- diagnostic and therapeutic approach
6. An 18 year old male with sudden onset seizure, pallor with renal failure and very high LDH- how to manage?
7. Novel treatment options in the management of Refractory Hodgkin lymphoma
8. Evaluation of iron overload in a patient with thalassemia major
9. Briefly discuss management strategies for patients with newly diagnosed Mantle cell lymphoma
10. A patient of sickle cell disease presents to the casualty with severe chest pain- how to approach?

MODEL PAPER

DM13303 **Clinical.Hem-III**

DM Examination Month, Year

CLINICAL HEMATOLOGY

Paper-III

Clinical Hematology

Time: Three Hours

Maximum Marks: 100

Attempt all questions
All questions carry equal marks
Draw labelled diagrams wherever necessary

1. Non inherited maternal antigens in Haploidentical SCT
2. Implications of deep molecular responses in CML
3. Diagnostic approach and management of hemorrhagic cystitis post transplant
4. Patient reported outcomes for drug development in Hematology
5. Cytokine release syndrome post CAR-T cell therapy
6. Pathophysiology of acquired sideroblastic anemia
7. How will you set up a stem cell transplant unit in a resource poor setting
8. Strategies to prevent post transplant relapse post Allogeneic transplant for AML
9. Current concepts in treatment of Carbapenem resistant enterobactereciae in immunocompromised patients
10. Discuss donor lymphocyte infusions

MODEL PAPER

DM13304 **Rec.Adv.-IV**

DM Examination Month, Year

CLINICAL HEMATOLOGY

Paper-IV

Recent Advances in Hematology

Time: Three Hours

Maximum Marks: 100

Attempt all questions
All questions carry equal marks
Draw labelled diagrams wherever necessary

1. Role of gut microbiota in GVHD and utility of fecal microbiota transplant in this setting.
2. Pharmacological treatment options in hemophilia- beyond recombinant factors
3. Gene therapy in the treatment of hematological diseases
4. Recent molecular classification of myeloid malignancies- discuss implications
5. Current position of Venetoclax in the treatment of hematological malignancies

Principal & Controller
Mahatma Gandhi Medical College & Hospital
Sitapura, JAIPUR

Prof. (Dr.) Purvish M. Parikh
MD, DNB, FICP, PHD, CPI
Head of Clinical Hematology
Mahatma Gandhi Medical College & Hospital