MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Super Specialty Courses

SYLLABUS

DM - CARDIOLOGY

Notice

1. Amendment made by the Medical Council of India 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.

Syllabus of DM / M.Ch. Courses
DM - CARDIOLOGY (9330)

SELECTION OF CANDIDATES:

There shall be a uniform entrance examination to all medical educational institutions at the Postgraduate level namely 'National Eligibility-cum-Entrance Test' for admission to postgraduate 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 Postgraduate 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 Postgraduate courses' 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 Postgraduate Courses, the Central Government in consultation with Medical council of India may at its discretion lower the minimum marks required for admission to Post Graduate 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 Postgraduate 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:

S. No.	Area of Specialisation	Prior Requirement
1	DM Cardiology	MD (Medicine / Paediatrics)
2	DM Medical Gastroenterology	
3	DM Nephrology	
4	DM Neurology	
5	M.Ch. Cardio vascular & Thoracic Surgery	MS (Surgery)
6	M.Ch. Urology	
7	M.Ch. Neuro-Surgery	
8	M.Ch. Plastic Reconstructive Surgery	

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.

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-speciality):
1- Professor
1- Associate Professor
1- Assistant Professor
1- Senior Resident
2- Junior Resident

Training Programme:
All the candidates joining the Post Graduate training programme shall work as 'Full Time Residents' during the period of training and shall attend not less than 80% (Eighty percent) of the imparted training during each academic year (Academic Term of 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 postgraduate 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 Post Graduate 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 speciality 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 Medical Council of India inspectors to assess the same at the time of inspection.

Post Graduate 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 surgical operations assisted or done independently by M.Ch. candidates.

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

During the training for award of Degree / Superspecialty 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 Post Graduate training programmes including both Clinical and Basic medical sciences, emphasis has to be laid on Preventive and Social aspects. Emergency care, facilities for Autopsies, Biopsies, Cytopsies, Endoscopy and Imaging etc. shall also be made available for training purposes.

The Post Graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

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 Post Graduate 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. Postgraduate Superspecialty Residents in Surgical Specialties shall participate in Surgical operations as well.

A postgraduate student of a postgraduate 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 postgraduate degree examination.

ENROLMENT AND REGISTRATION:

Every candidate who is admitted to DM/MCh. 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 upto November 30 of the year of admission without late fees upto December 31 of the year of admission with late fees after paying the prescribed eligibility and enrolment fees.

The candidate shall have to submit an application for the enrolment/eligibility along with the following original documents with the prescribed fees –

(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.

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/M.Ch. 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. Out of the four theory papers, one Paper-I shall be on 'Basic Sciences', and another Paper-IV on 'Recent Advances'. 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.

Nomenclature of Papers:

Paper-I : Basic Sciences (as Related to Cardiology)
Paper-II : Practices of Cardiology Part-I (Clinical and Therapeutic Cardiology)
Paper-III : Practices of Cardiology Part-II (Diagnostic, Preventive and Interventional Cardiology)
Paper-IV : Recent Advances in Cardiology

(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 special investigative techniques for Diagnosis and Therapy. M.Ch candidates shall also be examined in surgical procedures. Oral examination may be comprehensive enough to test the candidate's overall knowledge and competence about the subject, investigative

procedures, therapeutic technique and other aspects of the specialty, which shall form a part of the examination.

There shall be one long case of 150 marks, two short cases of 75 marks each and oral examination of 100 marks. Obtaining of 50% marks in Clinical / Practical and Oral examination shall be mandatory for passing the Clinical / Practical and Oral examination.

Result:
For passing DM/M.Ch. 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/M.Ch. examination.

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

Revaluation / Scrutiny:
No Revaluation shall be permitted in the DM/M.Ch. 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./M.Ch. 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.

D.M. – CARDIOLOGY (9330)

Duration : 3 Years
Admission Eligibility : MD (Medicine)/ MD (Paediatrics)

GOALS

The goal of DM (Cardiology) course is to produce a competent cardiologist who:

- Recognizing the health needs of patients, carries out professional obligations in keeping the principles of National Health policy and professional ethics.
- Is competent to practice cardiology at all levels of health care system.
- Is aware of the contemporary advances and developments in medical sciences, particularly cardiovascular medicine.
- Acquires a spirit of scientific enquiry and is oriented to principles of research methodology
- Has acquired skills in educating medical and paramedical professionals
- Has acquired skills in effectively communicating with the patients, family and the community.

OBJECTIVES

At the end of the DM course in Cardiology, the student should be able to:

- Practice the specialty of cardiology in keeping with the principles of professional ethics.
  - Take detailed history, perform full physical examination and make a clinical diagnosis.
  - Perform and interpret relevant investigations (Imaging and Laboratory) and also perform and interpret important diagnostic procedures.
  - Diagnose cardiovascular illnesses based on the analysis of history, physical examination and investigative work up;
  - Plan and deliver comprehensive treatment for illness using principles of rational drug therapy.
  - Plan and advice measures for the prevention of cardiovascular diseases.
  - Plan rehabilitation of adults suffering from chronic illness, and those with special needs;
  - Manage cardiological emergencies efficiently.
  - Demonstrate communication skills of a high order in explaining management and prognosis. Providing counseling and demonstrate empathy and humane approach towards patients and their families respecting their sensibilities;
  - Demonstrate competence in basic concepts of research methodology and epidemiology;
  - Facilitate learning on MD residents, medical/nursing students, practicing physicians, paramedical health workers and other providers as a teacher- trainer.

SYLLABUS

At this level of training, insistence of a syllabus may not be appropriate. Trainees should acquire an overall knowledge in cardiology by reading standard textbooks, monographs and peer reviewed journals dealing with cardiovascular sciences, related basic sciences and epidemiology. A core syllabus is however, recommended as below**,** but it does not purport to be either comprehensive or restrictive. Furthermore, it is likely to change from time to time

BASIC SUBJECTS

Applied Anatomy (including developmental anatomy), Physiology, Biochemistry, Pathology and Medical Statistics related to the Cardiovascular System.

CLINICAL CARDIOLOGY

Etiopathology, hemodynamics, clinical evaluation, noninvasive and invasive evaluation and management strategies for the following disorders:

- Coronary artery disease
- Rheumatic heart disease.
- Congenital heart disease and other paediatric cardiac disorders.
- Pericardial diseases.
- Cardiac arrhythmias.
- Heart failure.
- Peripheral vascular disorders.
- Pulmonary thromboembolism and pulmonary hypertension
- Systemic hypertension.
- Systemic diseases involving heart
- Heart muscle diseases.
- Traumatic heart disease.
- Tumors of heart.
- Genetics, molecular biology and immunology related to cardiology.
- Geriatric heart disease.
- General anaesthesia and non cardiac surgery in patients with heart disease.
- Pregnancy and heart disease.
- Epidemiology and preventive cardiology

- **Non-invasive Technique**

  To perform and interpret various non invasive techniques including:
  - Electrocardiography.
  - Radiography – routine and specialized areas like CT and MRI.
  - Stress testing – tread mill test, stress echocardiography and nuclear techniques.
  - Holter monitoring for arrhythmias and ischemic disorders.
  - Echocardiography – M-mode, Two dimensional, Doppler, color flow imaging, transesophageal Echocardiography and echo directed hemodynamic studies.

- **Invasive Cardiology**
  - Experience in cardiac catheterization to calculate and interpret various hemodynamic parameters
  - Right and left heart catheterization and coronary angiography procedures in adults and children
  - To perform temporary pacemaker insertion.
  - To assist in various interventions including valvuloplasty, coronary and structural heart disease interventions.

- Electrophysiology: To interpret electrophysiological data and assist in electrophysiology procedures and device implantations like permanent pacemaker, AICD and CRT.

- **Biomedical Aspects**
  - To understanding the functional principles of various bio-medical equipments used for the invasive and non invasive cardiology.

- **Academic and Clinical Work Requirements**
  - Journal club readings – minimum of 4 reviews and 6 journal readings
- **Minimum No. of Procedures**

Table: Proposed list of minimum number of procedures

Procedures	No.
Echocardiography	200
TMT	100
Holter Analyses	50
Cardiac cath procedures including Interventions assisted or done	100
No. of temporary pacemakers done	30
Permanent pacemakers assisted or done	5

SUGGESTED BOOKS & JOURNALS:

- **Books**
  - Braunwald's Heart Disease.
  - Hurst's The Heart.
  - Grossman's Cardiac Catheterization, Angiography, and Intervention.
  - Stress Testing: Principles and Practice by Myrvin H.Ellestad.
  - Drugs for the Heart by Lionel H. Opie.
  - The Cardiac Catheterization Handbook by Morton L. Kern.
  - Hemodynamic Rounds by Morton J. Ker.
  - Clinical Recognition of Congenital Heart Disease- Joseph.K Perloff
  - Moss and Adams' Heart Disease in Infants, Children, and Adolescents.
  - Pediatric Cardiology for Practitioners (4th Edition) by Myung K. Park.
  - Feigenbaum's Echocardiography.
  - Echo Manual by Jae K. Oh, Seward and Tajik
  - Chou's Electrocardiography in Clinical Practice
  - Valvular Heart Disease by Alpert & Dalen
- **Journals**
  - Indian Heart Journal
  - Journal of American College of Cardiology
  - Circulation
  - Heart
  - European Hearty Journal
  - Hypertension
  - American Journal of Cardiology
  - Journal of Interventional Cardiology
  - New England Journal of Medicine.
  - The Lancet.

MODEL PAPER

DM- 9331 **Cardio-I**

DM Examination Month, Year
CARDIOLOGY

Paper-I
Basic Sciences (as related to Cardiology)

Time : Three Hours
Maximum Marks: 100

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

Q.1 Discuss briefly genetics of cardiac rhythm disorder

Q.2 Describe Briefly Anatomy & function of Mitral Valve

Q.3 Coronary auto regulation

Q.4 Fetal Heart circulation

Q.5 Importance of pulmonary vascular Resistance and how to measure it

Q.6 Renin angiotension system

Q.7 AV Node in & its physiological significance

Q.8 Cardiovascular Changes During pregnancy

Q.9 Cardiomyocytes

Q.10 Cardiac Venous System.

MODEL PAPER

DM- 9332 **Cardio-II**

DM Examination Month, Year
CARDIOLOGY

Paper-II
Practices of Cardiology Part I
(Clinical and Therapeutic Cardiology)

Time : Three Hours
Maximum Marks: 100

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

Q.1 (a) Dynamic Auscultation

(b) Importance of S_2 in clinical cardiac practice

Q.2 Discuss Management of mechanical complications of acute MI

Q.3 Carcinoid Syndrome

Q.4 Direct Thrombin Inhibitors

Q.5 Management of pulmonary embolism

Q.6 Takotsubo Cardiomyopathy

Q.7 Aspirin Resistance

Q.8 Ankle Brachial Index

Q.9 Fontans procedure

Q.10 Duke's Criteria

MODEL PAPER

DM- 9333 **Cardio-III**

DM Examination Month, Year
CARDIOLOGY

Paper-III
Practice of Cardiology Part II
(Diagnostic, Preventive and Interventional Cardiology)

Time : Three Hours
Maximum Marks: 100

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

Q.1 Discuss various techniques of percutaneous mitral valve repair

Q.2 Rheumatic Fever Prophylaxis

Q.3 Echocardiography assessment of RV function

Q.4 Discuss in details difference between CP & RCMP

Q.5 Management of coronary Bifurcation lesion

Q.6 Assessment of Myocardial Viability

Q.7 Leadless pacemaker & its clinical applications

Q.8 Myocardial Strain & its clinical implications

Q.9 Assessment of operability in patient with left to right shunt & pulmonary hypertension

Q.10 Role of cardiac catheterization in TOF

MODEL PAPER

DM- 9334 **Cardio-IV**

DM Examination Month, Year
CARDIOLOGY

Paper-IV
Recent advances in Cardiology

Time : Three Hours
Maximum Marks : 100

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

Q.1 Discuss new and upcoming therapeutic agents and in management of Heart failure.

Q.2 Discuss recent advances in the management of patients with Atrial Fibrillation.

Q.3 What is the current status of TAVR. Discuss the recent clinical trials with TAVR. Describe the Technique of TAVR and its complications.

Q.4 Discuss recent advances in Management of Pulmonary Hypertension

Q.5 What is Optical Coherence Tomography (OCT). Discuss its role in Coronary artery imaging and compare it with IVUS.