



**MAHATMA GANDHI UNIVERSITY**  
*of*  
**MEDICAL SCIENCES & TECHNOLOGY**  
JAIPUR

**SYLLABUS**  
**Super Specialty Course**  
**M.Ch. Cardiovascular & Thoracic Surgery**

**Edition 2016-17**

## **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**  
**M.Ch. Cardiovascular & Thoracic Surgery (9380)**

**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 50<sup>th</sup> 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 40<sup>th</sup> percentile. In respect of candidates with benchmark disabilities specified under the Rights of Persons with Disabilities Act, 2016, the minimum marks shall be at 45<sup>th</sup> percentile for General Category and 40<sup>th</sup> 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 31<sup>st</sup> 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. Cardiovascular & 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.

The M.Ch. residents 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 posted in the department of Plastic & Reconstructive Surgery by rotation.

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 specialities.

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.

### **ELIGIBILITY TO APPEAR FOR UNIVERSITY EXAMINATION**

1. **Work diary or Logbook:** Every candidate shall maintain a work diary for recording his/her participation in the training program conducted in the department. The work diary and logbook shall be verified and certified by the Department Head and Head of the Institution.
2. Every student would be required to present one poster presentation, to read one paper at a National/State Conference and to have one research paper which should be published/accepted for publication/ sent for publication to an indexed journal during the period of his/her post graduate studies so as to make him/her eligible to appear at the Post Graduate Degree Examination
3. **Attendance:** Every candidate shall have fulfilled the requirement of 80% attendance during each academic year of the postgraduate course (as per MCI rules).

### **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 Cardio Vascular & Thoracic Surgery

**Paper-II** : Surgical Skills in Cardio Vascular & Thoracic Surgery

**Paper-III** : Investigative Cardio Vascular & Thoracic Surgery

**Paper-IV** : Recent advances in Cardio Vascular & Thoracic Surgery

### **(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 super-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, Instruments/Radiology/Pathology/Bones & Splints / Operations (5 marks each) and Viva examination of 75 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.

## **M.Ch. Cardiovascular & Thoracic Surgery (CVTS) (9380)**

### **CURRICULUM**

M.Ch. Cardio Vascular & Thoracic Surgery The infrastructure and faculty of the department of Cardio Vascular and Thoracic Surgery will be as per MCI guidelines.

### **GOALS**

The goal of M.Ch. course is to produce a competent CVTS surgeon who:

- Recognizes the health needs of adults and carries out professional obligations in keeping with principles of National Health Policy and professional ethics;
- Has acquired the competencies pertaining to cardiothoracic surgery that are required to be practiced in the community and at all levels of health care system;
- Has acquired skills in effectively communicating with the patients, family and the community;
- Is aware of the contemporary advances and developments in medical sciences.
- Acquires a spirit of scientific enquiry and is oriented to principles of research methodology; and
- Has acquired skills in educating medical and paramedical professionals.

### **OBJECTIVES**

At the end of the MCh course in Cardio Vascular and Thoracic Surgery, the student should be able to:

- Recognize the key importance of medical problems in the context of the health priority of the country;
- Practice the specialty of CVTS in keeping with the principles of professional ethics; Identify social, economic, environmental, biological and emotional determinants of adult Cardiothoracic disorders and know the therapeutic, rehabilitative, preventive and promotion measures to provide holistic care to all patients; Take detailed history, perform full physical examination and make a clinical diagnosis;
- Perform and interpret relevant investigations (Imaging and Laboratory); Perform and interpret important diagnostic procedures; Diagnose illnesses in adults based on the analysis of history, physical examination and investigative work up;
- Plan and deliver comprehensive treatment for illness in adults using principles of rational drug therapy;
- Plan and advise measures for the prevention of diseases; Plan rehabilitation of adults suffering from chronic illness, and those with special needs;
- Manage emergencies efficiently;
- Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the assigned situation;
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities;
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counselling and giving health education messages to patients, families and communities.
- Develop skills as a self-directed learner, recognize continuing educational needs; use appropriate learning resources, and critically analyze relevant published literature in order to practice evidence-based medicine; Demonstrate competence in basic concepts of research methodology and epidemiology;



- Facilitate learning of medical/nursing students, practicing physicians, para-medical health workers and other providers as a teacher-trainer; Play the assigned role in the implementation of national health programs, effectively and responsibly;
- Organize and supervise the desired managerial and leadership skills; Function as a productive member of a team engaged in health care, research and education.

## **SYLLABUS**

### **Fundamentals**

- History of Cardiac Surgery
- Surgical Anatomy of the Heart
- Cardiac Surgical Physiology
- Cardiac Surgical Pharmacology
- Pathology of Cardiac Surgery

### **Theory**

- **Cardiopulmonary Bypass, Myocardial Protection and Circulatory Support**
  - The management of a patient undergoing cardiopulmonary bypass.
  - The management of myocardial protection during cardiac surgery.
  - The management of a patient requiring circulatory support.
- **Critical Care and Post-operative Management**
  - The management of critically ill cardio-vascular & thoracic surgical patients in the pre and post-operative periods
- **Ischaemic Heart Disease**
  - Indications for Revascularization
  - Myocardial Revascularization with Percutaneous Devices
  - Myocardial Revascularization with Cardiopulmonary
  - Myocardial Revascularization without Cardiopulmonary Bypass
  - Myocardial Revascularization with Carotid Artery Disease
  - Myocardial Revascularization after Acute Myocardial Infarction
  - Minimally Invasive Myocardial Revascularization
  - Coronary Artery Reoperations
  - Ischemic Mitral Regurgitation
  - Left Ventricular Aneurysm
  - The assessment and management of patients with coronary heart disease, including elective and emergency presentations. To include competence in both primary and secondary procedures, and where appropriate to include off pump and on pump strategies and arterial revascularisation
  - The preliminary assessment and initial management of patients with complications of myocardial infarction, including mitral regurgitation, aneurysm and septal defects. To include operative management in appropriate situations. Full competence in operative management of complex cases to be developed.
- **Heart Valve Disease**
  - The assessment and management of patients with valvular heart disease; including both isolated and combined aortic and mitral valve disease, Tricuspid valve disease.
  - The assessment and management of patients with combined coronary and valvular heart disease, including operative management.

- Full competence in operative management of complex cases including mitral valve repair and secondary procedures to be developed.
- **Aortovascular Disease**
  - Aortic Dissection
  - Ascending aortic aneurysm
  - Aneurysm of the aortic arch
  - Descending a thoracoated aneurysm
  - Endo Vascular Management
  - The preliminary assessment and initial management of patients with acute dissection of the ascending aorta. To include operative management in appropriate situations.
  - Full competence in operative management of complex cases to be developed.
- **Congenital Heart disease**
  - Acyanotic congenital heart disease - Clinical presentation, Physiology medical & surgical management.
  - Cyanotic heart disease - Clinical presentation, Physiology medical & surgical management.
- **Cardiothoracic Trauma**
  - The assessment and management of patients with minor and major cardio-vascular & thoracic trauma. To include operative management in appropriate situations.
  - Full competence in the operative management of complex cases including great vessel injury to be developed.
- **Minimally invasive cardiac surgery -**
  - Equipment techniques, complications, outcomes.
- **Cardiac catheter interventions**
- **General Management of a Patient Undergoing Thoracic Surgery**
  - Patient selection and determination of suitability for major thoracic surgery and the pre- and post-operative management of a thoracic surgical patient.
  - The assessment and management of a patient by bronchoscopy including foreign body retrieval.
  - The assessment and management of a patient by mediastinal exploration.
  - Competence in performing appropriate thoracic incisions.
- **Neoplasms of the Lung**
  - The assessment and management of lung cancer, including the scientific basis of staging systems and techniques used in the determination of stage and fitness for surgery.
  - An understanding of the role of surgical treatment in the multidisciplinary management of lung cancer and other intrathoracic malignant diseases, including an appreciation of the principles of other treatment modalities and their outcomes
- **Disorders of the Pleura**
  - The assessment and management of patients with pleural disease; including pneumothorax and empyema, and including both VATS and open strategies.
- **Disorders of the Chest Wall**
  - The assessment and management of patients with chest wall abnormalities, infections and tumours.

- **Disorders of the Diaphragm**
  - The assessment and management of patients disorders of the diaphragm, including trauma to the diaphragm.
- **Emphysema and Bullae**
  - The assessment and management of patients with emphysematous and bullous lung disease; including surgical management if appropriate and utilising both VATS and open strategies.
  - Full competence in operative management of complex cases, including lung reduction surgery, to be developed.
- **Disorders of the Pericardium**
  - The assessment and management of patients with disorders of the pericardium and pericardial cavity; including surgical management if appropriate and utilising both VATS and open strategies.
- **Disorders of the Mediastinum**
  - The assessment and management of patients with mediastinal tumours and masses; including surgical management if appropriate and utilising both VATS and open strategies.
- **Disorders of the Airway**
  - The assessment and management of patients with disorders of the major airways.
  - Including operative management in suitable cases.
  - Full competence in operative management of complex cases, including tracheal resection, to be developed.

### **Practical**

- History, examination and writing of records:
- History taking should include the background information, presenting complaints and the history of present illness, history of previous illness, family history, social and occupational history and treatment history.
- Detailed physical examination should include general physical and CVS examination
- Skills in writing up notes, maintaining problem-oriented medical records (POMR), progress notes, and presentation of cases during ward rounds, planning investigation and making a treatment plan should be taught.
- The resident should fortify the skills of hemodynamic monitoring in emergency situations and should learn procedures like arterial line insertion, temporary venous pacing, central line insertion, pericardiocentesis, re-exploration for bleeding, intra aortic balloon pump insertion, swan ganz catheter insertion, knowledge of ventilators etc.
- The resident should assist in procedures like coronary artery bypass grafting, valve replacements, congenital heart surgeries, aortic surgeries, thoracic surgeries and closed procedures etc.
- Other CVTS procedures like Peripheral Vascular Surgery, Thymectomy, and Trauma Surgery.

### **Clinical Teaching**

- General physical and CVS examination should be mastered. The resident should be able to analyse the history and correlate it with clinical findings with the assistance of basic investigations like ECG, X-Ray, Echocardiography, CT Scans, Coronary and CT Angiography etc. Besides, during the bed side rounds he/she should learn to improvise on management skills, haemodynamic monitoring, fluid balance, arterial blood gas analysis and identification of cardiac emergencies like tamponade, arrhythmias etc.

- **Add CVTS procedures**

## **TEACHING PROGRAMME**

- **General Principals**

- Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training is skills oriented.
- Learning in postgraduate program is essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

- **Teaching Sessions**

- The teaching methodology consists of bedside discussions, ward rounds, case presentations, clinical grand rounds, statistical meetings, journal club, lectures and seminars. Along with these activities, trainees should take part in inter-departmental meetings i.e clinico-pathological and clinico-radiological meetings that are organized regularly.
- Trainees are expected to be fully conversant with the use of computers and be able to use databases like the Medline, Pubmed etc.
- They should be familiar with concept of evidence based medicine and the use of guidelines available for managing various diseases.

- **Teaching Schedule**

- Following is the suggested weekly teaching programme in the Department of CVTS:

<b>Sr. No.</b>	<b>Description</b>	<b>Frequency</b>
1.	Bedside clinical case	Once a week
2.	Seminar / Journal club	Once a week
3.	Grandround	Once a week
4.	Cath conference	Once a week
5.	Session on ECG's/ X-ray's / CT Scan/MRI	Once a month
6.	Session on Histopathology Reports	Once a month
7.	Session on echocardiography / TMT/ Holter of one hour per week duration.	Once a month
8.	There should be 3 teaching sessions at least	Once a week

- Each unit should have regular teaching rounds for residents posted in that unit. The rounds should include bedside case discussions, file rounds (documentation of case history and examination, progress notes, round discussions, investigations and management plan), interesting and difficult case unit discussions.
- Central hospital teaching sessions will be conducted regularly and M.Ch residents would present interesting cases, seminars and take part in clinico-pathological case discussions.

- **Conferences & Papers**

- A resident must attend at least one conference per year.
- One paper must be presented in at least 3 years.

## **SCHEDULE OF POSTING**

- **Ward & OPD Duties (12 months)**
  - Duties should include diagnostic case workup and day to day management of pre & post operative cases. The resident should acquire the experience in the management of post surgical patients on the critical care, high dependency and post operative wards and to be able to managed such patients with appropriate supervision.
- **Recovery posting (6 months)**
  - To gain experience in aspects of the management of surgical patients, the resident should learn prompt diagnosis and management of cardiac emergencies. He should fortify the skills of hemodynamic monitoring in emergency situations and should learn procedures like arterial line insertion, temporary venous pacing, central line insertion, pericardiocentesis, intra aortic balloon pump insertion, timing and management. Swan ganz catheter insertion, use of defibrillator and should learn to do the tracheostomy, chest aspiration, chest drain insertion and management.
- **Operation Theatre Posting (6 months)**
  - During this stage, the trainee will gain competence in a number of technical skills and procedures. He should gain experience in the practical applications of cardiopulmonary bypass, myocardial protection and circulatory support. To understand the science and technology that underpins these disciplines. He should learn Saphenous vein harvest, Median sternotomy, Surgical re-explorations for bleeding or temponade and heart valve replacement. He should also get exposure of the thoracic and vascular procedures.
- **Cardiology Posting (2 months)**
  - The resident should acquaint himself with invasive and non invasive procedures.
  - He should learn the principles and fundamentals of echocardiography. He should observe trans-esophageal echo and also masters the skills of interpreting TMT, Stress Test and Holter monitoring.
  - In the cath lab, he should learn procedures like Coronary Angiography, PTCA, Balloon Valvoloplasty, Cardiac Catheterization Data, Insertion of Temporary and Permanent Pacemaker.
- **Operation Theatre Posting (6 months)**
  - The resident should develop the ability to function as a competent assistant at commonly performed cardio-thoracic operations including CABG, Valve Replacement and Lung Resection. He should learn to harvest the arterial grafts, preparation for and management of cardio-pulmonary bypass, proximal aortovenous coronary anastomosis, thoracic incisions and surgery for benign and malignant conditions of the lungs.
  - He should also gain experience in the management of vascular surgical procedures and chest trauma.
- **Recovery posting (6 months)**
  - The resident should work as a part of multi-professional, multi-disciplinary team in the management of a patient requiring complex critical care. He should be able to manage the haemodynamics of post surgical patients, cardiac arrhythmias, haemostasis, acid base balance, ventilatory support, GIT renal and hepatic physiology, nutrition and temperature regulation.

- He should also have good knowledge of the drugs used like inotropes, vasodilators, vaso-constrictors, anti-arrhythmics drugs, haemostatic drugs, anti-platelets, anti-coagulants, thrombolytic drugs, antibiotics and anaesthetic agents.
- He should also be well aware of the anti-microbial treatment and policies. He should be able to analyze and interpret the post operative and critical care charts with documentation.

### LOG BOOK

- The student will maintain a log book of all the procedures.
- The student will be graded as per his clinical & technical skill performance.
- The student has observed the procedures as an assistant.
- The part of the procedures performed under direct supervision.
- The procedure performed with assistance.
- The purpose of training is to grade the skills and evaluate the ability to take decisions.

### RESEARCH PROJECTS

- Every candidate shall carry out work on an assigned research project under the guidance of a recognized postgraduate teacher, the project shall be written and submitted in the form of a Project.
- Every candidate shall submit project plan to university within time frame set by university
- Thesis shall be submitted to the University within 9 months of joining the course.
- The student will (i) identify a relevant research problem, (ii) conduct a critical review of literature, (iii) formulate a hypothesis, (iv) determine the most suitable study design, (v) state the objectives of the study, (vi) prepare a study protocol, (vii) undertake a study according to the protocol, (viii) analyze and interpret research data, and draw conclusion, (ix) write a research paper.

### ASSESSMENT

All the PG residents are assessed daily for their academic activities and also periodically.

#### ○ **General Principles**

- The assessment is valid, objective and reliable It covers cognitive, psychomotor and affective domains.
- Formative, continuing and summative (final) assessment is also conducted in theory as well as practical. In addition, research project is also assessed separately.

#### ○ **Formative Assessment**

- The formative assessment is continuous as well as end of term.
- The former is based on the feedback from the consultants concerned.
- Formative assessment will provide feedback to the candidate about his/her performance and help to improve in the areas they lack.
- Record of internal assessment should be presented to the board of examiners for consideration at the time of final examination.

#### ○ **Internal Assessment**

- The performance of the resident during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1.	Personal Attributes	20

2.	Clinical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

- **Personal attributes**
  - **Behaviour and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
  - **Motivation and Initiative:** Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.
  - **Honesty and Integrity:** Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
  - **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.
- **Clinical Work**
  - **Availability:** Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
  - **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.
  - **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
  - **Clinical Performance:** Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.
- **Academic Activity**
  - Performance during presentation at Journal club/ Seminar/Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.
- **End of term theory examination conducted at end of 1st, 2nd year and after 2 years 9 months**
- **End of term practical/oral examinations after 2 years 9 months.**
  - Marks for personal attributes and clinical work should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.
  - Marks for academic activity should be given by the all consultants who have attended the session presented by the resident.
  - The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.
- **Summative Assessment**
  - Ratio of marks in theory and practical will be equal.
  - The pass percentage will be 50%.
  - Candidate will have to pass theory and practical examinations separately.

### A. Theory examination

Code	Title	Marks
	<b>Paper-I</b> : Basic Sciences as related to Cardio Vascular & Thoracic Surgery	100
	<b>Paper-II</b> : Surgical Skills in Cardio Vascular & Thoracic Surgery	100
	<b>Paper-III</b> : Investigative Cardio Vascular & Thoracic Surgery	100
	<b>Paper-IV</b> : Recent advances in Cardio Vascular & Thoracic Surgery	100
	<b>Total</b>	<b>400</b>

### B. Practical & Viva-Voce Examination

Code	Title	Marks
	Long Case (1)	100
	Short Cases (2) 75 marks each	150
	Procedure	50
	Grand Viva including Instruments/ Radiology/Pathology	100
	<b>Total</b>	<b>400</b>

### JOB RESPONSIBILITIES

#### ○ Outdoor Patient (OPD) Responsibilities

- The working of the residents in the OPD should be fully supervised.
- They should evaluate each patient and write the observations on the OPD card with date and signature.
- Investigations should be ordered as and when necessary using prescribed forms.
- Residents should discuss all the cases with the consultant and formulate a management plan.
- Patient requiring admission according to resident's assessment should be shown to the consultant on duty.
- Patient requiring immediate medical attention should be sent to the casualty services with details of the clinical problem clearly written on the card.
- Patient should be clearly explained as to the nature of the illness, the treatment advice and the investigations to be done & results & prognosis.
- Resident should specify the date and time when the patient has to return for follow up.

#### ○ In-Patient Responsibilities

- Each resident should be responsible and accountable for all the patients admitted under his care. The following are the general guidelines for the functioning of the residents in the ward:
- Detailed work up of the case and case sheet maintenance:
- He/She should record a proper history and document the various symptoms.
- Perform a proper patient examination using standard methodology. He should develop skills to ensure patient comfort/consent for examination. Based on the above evaluation he/she should be able to formulate a differential diagnosis and
- prepare a management plan. Should develop skills for recording of medical notes, investigations and be able to properly document the consultant round notes.
- To organize his/her investigations and ensure collection of reports.
- Bedside procedures for therapeutic or diagnostic purpose.
- Presentation of a precise and comprehensive overview of the patient in clinical rounds to facilitate discussion with senior residents and consultants.
- To evaluate the patient twice daily (and more frequently if necessary) and maintain a progress report in the case file.



- To establish rapport with the patient for communication regarding the nature of illness and further plan management.
  - To write instructions about patient's treatment clearly in the instruction book along with time, date and the bed number with legible signature of the resident.
  - All treatment alterations should be done by the residents with the advice of the concerned consultants and senior residents of the unit.
- **Admission day**
    - Following guidelines should be observed by the resident during admission day.
    - Resident should work up the patient in detail and be ready with the preliminary necessary investigations reports for the evening discussion with the consultant on duty.
    - After the evening round the resident should make changes in the treatment and plan out the investigations for the next day in advance.
- **Doctor on Duty**
    - Duty days for each Resident should be allotted according to the duty roster.
    - The resident on duty for the day should know about all sick patients in the wards and relevant problems of all other patients, so that he could face an emergency situation effectively.
    - In the morning, detailed over (written and verbal) should be given to the next resident on duty. This practice should be rigidly observed.
    - If a patient is critically ill, discussion about management should be done with the consultant at any time.
    - The doctor on duty should be available in the ward through out the duty hours.
- **Care of Sick Patients**
    - Care of sick patients in the ward should have precedence over all other routine work for the doctor on duty.
    - Patients in critical condition should be meticulously monitored and records maintained.
    - If patient merits ICU care then it must be discussed with the senior residents and consultants for transfer to ICU.
- **Resuscitation skills**
    - At the time of joining the residency programme, the resuscitation skills should be demonstrated to the residents and practical training provided at various work stations.
    - Curriculum MCh. (Cardio-Vascular and Thoracic Surgery) Residents should be fully competent in providing basic and advanced cardiac life support.
    - They should be fully aware of all advanced cardiac support algorithms and be aware of the use of common resuscitative drugs and equipment like defibrillators and external cardiac pacemakers.
    - The resident should be able to lead a cardiac arrest management team.
- **Discharge of the Patient**
    - Patient should be informed about his/her discharge one day in advance and discharge cards should be prepared 1 day prior to the planned discharge.
    - The discharge card should include the salient points in history and examination, complete diagnosis, important management decisions, hospital course and procedures done during hospital stay and the final advice to the patient.

- Consultants and M.Ch Residents should check the particulars of the discharge card and counter sign it.
  - Patient should be briefed regarding the date, time and location of OPD for the follow up visit.
- **In Case of Death**
- In case it is anticipated that a particular patient is in a serious condition, relatives should be informed about the critical condition of the patient beforehand.
  - Residents should be expected to develop appropriate skills for breaking bad news and bereavements.
  - Follow up death summary should be written in the file and face sheet notes must be filled up and the sister in charge should be requested to send the body to the mortuary with respect and dignity from where the patient's relatives can be handed over the body.
  - In case of a medico legal case, death certificate has to be prepared in triplicate and the body handed over to the mortuary and the local police authorities should be informed.
  - Autopsy should be attempted for all patients who have died in the hospital especially if the patient died of an undiagnosed illness.
- **Beside Procedures**
- The following guidelines should be observed strictly:-
    - Be aware of the indications and contraindications for the procedure and record it in the case sheet. Rule out contraindications like low platelet count, prolonged prothrombin time, etc.
    - Plan the procedure during routine working hours, unless it is an emergency.
  - Explain the procedure with its complications to the patient and his/her relative and obtain written informed consent on a proper form. Perform the procedure under strict aseptic precautions using standard techniques. Emergency tray should be ready during the procedure.
  - Make a brief note on the case sheet with the date, time, nature of the procedure and immediate complications, if any.
  - Monitor the patient and watch for complications(s).
- **OT responsibilities**
- The 1st year resident observes the general layout and working of the OT, understands the importance of maintaining sanctity of the OT, scrubbing, working and sterilization of all the OT Instrument, know how of cardio-pulmonary bypass pump. He/ She is responsible shifting of OT patients, for participating in surgery as 2nd assistant and for post operative management of patient in recovery and in ward.
  - The 2nd year resident is responsible for pre op work up of the patient, surgical planning and understanding the rationale of surgery. He/she is the first assistant in surgery and is responsible for anticipating intra op and post op complications and managing them. The final year resident should be able to perform minor/medium surgeries under observation and assist in medium/major/extra major surgeries.
  - He/she should be able to handle all emergencies and post op complications under observations / independently and is responsible for supervision and guidance of his/her juniors.
- **Medico-Legal Responsibilities of the Residents**

- All the residents are given education regarding medico-legal responsibilities at the time of admission in a short workshop.
- They must be aware of the formalities and steps involved in making the correct death certificates, mortuary slips, medico-legal entries, requisition for autopsy etc.
- They should be fully aware of the ethical angle of their responsibilities and should learn how to take legally valid consent for different hospital procedures & therapies.
- They should ensure confidentiality at every stage.

## **SUGGESTED BOOKS AND JOURNALS**

### ○ **Books**

- Cardiac Surgery in the Adult by Lawrence H. Cohn, MD.
- Sabiston and Spencer's Surgery of the Chest: Expert Consult - Online and Print (2-Volume Set) (Surgery of the Chest (Sabiston)) by Frank Sellke MD, Pedro J. del Nido MD, Scott J. Swanson MD.
- Rutherford's Vascular Surgery, 2-Volume Set: Expert Consult: Print and Online (Vascular Surgery (Rutherford)(2 Vol.)) by Jack L. Cronenwett MD, Wayne Johnston.
- Kirklin / Barrat-Boyes : Cardiac Surgery, 2 Vols. 2003.
- Shield : Genral Thoracic Surgery, 2 Vols. 7<sup>th</sup> /2009.
- Khonsari : Cardiac Surgery, 4<sup>th</sup> / 2008
- Drugs for the heart by Lionel H. Opie.
- Shamroth's An Introduction to Electrocardiography.
- Jonas, Richard A : Comprehensive surgical management of congenital heart disease, 2004.
- Kaiser : Mastery of cardiothoracic surgery, 2<sup>nd</sup> /2007.
- Manual of Peri-operative Care In Adult Cardiac Surgery Fourth Edition by Robert M. Bojar.

### ○ **Journals**

- Annals of Thoracic Surgery.
- European Journal of Cardiothoracic Surgery
- Journal of Thoracic & Cardiovascular Surgery
- Asian Cardiovascular & Thoracic Annals
- Seminars in Thoracic and Cardiovascular Surgery
- Circulation
- Indian journal of cardiothoracic & vascular surgery
- Pediatric Cardiology
- Annals of Pediatric cardiology

**MODEL PAPER**

**M.Ch.- 9381**

**Cardiovas.Surg.-I**

**M.Ch. Examination Month, Year  
CARDIOVASCULAR & THORACIC SURGERY**

**Paper - I**

**Basic Sciences as related to Cardio Vascular & Thoracic Surgery**

**Time : Three Hours**

**Maximum Marks : 100**

Attempt All questions

All questions carry equal marks

Draw diagrams wherever necessary

- Q.1 Describe the development of pulmonary venous system and left atrium?
- Q.2 What are the various organisms responsible for Nosocomial infections in recovery rooms and intensive care units?
- Q.3 Discuss the surgical anatomy of the normal conduction system and outline its importance in various cardiac surgical procedures?
- Q.4 Discuss the anatomy of the aortic root.
- Q.5 Describe briefly the regulation of thrombosis by the endothelium?
- Q.6 Describe the anatomy and surgical exposure of the carotid bifurcation and internal carotid artery?
- Q.7 Describe the pathology of lung cancer?
- Q.8 Describe in brief development of inter-ventricular septum?
- Q.9 Discuss the anatomy of diaphragm with special reference to different diaphragmatic hernias?
- Q.10 Describe Broncho-pulmonary segments?

**MODEL PAPER**

**M.Ch.- 9382**

**Cardiovas.Surg.-II**

**M.Ch. Examination Month, Year  
CARDIOVASCULAR & THORACIC SURGERY**

**Paper - II  
Surgical Skills in Cardio Vascular & Thoracic Surgery**

**Time : Three Hours**

**Maximum Marks : 100**

Attempt All questions

All questions carry equal marks

Draw diagrams wherever necessary

- Q.1 Describe the various posterior mediastinal masses and their surgical treatment?
- Q.2 Describe the atrial septal defect surgery using thoracotomy approach?
- Q.3 Discuss the closure of ventricular septal defect?
- Q.4 Discuss the etiopathology of myasthenia gravis and outline the management of a patient admitted with myasthenic crisis?
- Q.5 Enumerate the causes of continuous cardiac murmur?
- Q.6 Discuss the various surgical options in management of DORV?
- Q.7 Discuss the management of anomalous left coronary artery from pulmonary artery?
- Q.8 Discuss the management options in tight mitral stenosis?
- Q.9 Discuss different types of arterial conduits used during coronary artery bypass grafting?
- Q.10 Discuss the factors affecting the haemodynamic performance of mechanical heart valves?

**MODEL PAPER**

**M.Ch.- 9383**

**Cardiovas.Surg.-III**

**M.Ch. Examination Month, Year  
CARDIOVASCULAR & THORACIC SURGERY**

**Paper - III  
Investigative Cardio Vascular & Thoracic Surgery**

**Time : Three Hours**  
Maximum Marks : 100

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

- Q.1 Describe the digital plethysmography?
- Q.2 Discuss the synthetic patches and grafts used in cardiac surgery?
- Q.3 Discuss the role of “Blood Components” in open heart surgery?
- Q.4 Discuss the virtual bronchoscopy?
- Q.5 Discuss the diagnosis and management of prosthetic valve endocarditis?
- Q.6 Describe the evolution of porcine xenografts?
- Q.7 Describe the atrial natriotic peptide?
- Q.8 Discuss the oncogenes in lung cancer?
- Q.9 Discuss the types of vena caval filters and their indicators?
- Q.10 Discuss the diagnostic tools for the dissection of the aorta?

**MODEL PAPER**

**M.Ch.- 9384**

**Cardiovas.Surg.-IV**

**M.Ch. Examination Month, Year  
CARDIOVASCULAR & THORACIC SURGERY**

**Paper - IV**

**Recent advances in Cardio Vascular & Thoracic Surgery**

**Time : Three Hours**

**Maximum Marks : 100**

Attempt All questions

All questions carry equal marks

Draw diagrams wherever necessary

- Q.1 Describe the valve conduits in cardiac surgery?
- Q.2 Discuss early detection of lung cancer and role surgery in Small-cell lung cancer?
- Q.3 Describe the advantages of early correction of various congenital defects?
- Q.4 Discuss the various factors governing the early and late patency of different conduits used in coronary bypass grafting?
- Q.5 Discuss the role of intra aortic balloon pump in cardiac surgery?